TESTING OF CONSISTENT TRENDS IN STOCK PERFORMANCE IN THE NAIROBI SECURITIES EXCHANGE.

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DECLARATION

This thesis is my original work and has not been submitted, to the best of my knowledge, for a degree in any other University.

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To all of you may God bless all of you in great ways.

All glory to God.

DEDICATION

To my wife and sons

ABSTRACT

This research set out to test for the presence of consistent stock performance as an anomaly in the Nairobi Securities Exchange (NSE) by employing monthly closing average stock price data that is balanced for 32 out of the 56 stocks listed in the NSE from years 2001 to 2010 as the sample. Frequency tests were employed to identify consistent stock trends, t-tests were employed to test significance of abnormal returns. Spearman rank correlation, standard deviation, range and proportionate runs metrics were employed to test volatility of stock prices. Runs test was employed to test serial correlation of stock returns. Simple regression equation is employed to measure the extent of cause effect relationship of market anomalies on consistent stock performance. Simple regression modeling was also employed to test the significance of the cause effect relationship of stock valuation on consistent stock performance. Multi-regression modeling was employed to test the significance that underlying company characteristics have on consistently performing stocks. The results indicate that there is weak evidence of consistent trends in stock performance in the NSE. The few consistently performing stocks in the NSE exhibited insignificant abnormal returns, no serial correlation and high stock price volatility except for consistent best performing stocks which displayed low stock price volatility. Consistent performing stocks are anomalous to some limited extent for momentum and seasonality. The results also indicated that the valuation of stocks had no influence on consistent stock performance. The results indicated that despite the multi-regression prediction model being a bad fit, there were some underlying firm characteristics with significant influence of consistent stock performance including: book value of stocks, dividend yield, market return and volume of stocks traded. These results indicate that there is insignificant presence of consistent stock performance which confirms that NSE is weak form efficient.

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LIST OF ABBREVIATIONS

AIMS - Alternative Investment Market Segment

AMEX – American Stock Exchange

APT – Arbitrage pricing theory

CAPM – Capital asset pricing model

CBK - Central Bank of Kenya

CDSC - Central Depository and Settlement Corporation

CMA – Capital Markets Authority

CRSP – Centre for Research on Security Prices

E/P – Earnings / Price ratio

GOK - Government of Kenya

IFC - International Finance Corporation

MIM - Main Investment Market

NSE - Nairobi Securities Exchange (formerly Nairobi Stock Exchange)

NYSE – New York Stock Exchange

P/E – Price / Earnings ratio

ANOVA – Analysis of Variance

GARCH – Generally Autoregressive Conditional Heteroscedasticity

B/M - Book to Market Ratio

CHAPTER ONE INTRODUCTION

1.1 Background of the Study

This section covers testing of consistent trends in stock performance in the Nairobi Stock Exchange (NSE) during the years 2001 to 2010.

1.1.1 Financial Markets in Africa

Financial markets consist of money markets in which short term instruments are transacted and capital markets which trade in long term securities. The roles of capital markets include: long term funds mobilization, facilitation of competitive pricing for efficient resource allocation, broadening the ownership of firms and for provision of relevant signals for investment appraisal (Odundo, 2004).

In year 2009 the size of Nairobi Securities Exchange (NSE) based on market capitalization ranked 5th in Africa with the Johannesburg Stock Exchange at the top with its market capitalization constituting 76.2% of African stock markets. NSE market capitalization was only 1.04% of Africa's as per Appendix 4 (CMA, 2010). The key ingredients for enhancing the capacity and efficiency of stock markets are integration, automation, innovation and openness to international investors (Odundo, 2004) which the NSE has been implementing with time (Mwangi, 2009).

1.1.2 Efficient Markets and Anomalies

Finance theory assumes that stock markets have a large number of rational profit maximizing investors who are actively competing to outdo the each other in predicting the future stock prices. The intense competition causes new information to be instantaneously reflected in stock prices and thus hinders any participant from possessing superior and profitable information (Cuthbertson, 2005). If the flow of information is unimpeded, the future period's price changes will only reflect future news and not the current or past news (Malkiel, 2003). News by definition is unpredictable and random and in markets that are efficient, the average stock is fairly priced (Pearce, 1987). New information can be in the form of news, announcements, expectations, opinions, stories, and even lack of news (Stefan, 2009).

Stock price movement should be commensurate with release of relevant news items (Pearce, 1987). Stock price movement provides managers with a metric for evaluating their performance and provides important signals about efficient allocation of funds by firms (Pearce, 1987). In markets that are efficient, paid investment advisors are needed for identification of mispriced stocks as they present opportunity for significant abnormal returns (Khan, 2011). Estimation of stock price movement attempts to compute the discounted value of all the payments an investor expects to receive from a stock in a process referred to as fundamental analysis (Baresa *et al.*, 2012). Research has also

shown that certain fundamental variables complement or are even more important in explaining stock performance (Siqueira *et al*., 2012).

Fundamental analysts are interested deriving significant abnormal stock returns and thus focus on establishing the intrinsic or fundamental value of stocks for comparison with market value in order to identify a mismatch and an opportunity for investment if favorable or divestment if unfavorable (Cuthbertson, 2005). Value stocks are undervalued stocks whose market prices are temporarily low relative to their fundamental value while growth stocks are overvalued stocks whose market prices are temporarily higher than their fundamental value (Kelly *et al.*, 2008). When the market corrects itself, the value stock prices rise as the market price adjusts upwards towards the high intrinsic value. At the same time, the growth stock prices fall as their market prices adjust towards the low intrinsic value (Chou *et al*., 2011). The mismatch between intrinsic and market value of prices is caused by the behavior of irrational investors who depend on fads, euphoria and wrong information to make inappropriate investment decisions which are subsequently corrected by rational investors who focus on fundamental value (Engel and Morris, 1991).

Stock market efficiency is categorized into informational, operational and allocation efficiencies. Informational efficiency tests focus on the speed and extent to which stock prices fully reflect all available and relevant information (Khan, 2011). Operational

efficiency is concerned with whether investors can purchase transactional services at the lowest prices possible given the costs associated with their provision. Allocation efficiency is concerned with whether resources have been correctly allocated and requires both pricing and operational efficiencies (Samuels 1990; Bauer 2004).

Informational efficiency is further categorized into strong, semi-strong and weak forms. Efficiency in the strong form implies current stock prices fully reflect privately and publicly held information and an investor cannot outperform the market by possessing such information. Efficiency in the semi-strong form implies that current stock prices fully reflect all publicly released information. Efficiency in the weak form efficient postulates that past information and variables including underlying firm characteristics are fully reflected in current stock prices and should not aid in outperforming the market or predicting future prices (Fama, 1991).

A weak form efficient stock market should exhibit randomness in the occurrence of stock prices (Fama, 1991) which implies that efficient markets should exhibit: zero abnormal returns (Larson and Madura, 2003); zero serial correlation of stock returns (Watkins, 2003) and high stock price volatility that is commensurate with release of relevant news about the stocks (Cuthbertson, 2005). This research focuses on weak form efficiency of NSE since consistency of stock performance represents trends or patterns in stock price movement that should not persist in weak form efficient markets (Fama, 1991).

The contributors to stock price trends or patterns include information diffusion which refers new information not reaching all investors simultaneously but in delayed phases. New information will initially reach the informed professionals, then aggressive investors before finally it reaches less aggressive investors. The slow dissemination of news results in slow reaction to the news by investors and slow incorporation of the news in stock prices which creates trends or patterns in stock performance (Grinblatt and Moscowitz, 2004). Even if news is dispensed fast, some investors may delay when analyzing and synthesizing stock news resulting in under or lagged reaction and hence stock price trends (Malkiel, 2003).

Stocks with zero risk adjusted returns are deemed to provide fair value for their risk while anomalies manifest in non-zero risk adjusted returns (Fama, 1991). Anomalous stocks thus exhibit positive or negative risk adjusted returns and are deemed to provide more than fair or less than fair risk adjusted returns respectively (Khan, 2011). Anomalies are empirical results that appear to be inconsistent with the known theories of asset pricing models and permit investors to derive significant abnormal returns and may occur despite stock markets being efficient (Schwert, 2003). Common stock market anomalies include: size, value, momentum and overreaction anomalies (Kiem, 2008).

1.1.3 Consistent Winner and Loser Stock Performance

There are two definitions of consistent stock performance including the longitudinal or time series based and the cross sectional based. The longitudinal based defines consistent winner and loser stock performance as the existence of repetitive and outstanding positive or negative stock returns respectively for $2/3^{rds}$ of the study period (Grinblatt and Moscowitz 2004; Watkins 2003). The cross sectional based defines consistent winner and loser stock performance as stocks that rank repeatedly at the top and bottom of a stock return ranking relative to the ranking of other stocks (Alwathainani, 2011). Stock prices should occur in a random fashion in markets that are efficient which implies that consistent stock performance contradicts stock market efficiency and constitute an anomaly (Fama, 1991).

Consistent stock performance implies that realized stock returns have been less volatile and this generates patterns which provide reliable signals of a stock's underlying or intrinsic value (Watkins, 2003). There is a direct relationship between stock price movement or volatility and the release of news items about the stock which implies that consistent stock performance relates to reduced news items (Stefan 2009; Cuthbertson 2005). Consistent positive returns relate to low discounting rates while consistent negative returns relate to high discounting rates (Watkins, 2003).

Additional features of consistent stock performance include: exhibition of positive serial correlation of stock returns (stock returns of a certain sign in a period are followed by

returns of the same sign in the next period) hence consistency of performance and possible momentum anomaly (Watkins, 2003). Consistent stock performance also results in significant abnormal returns (Watkins, 2003). In markets that are efficient, the market value of stocks should be equal to the intrinsic or fundamental value which implies that consistent stock performance arises when there is a mispricing of stocks such that the market value of stocks has been driven away from the intrinsic value by the actions of irrational and uninformed investors (Engel and Morris, 1991).

1.2 STATEMENT OF THE PROBLEM

The NSE website indicates the top daily stock gainers and bottom daily stock losers that are based on ranking of stock returns. The fascinating issue is that some stocks repeatedly feature among the daily best and worst performers and thus possess features of consistently performing stocks. Other features of consistently performing stocks include significant abnormal returns, positive serial correlation and low stock price volatility.

Past empirical research findings show that NSE is weak form efficient and thus no consistent stock trends or patterns should occur unless there is an anomaly yet to be discovered and exploited. Features of weak form efficient stock markets include exhibition of zero abnormal returns, zero serial correlation of stock returns and high stock price volatility that is commensurate with release of relevant news.

This research investigates the existence of consistent stock performance in the NSE and the causes of such trends if they exist during the period of 2001 – 2010. Other research gaps and motivations behind this research include the uncertain cause effect relationships between stock market anomalies, stock valuation and underlying firm characteristics on consistent stock performance.

1.3 GENERAL OBJECTIVE OF THE STUDY

To test the existence of consistent trends in the performance of stocks listed in the NSE during the years 2001 to 2010.

1.4 SPECIFIC OBJECTIVES OF THE STUDY

1 To test the existence of consistent log and abnormal returns in the NSE during the years 2001 to 2010.

2 To examine whether a relationship exists between consistent stock performance and efficiency of NSE during the study period.

3 To assess whether consistently performing stocks in the NSE are related to the common market anomalies during the study period.

4 To assess the relationship between stock valuation and consistent stock performance stocks during the study period.

5 To examine whether there are some underlying firm characteristics with significant influence on consistent stock performance during the study period.

1.5 RESEARCH QUESTIONS

1 Are there consistent trends in log and abnormal returns in the NSE during the years 2001 to 2010?

2 Is there a relationship between consistent stock performance and efficiency of NSE during the study period?

3 Are consistently performing stocks in the NSE related to the common market anomalies during the study period?

4 Is there a relationship between stock valuation and consistent stock performance during the study period?

5 Are there some underlying firm characteristics with significant influence on consistently performing stocks during the study period?

1.6 SIGNIFICANCE OF THE STUDY AND CONTRIBUTION TO NEW KNOWLEDGE

This research contributes to the pool of knowledge as follows: it enhances the threshold of determining consistent winning and losing by requiring that returns of consistently performing stocks exceed 10% on a daily basis in order to qualify to be termed as consistent winners or losers (Larson and Madura, 2003). Otherwise stocks that exhibit consistent trends but do not meet the 10% threshold are regarded as consistent best or

worst performing stocks. Such outstanding stocks may outperform other stocks but do not qualify to be termed as winners and losers. The enhanced qualifications of consistent winners and losers can assist investors who are searching for stocks that yield both statistically and economically significant returns which cover cost of transacting in the NSE which amounts to 2.1% of the transaction value.

Consistent stock performance can be determined from occurrence of repeated outstanding stock return ranking also referred to as cross sectional returns. Consistent stock performance can also be determined from through occurrence of repeated positive or negative stock returns during a period also referred to as time series returns. This research combines the alternative definitions of consistent stock performance (cross sectional and time series based) to eliminate possible redundancies that may arise from use of the alternative definitions independently.

Proportional runs volatility metric is innovated in this research from the requirements volatility model of the Computer Science discipline for the purpose of measuring stock return volatility. The proportional runs volatility model is non-parametric and does not rely on measures of central tendency and hence suitable for non-normally distributed data such as stock returns.

Stock market investors benefit from this research as they are able to establish the existence of consistent stock performance in the NSE for the purpose of strategizing on how to exploit resultant profits if any.

Students of stock markets benefit from the findings of this research which include the establishing the existence of consistent trends in stock performance, relationship between consistent stock performance and efficiency status of NSE including stock market anomalies.

1.7 ASSUMPTIONS OF THE STUDY

During conversion of stock prices to returns, the study does not assume dummy values when the problem of thin trading or missing value occurs. This ensures that the research is based on the actual trading data and not assumed values. This research also assumes that NSE is efficient and thus no consistent stock trends should persist unless there is an anomaly. The research also assumes that the market exhibits zero abnormal returns and zero serial correlation of stock returns high stock price volatility that is commensurate with release of relevant news.

1.8 DEFINITION OF KEY TERMS

This section covers the definition of key terms as follows:

Table 1.10.1 Definition of Key Terms

Term	Definition
Consistent stock performance	1. Stocks that rank repeatedly at the top or bottom based on returns in the study period (cross sectional based definition) 2. Stocks with repetitive outstanding positive or negative returns for 2/3rds of the study period (longitudinal or time series based definition). 3. Consistent best and worst performing stocks whose daily stock returns are below 10% (combined cross sectional and time series based definitions).
Stock performance	1. Monthly stock log returns 2. Monthly abnormal stock returns: actual stock log returns less predicted or estimated stock returns. 3. Monthly excess stock returns: actual stock returns less the NSE index log returns
Winner stock	Stock whose daily positive returns exceeds 10%
Loser stock	Stock whose daily negative returns exceeds 10%

Efficient market hypothesis	1. In stock markets that are efficient new information is instantaneously incorporated in stock prices so that no investor is able to profit from having such information. 2. Weak form stock market efficiency is represented by randomness in the occurrence of stock prices whose features are: zero abnormal returns, zero serial correlation and high stock price volatility.
Volatility of stock prices	High volatility of stock prices is associated with weak form efficient stock markets and represents randomness in the occurrence of stock prices.
Serial correlation of stock returns	1. Correlation of current month stock returns against those of past months. 2. Negative serial correlation implies positive stock returns in a period is followed by negative returns in the next period and hence reversal. 3. Positive serial correlation implies that positive stock returns in a period are followed by positive stock returns in the next period and negative stock returns in a period are followed by negative stock returns in the next period hence return continuation or

	momentum. 4. Zero serial correlation implies randomness and unpredictability.
Stock market anomalies	1. Size anomaly postulates that small firms in terms of market capitalization yield higher risk adjusted returns than large firms. 2. Calendar anomalies postulate that there are certain times of the year when firms yield higher risk adjusted returns. 3. Momentum anomaly assumes that stocks that have been outperforming the market at certain times will continue with the trend for some subsequent time. 4. Overreaction anomaly postulates that investors sometimes over react to information which drives stock prices away from their fundamental value. This is subsequently corrected by a reversal in the price when rationality sets in.
Intrinsic value of stocks	1. Value anomaly postulates that firms with high book to value ratio (value firms) yield higher risk adjusted returns than firms with low book to market ratio (growth firms).

	2. Price to earnings ratio anomaly postulates that firms with low P/E ratio (payback period) yield higher risk adjusted returns than firms with high P/E ratio (payback period).
Underlying firm characteristics	1. Book value of assets, 2. Debt to equity ratio, 3. Earnings per share, 4. Dividend per share, 5. Capital expenditure, 6. Sales, 7. Risk free rate, 8. Market return, 9. Volume of stocks traded, 10. Dividend yield, 11. Dividend payout

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter is divided into two sub chapters that are based on the specific research objectives of consistency of stock performance, efficient market hypothesis, stock market anomalies, valuation and underlying firm characteristics.

2.1.1 Theory on Consistent Stock Returns

Consistency winner and loser stocks are defined as the repeated outstanding positive and negative stock returns for 2/3rds of the study period (Grinblatt and Moscowitz 2004; Watkins 2003). Alternatively consistent winner and loser stocks are defined as the repeated ranking of stocks at the top and bottom of a ranking that is based on stock returns periodically (Alwathainani, 2011). Consistent stock performance contradicts the theory of stock market efficiency in the weak form which postulates randomness in the occurrence of stock prices (Watkins, 2003).

Possible causes of consistent stock performance include information diffusion theory which postulates that stock market investors underreact to stock news due to delay in receiving the news and delay in synthesizing it on arrival. Randomness in the occurrence of stock prices is associated with rapid reaction to continuously occurring news by investors (Cuthbertson, 2005). Lag or delays between the release of stock news and

investor reaction leads to trends in stock price movement as the news is not immediately incorporated in stock prices hence consistent stock performance (Grinblatt and Moscowitz, 2004). Incidents of such lags in reaction to news by investors include stale limit orders which arise when uninformed investors who do not constantly monitor the market fail to withdraw earlier placed limit orders after release of news (Watkins 2003; Hou 2007). The slow diffusion of information amongst investors may also arise from high information and transaction costs with cause delay in investor reaction. Interference by noise traders who move stock prices away from their fundamental value based on wrong or insufficient information can cause lags between release of news and investor reaction (Cuthbertson, 2005). The speed at which new information is incorporated in stock prices is tested using the event study methodology of semi-strong form efficiency studies (Olweny, 2012).

Consistent stock performance can also be explained by investors who bought stocks at a basis below or above the current price who then experience capital gains in the form of price increases or capital losses in the form of price decreases which are persistent and cannot be undone by the effects of arbitrageurs or rational investors lead to consistent stock performance. This causes reference price updates that revert back to fundamentals through some feedback or reverse mechanism between the equilibrium stock price and its fundamental value (Grinblatt and Moscowitz, 2004).

If there are consistent stock price patterns, irrational investors may be led to believe that there is meaning in the patterns and this may cause them to invest in the stock if the patterns are positive (Watkins, 2003). The fact that consistent stock performance can exist in the NSE is a contradiction to its weak form status which has been empirically proven in the past (Magnusson and Wydick 2005; Mlambo and Biekpe 2007). This contradiction triggered the first objective of establishing whether consistent log returns exist in the NSE during the study period.

2.1.2 Theory on Consistent Abnormal Returns

Abnormal returns are defined as the difference between actual returns and predicted or estimated returns while excess returns are defined as the difference between actual returns and the risk free rate (Gillette, 2005). Excess returns can also be derived as the difference between actual returns and market return rather than risk free rate (Albanis and Batchelor, 1999). Market excess returns are derived as the difference between the market index and the risk free rate (Lishenga, 2011). Superior investment managers are those that possess the ability to consistently forecast positive market returns or select undervalued securities and thus generate consistent positive abnormal returns over time (Fabozzi *et al.*, 2010). Abnormal returns may occur occasionally but consistent abnormal returns should not be generated in a market is weak form efficient like NSE unless there is an anomaly yet to be exploited (Fama, 1998).

The average fund manager is believed not able to consistently out-perform the market through the generation of abnormal returns. This view is contradicted by another which believes that positive abnormal returns can be generated not by luck but through a fund manager's inherent skill of adjusting a portfolio's asset al.location mix appropriately (Fabozzi *et al.*, 2010). These contradictory views triggered the need for this research to test whether consistent abnormal returns exist in the NSE despite its weak form efficiency status (Magnusson and Wydick 2005; Mlambo and Biekpe 2007).

2.1.3 Past Studies on Consistent Stock Performance

Alwathainani (2011) studied whether consistent monthly returns were able to generate price momentum and subsequent reversals. He defined consistent winner and loser stocks that appeared repeatedly at the extreme top and bottom 40% respectively after ranking of stock returns in descending order over a period of 2 to 5 years. His finding indicate that across all horizons, consistent past price movements are useful in predicting future stock returns. The findings also indicated that past consistent losers earned higher returns compared to the inconsistently performing stocks and past consistent losers earned lower returns than the inconsistently performing stocks. The stock ranking method employed by Alwathainani (2011) prevented bullish or bearish market movements and manipulative market forces from influencing the results of consistent winner and loser stocks (Hanks, 2009). Alwathainani (2011) study also employed monthly data and minimized the problem of thin trading that is prevalent in daily data and results in numerous zero and

large non-zero returns which lead to non-normal distributions (Cowan and Sergeant, 1996). The Alwathainani (2011) ranking method of determining consistent winners and losers focuses on top and bottom ranking of stocks and does not consider the magnitude of performance. This research introduces magnitude of outstanding performance by requiring consistent winners and losers yield daily stock returns in excess of 10% (Larson and Madura, 2003). The current research also combines the alternative definitions of consistent stock performance unlike the Alwathainani (2011) study that concentrated on consistent top and bottom ranked stocks.

Grinblatt and Moskowitz (2004) studied the prediction of stock price movement from past stock returns by focusing on the role of stock return consistency and tax loss selling. They defined consistent winners and losers as stocks with positive or negative returns respectively in 8 out of 12 months or 15 out of 23 months or 2/3rds of the period. They used regression analysis to assess the power of past returns in predicting future returns and found that consistency of past stock returns was a crucial determinant of momentum profitability. Monthly stock return data was drawn from all listed securities in the CRSP database in years 1963 to 1999. They found that being a consistent winner was important economically as it could double the return premium as a result of belonging to the top decile in a ranking. They also found that consistent winners across all time horizons have positive and statistically significant coefficients which implied that the consistent winners outperform other stocks. They found that past consistent losers have negligible impact on

future stock returns. This study employed monthly data and thus avoided the problem of thin trading that is prevalent in daily stock data (Cowan and Sergeant, 1996). Arithmetic stock return data was employed in this study despite the fact that it significantly overstates financial performance especially in the long run (Henry and Kannan, 2008). The current research combines the alternative definitions of consistent stock performance unlike the Grinblatt and Moskowitz (2004) study that concentrated on stocks with consistent positive and negative returns.

Watkins (2003) studied overreaction by investors in the short run and defined winners and losers as stocks whose prices had appreciated or depreciated in the past for a study period of 6 to 12 days. He also defined consistency of stock performance to be the inverse of volatility, implying that realized returns were less volatile and provided more reliable signals of a firm‘s underlying value. Daily stock return data was derived from CRSP database for NYSE and AMEX listed securities from 1962-2001 period. He established that there existed an inverse relationship between the consistency of past returns and the future stock returns in the short run. Consistent past positive returns for over 6 to 12 days, generated negative returns over the next 1 to 4 weeks. He attributed this relationship to the fact that investors perceived stocks with consistent positive returns to have released all favorable information which the market had utilized. He also established seasonality effects in consistency of past returns which were more pronounced the month of January compared to other months and that it interacted

strongly with size, momentum and share turnover. Watkins (2003) also found that high turnover stocks in terms of trading volume have tremendous returns to consistency and that highly visible, high turnover and consistent stocks are likely to attract the attention and reaction of investors. He also established that negative consistency leads to abnormally high returns in the short term. The daily data employed by Watkins, (2003) is vulnerable to thin trading problem and the occurrence of numerous zero and large non-zero returns which causes data not to be randomly distributed. Insertion of dummy values when the problem of thin trading is encountered is common practice which results in data that is not realistic. The current research that employed monthly data and that has less noise and does not include dummy values. The current research combines the alternative definitions of consistent stock performance unlike the Watkins (2003) study that concentrated on stocks with consistent positive and negative returns.

2.2 Efficient Markets Hypothesis

Capitalism refers to the freedom of market participants to deploy assets as they deem fit at prices that are regarded as reasonable to market participants for the purpose of capital allocation (Ezra, 2009). Rational allocation of capital would arise if firms with viable investments are able to raise funds cheaply in the market by issuance of few shares at a high price. But if share prices are influenced by the whims and fads of irrational investors, the link between share prices and fundamentals is broken resulting in abnormally low share prices that may inhibit deserving firms from embarking on the

viable investment immediately (Cuthberston, 2005). Stock markets with more of short term traders who depend on euphoria and fads perform less efficiently than markets with long term investors who mainly focus on fundamentals which makes stock prices to converge to their equilibrium values (Zhang, 2010).

The breakdown between share prices and intrinsic value also referred to as mispricing is corrected by the actions on arbitrageurs or rational investors. As rational investors attempt to exploit the mispricing opportunities, they incorporate rationality and correct news into stock prices which corrects the mispricing (Khan, 2011). In markets that are efficient, stock prices should reflect the present value of future dividends and future capital gains which is equal to the stock's fundamental or intrinsic value (Baresa *et al.*, 2012). This implies that only new information about the future profits should cause the market price to change (Cuthberston 2002).

Random walk is characterized by stock price series where future stock prices are independent of those of current and past periods (Fama, 1991). This makes the occurrence of stock prices to be unpredictable. The implication is that successive price changes have zero serial correlation and possess high but not excess volatility that is commensurate with the release of economic news items (Cuthberston, 2005). The logic behind random walk is that if the flow of information is unimpeded it should

instantaneously be reflected in stock prices and hence future price changes will only reflect future news (Malkiel, 2003).

Efficient market hypothesis by Eugene Fama (1965) is closely linked to randomness of stock prices by Louis Bachelier (1900) since in weak form efficient markets the assumption is that stock prices occur in a random manner. The main implication of efficient market hypothesis is that investors should trust market prices and that in efficient markets investors get value for money (Fama, 1991).

Behavioral finance advocates arose in the mid-1980s including De Bondt and Thaler (1985) challenged the efficient market hypothesis by advocating that investor psychological biases inhibit their ability to make good investment decisions. The psychological biases which lead to wrong investment decisions include: overconfidence, herd like behavior, self-control, mental accounting, representative bias and risk perception. Herd like behavior implies aping the actions of other investors instead of critically analyzing the stocks. Representativeness bias implies that investors may not consider all information in decision making. Risk perception refers to the risk profile of aversion, risk seeking or investors being risk neutral. Mental accounting refers to investors tending not adjust their portfolios even when conditions demand that they adjust. Self-control bias causes investors to protect their investment even when it is yielding breakeven returns (Nofsinger, 2008).

According Magnusson and Wydick (2005); Mlambo *et al.* (2007) the NSE is weak form efficient and hence prices of stocks listed in it have already incorporated any past information which thus prevents abnormal returns being generated from strategies involving past information.

2.2.1 Significance of Abnormal Stock Returns

According to Fama (1991) if a stock market is efficient then abnormal returns should be zero but with possibilities of deviations from zero in both directions. Consistent stock price patterns are expected to generate significant abnormal returns (Watkins, 2003). In efficient stock markets, the market value of stocks should be equal to its intrinsic or fundamental value which implies zero abnormal stock returns (Zhang, 2010). Asset pricing models are employed in determination of the normal returns which are then compared with the actual returns in order to establish abnormal returns (Fama, 1998). The joint hypothesis problem advocates that markets should be tested jointly with models and that the existence of abnormal return implies that neither conclusion can be made as to whether the model employed in generating abnormal return is flawed or whether a market tested is efficient (Fama, 1991). The NSE is weak form efficient and thus abnormal returns should be zero unless there is an anomaly yet to be exploited (Magnusson and Wydick 2005; Mlambo *et al.* 2007).

2.2.2 Volatility of Stock Prices

Finance literature has covered the volatility of both stock returns and stock prices where the volatility of returns seeks to measure the strength of unexpected return variation over a specific period (Biglova *et al.*, 2004). Volatility of stock prices measures the dispersion of current prices about a central tendency that is based on past prices (Raju and Ghosh, 2004). The implication of stock volatility is that market prices tend to move away from the intrinsic values due to actions of irrational investors who are influenced by usually euphoria or panic (Vukas, 2012). The consequent arbitrage opportunities attract rational investors who join the market and correct the mispricing caused by the irrational investors (Engel and Morris, 1991).

The level of volatility is important in stock market efficiency as it is interpreted as risk by investors when deciding on allocation of financial resources to alternative investment projects (Cuthbertson, 2002). High stock price volatility that is commensurate with release of relevant economic news about stocks represents randomness in the occurrence of stock prices (Stefan, 2009). Reduced volatility represents non-randomness in occurrence of stock prices and is associated with consistent stock performance as it emits reliable signals of the firm's underlying value (Watkins, 2003). Excess volatility doesn't support weak form efficiency as it implies that stock prices do not reflect changes in economic fundamentals (Cuthbertson, 2002). As the NSE is weak form efficient, it

expected to exhibit high stock price volatility that is commensurate with release of news (Watkins, 2003).

2.2.3 Serial or Autocorrelation of Stock Returns

Weak form efficiency employs serial correlation tests to examine the relationship between the stock prices at different time lags. This is done by relating current stock prices to those of previous periods (Oprean, 2012). Positive serial correlation implies that positive (negative) stock return in a period are followed by positive (negative) returns in the next period and hence occurrence of trends and consistent stock performance. Negative serial correlation implies that stock returns of a certain sign in a period are followed by returns of opposite sign in the next period and hence occurrence of reversal (Hillebrand, 2003).

Positive serial correlation is associated with momentum anomaly and implies that stock prices are mean averting which contradicts the existence of weak form efficiency due to existence of momentum trends. Negative serial correlation also implies that stock prices are mean reverting and that market prices overshoot compared to their fundamental values due to the decisions of irrational investors. The actions of rational investors causes price reversal thereafter which than causes stock prices to become stationary and predictable and contradicts weak form stock market efficiency (Hillebrand, 2003). Zero serial correlation represents randomness in the occurrence of stock prices and occurs in

markets that are efficient which is consistent with weak form efficiency of markets (Pearce, 1987).

In the short run stocks can exhibit positive serial correlation or mean aversion due to the actions of irrational investors which supports the momentum anomaly while in the long run, stocks exhibit negative serial correlation or mean reversion due to the actions of rational investors (Lo and McKinlay, 1998). This research employs serial correlation tests to study the randomness in the occurrence of stock prices which is a feature of weak form efficiency and is evidenced by negative serial correlation. The uncertainty surrounding the relationship between consistent stock performance and weak form efficiency status of NSE triggered the second specific research objective.

2.2.4 Past Studies on Abnormal Stock Returns

Olweny (2012) studied the effect of cash dividend announcement on value of the firm using event study methodology involving t-test of significance to establish whether dividend announcements had information content. The market model was employed to compute abnormal returns. He used NSE data of 4 firms for the period between years 1999 to 2003. Purposive sampling was employed to draw a sample of 4 stocks out of a population of 52 stocks listed in the NSE during the study period. The results indicated that cash dividend announcements affect the value of firms significantly that cash dividend announcements convey useful information about the future value of firms. The

implication is that the NSE by year 2003 was not yet efficient in the semi strong form as it can allow significant abnormal returns to be generated by investors during cash dividend announcement periods. The study is employed as it relates to NSE during years 1999 – 2003 and due to employing the market asset pricing model that is superior to constant mean return model and has validation advantage over capital asset pricing and arbitrage pricing models of estimating normal returns (Mac Kinlay, 1997). This study also employed log returns methodology of converting stock prices to returns which is superior to arithmetic returns methodology (Mac Kinlay, 1997). This study did not focus on weak form efficiency but semi-strong form efficiency of NSE. The Olweny (2012) study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The period of study slightly overlapped that of the current research but is mainly irrelevant. The current research does not assume dummy values when missing stock price data is encountered as a result of thin trading in the NSE but employs only actual data unlike the Olweny (2012) study.

Larson and Madura (2003) studied investor reaction to information following extreme one day returns and identified a sample of winners and losers by selecting daily returns that were in excess of 10% (ignoring the sign) to determine whether the samples over or underreacted to public information. The event study methodology was employed in the study with pre-event period of 260 days and examination period of 20 days. Abnormal returns were derived using the market model with market return based on the CRSP

equally weighted index and whose returns were computed using arithmetic returns model. Various event windows ranging from day 1 to day 20 were used to identify the overreaction and under-reaction behavior. Data from stocks priced below 10 dollars per share in the day before the event was excluded to reduce the possible effects of bid ask bounce. The results were consistent with the theory of overconfidence and self-attribution bias which postulate that stock prices overreact to private information but underreact to public information. In practice, NSE controls investor overreaction by setting a threshold of 10% as the limit to which stock prices can fluctuate during a day's trading. This study introduces magnitude in measurement of significant abnormal returns by setting a threshold that requires significant abnormal returns to be in excess of 10% on a daily basis. This study did not focus on weak form efficiency but focuses on semi-strong efficiency. It also did not focus on consistent stock performance in the NSE which is the focus of the current research. This study also computes index returns while the current research employs individual stock returns. Arithmetic returns are used by Larson and Madura (2003) study while the current research employs log stock returns.

Aduda and Chemarum (2010) studied the effects of stock splits in the NSE by studying nine companies during 2002 to 2008 that had their stocks split. They employed the event study methodology with an event window of 50 days before and after the split and t-test at 5% level of significance. The market model was employed to compute abnormal returns. The findings were that the Kenyan market reacts positively to stock splits as

shown by the general increase in volume of shares traded during and after the split. This implied that managers split stocks to pass information to shareholders and potential investors a phenomenon referred to as signaling theory. A census study was carried out on 9 stocks that had undergone stock splits in the NSE during the study period. Findings also indicated that on the day of split and the days surrounding, there was positive average abnormal return that was very significant at 0.05 level of confidence. This implied that NSE was not semi-strong form efficiency during years 2002 - 2008. This study is employed as it relates to NSE during years 2002 - 2008 and due to employing the market asset pricing model that is superior to constant mean return model and has validation advantage over capital asset pricing and arbitrage pricing models of estimating normal returns (Mac Kinlay, 1997). This study also employed log returns methodology of converting stock prices to returns which is superior to arithmetic returns methodology (Mac Kinlay, 1997). The Aduda and Chemarum (2010) study did not focus weak form efficiency but semi-strong form efficiency of NSE. Their study did not focus on consistent stock performance in the NSE which is the focus of the current research but focused on event study. The period of study is also outside the study period of the current research. The current research also does not assume dummy values when missing stock price data is encountered as a result of thin trading in the NSE but employs only actual data only.

Ndegwa and Kiweu (2013) studied profiting from bonus share announcement in the NSE during years 2005 to 2010 and involving 18 listed stocks that issued bonus shares. Event study method was employed with pre-event window of 80 days and event window of 20 days before and after the bonus share announcement dates. One sample t-test methodology was employed to test the statistical significance of the average abnormal returns (AAR) and cumulative average abnormal returns (CAAR). Arithmetic returns were employed in conversion of daily stock prices to returns and capital asset pricing model was employed in derivation of abnormal returns. The findings revealed that the AAR and CAAR were statistically significant at 0.05 level of confidence. This implied that NSE was not semi-strong form efficient during the study period. This study did not focus on consistency of stock performance in the NSE even though the period of study partially overlapped with that of the current research. The research findings that fail to confirm semi form efficiency status of NSE perhaps emanate from use of arithmetic returns which significantly overstate financial performance unlike the log stock returns (Henry and Kannan, 2008). CAPM was employed to determine abnormal returns despite its unrealistic assumptions about perfection of the market (Mac Kinlay, 1997).

2.2.5 Past Studies on Volatility of Stock Prices

Magnusson and Wydick (2005) studied efficiency of 8 African stock markets indices during years 1986 to 1998 drawn from the International Finance Corporation index. In their methodology they analyzed weak form efficiency into 3 levels. Random walk III

was the least limiting and postulated that it was not possible to use past prices to predict future prices which implied weak form efficiency. Random walk II level implied compliance with random walk III and additional requirement of heteroscedasticity which implied that variances can change over time but in an unpredictable manner. This means that it is not possible to predict future volatility by studying past volatility. The random walk I was the most restrictive and required white test of heteroscedasticity. It implied that it is not possible to predict future prices or future volatility by studying past information. The random price increments requirement in RW I is described as white noise. The results indicated that none of the African stock markets conformed to random walk I and only the US markets met random walk I requirements. The NSE and 5 other African markets conformed to random walk II just like markets in south East Asia and Europe. This implied that the NSE and some African markets were not inferior to those in other parts of the world. This study deviated from the forms of efficient market hypothesis of weak, semi-strong and strong forms and introduced an alternative criteria based on randomness of stock prices but at 3 levels. The Magnusson and Wydick (2005) study focused on market indices while the current research focuses on individual stocks. The research confirmed the weak form efficiency status of NSE between years 1986-1998 which is outside the study period of the current research.

Owido *et al.*, (2013) measured efficiency of the NSE using GARCH volatility model after criticizing past studies that employed linear regression analysis to test weak form

efficiency as they assumed that the error term is constant over time. GARCH model relax the constant error term (homoscedasticity) requirement and assumes that the variance of the error term depends on the previous lagged values and lagged values of innovation terms. They employed non-parametric tests of randomness of stock market log returns on the NSE 20 share index returns during years 2006 - 2011. The results indicated that daily returns are non-random and the GARCH results indicated that current returns are dependent on the returns of the previous 3 days. This research tested volatility by employing the GARCH test while current research employed Spearman ranks volatility, standard deviation, range and proportional runs volatility tests. Even though the study periods of the study and current research overlapped, they are not identical. The current research also focuses on individual stocks log returns rather than the entire market index log return which is the focus of the Owido *et al.*, (2013 study.

2.2.6 Past Studies on Serial Correlation of Stock Returns

Mlambo and Biekpe (2007) studied the weak form of efficiency of African stock markets and employed runs serial correlation tests. The research focused on the period of years 1990 – 1995 for the Kenyan stock market. They observed thin trading problem especially in Namibia and Botswana markets. In many of the markets studied, the random walk hypothesis was rejected except for the markets in Kenya, Namibia and Zimbabwe that were found to be relatively weak form efficient. Namibia's market weak form of efficiency was attributed to cross listings from JSE. For the markets in Mauritania,

Ghana, Egypt and Cote d I'voire they were found to be weak form inefficient which implies that past trends analysis can generate abnormal returns. This study is used for testing and confirming that the NSE is weak form efficient by employing serial correlation methodology. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The research confirmed weak form efficiency status of NSE between years 1990-1995 which is outside the study period of the current research.

2.3 Theories on Stock Market Anomalies

Theories are approximation of reality and zero approximation errors are unheard of in reality. Anomalies are common and expected in every field and are an integral part of puzzle solving processes in science. Scientists are thus reluctant to discard broad theory or paradigm upon the discovery of instances of anomalies even if significant. To discard theory or paradigm, a replacement candidate that better explains a wide range of the phenomenon is needed (Khan, 2011). This implies that the occurrence of anomalies even if significant in stock markets should not cause EMH to be discarded without a suitable replacement theory that better explains the behavior of stock prices.

Stock markets are not testable without some equilibrium model also referred to as asset pricing model which yields estimated or predicted returns for comparison with actual returns for the purpose of establishing abnormal returns or alpha which ideally should be

zero if the market is efficient. The Joint hypothesis problem states that the testing of stock market efficiency should be done jointly with the tests of asset pricing models involved in estimation of normal stock returns so that when abnormal returns are identified, a puzzle will exist as to whether there is some imperfection in the model or whether the market is actually inefficient. This implies that studies on efficient stock markets and asset pricing models are inseparable (Fama, 1991).

Econometricians have argued that profiting from stock movements is to a large extent predictable as a result of market anomalies (Malkiel, 2003) and that money can be made upon analysis of historical data in a market that is regarded to be efficient in the weak and semi strong forms due to existence of stock market anomalies (Nathan 2006; Elleuch 2009). Anomalies are regarded as statistical aberrations or deviations have attracted the attention of academics or practitioners (Schwert, 2003). After academics and practitioners document and analyze anomalies, they often seem to disappear or reverse perhaps due to being arbitraged away when the market becomes efficient. It is not clear whether anomalies are really unexplained puzzles in the financial markets or whether they are manipulations using data mining techniques (Khan, 2011).

During the process of research, some analysts may focus attention on data snooping which involves using computers to search through huge data sets of past performance with the hope of finding some relationships and surprising results. Subsequent

researchers then repeat and refine the anomalies further using the same or positively correlated data but without adding additional evidence (Schwert, 2003). Anomalies can also arise due to the methodology used and therefore change of methodology can cause the anomalies to disappear (Keim, 2008). Data snooping is a problem that arises during the testing for anomalies and it involves using computers to search through huge data sets of past performance with the hope of finding some relationships and surprising results. Anomalies can disappear when tested using independent data from prior periods or from different countries as opposed to using similar or positively correlated data (Nathan, 2006).

Research has shown that the problem of data snooping bias is inherent in portfolio based asset pricing tests and hence can be avoided by use of single securities in empirical tests of asset pricing models which also avoids loss of information that arises when stocks are sorted into portfolios. The use of single securities also provides results that are robust to the sensitivity of asset pricing tests to the portfolio grouping procedure (Avramov and Chordia, 2006). The proponents of efficient market hypothesis (EMH) believe that despite all the anomalies, EMH is still a valid hypothesis and that published work apparently is in favor of reporting anomalies rather than the confirmation of randomness which is deemed boring by the researchers (Nathan, 2006).

Some common errors of past EMH studies have been documented including: biased models of equilibrium returns which lead to incorrect abnormal returns. Specification searches employ models that outperform the market during test periods but may give different results when different test periods are used. Inappropriate portfolio weighting can cause market inefficiency especially when studying equally weighted portfolios that are dominated by small stocks that are characterized by illiquidity and thus induce the illiquidity problem to the portfolio. There is also failure to distinguish between statistical and economic significance where many studies conclude the inefficiency of markets only after statistical analysis but before verifying the economic significance of arbitrage profits which requires the netting off transaction costs, brokerage fees and other similar costs (Copeland, 2005). Efficient market hypothesis is a proven theory and evidence that contradicts the theory is regarded as an anomaly (Fama, 1991). This research investigates the existence of consistent of stock trends in the NSE and their causes if they exist.

2.3.1 Size Anomaly

Small size firms as determined using market capitalization are associated with high risk adjusted returns arising from infrequent trading of their stocks. Market capitalization refers to number of stocks traded multiplied with the market price of such stocks (Gadhi and Lustig, 2010).

2.3.2 Calendar Anomalies

Calendar or seasonality anomalies advocate that positive or negative returns can be associated with some specific time periods when stock prices either rise or fall. Experience has shown that at certain times of the year stock prices seem to exhibit patterns including: during weekends, Mondays, turn of the year or month and holidays. There is a tendency for stocks to perform well on any day that precedes a holiday. January effect occurs between the last trading day of December and the fifth trading day in the USA, it is associated with tax loss selling activities by investors. The non-trading period from Friday to Monday is associated with depressed stock prices on Mondays. Turn of the year anomaly is associated with window dressing activities of companies and adjustments of inventories. Turn of the month anomaly is associated with mental behavior of investors who prefer disposing stocks at month ends (Latif *et al.*, 2011). If there is presence of seasonality or calendar anomalies in the NSE, this will be anomalous since the market is weak form efficient (Magnusson and Wydick, 2005).

2.3.3 Overreaction Anomaly

Overreaction occurs when unexpected information is over weighted by investors who are mainly poor Bayesian decision makers and are thus irrational. An alternative explanation behind overreaction anomaly is herd mentality of investors who instead of analyzing and incorporating all new information into decision making process, they replicate the decisions of other investors. In an attempt to outperform the market or beat the crowd, few of such investors realize that they are actually the crowd (Kelly *et al.*, 2008).

Behavioral finance advocates consider the reversal anomaly as overreaction hypothesis that irrational investors overreact to information which leads the stock price to move away from its fundamental value which is corrected through a reversal process by rational investors (Nosfinger, 2008).

When overreaction occurs, positive stock price changes are followed by negative stock price changes and vice versa which create a pattern or trend. Under reaction anomaly occurs when positive (negative) stock price changes are followed by positive (negative) stock price changes which also creates a pattern. When patterns occur in stock markets, uninformed investors usually base their decisions on such patterns which tend to enhance the occurrence of the patterns (Engel and Morris, 1991). In markets that are weak form efficient, such patterns should not exist as they will be quickly noticed by professional investors who will eliminate them quickly through appropriate transactions unless there is an anomaly in the market (Pearce, 1987). Consistent stock performance represents patterns and since the NSE is weak form efficient such patterns should be not exist.

2.3.4 Momentum Anomaly

Price momentum strategy assumes that stocks that have been outperforming the market will continue with the price increase trend while stocks that have been underperforming the market will also continue with the price decrease trend. A possible explanation of the continuation of the stock returns from behavioral finance advocates is that investors

under react to the arrival of new information (Detlev, 1990). This implies that the past winners will tend to persistently outperform recent past losers over the same period and hence there is a return continuation or momentum effect (Schwert, 2003). Momentum can be absolute which refers to a stock's return increasing over some time regardless of the performance of other assets. Momentum can also be relative which refers to the performance of a stock being high relative to the performance of the market index (Lishenga, 2011). By investors buying stocks with recent high returns and selling stocks with recent low returns produces profits that are both statistically and economically significant (Arena *et al.*, 2008).

Consistent past stock returns are a crucial determinant of momentum profits and become great in the presence of momentum but remain economically and statistically significant even when momentum lacks (Watkins, 2003). For stock returns to be termed as economically significant, they should be in excess of transaction, brokerage and related costs (Lishenga, 2011). Consistency of stock performance may serve as a potential explanation for momentum effect but there is distinction between the two phenomena. Momentum incorporates both path or serial dependence and magnitude unlike consistency which only includes path or serial dependence without considering magnitude (Watkins, 2003). This implies that persistent stock price increase or decrease must occur with magnitude for momentum to exist. When persistent stock price increase or decrease arises without magnitude momentum will not be detected rather consistent

stock performance will be deemed to arise (Watkins, 2003). The current research on consistency of stock performance in the NSE focuses on path or serial dependence and incorporates magnitude of stock returns by requiring consistent winner and loser stock returns exceed 10% on a daily basis otherwise such consistently performing stocks are termed as consistent best and worst performing stocks respectively.

2.3.5 Past Studies on Anomalies

Elfakhani and Zaher (1998) studied the differential information hypothesis, firm neglect and small firm size effect. They postulated that small firms suffer from excessive lack of public information and are thus neglected. They defined neglect to be the lack of frequent professional analysis and thus the less public information about a stock a phenomenon associated with small stocks. Data was drawn from CRSP data base that included stocks listed in the New York and American stock exchanges (AMEX) during years 1986 to 1990. Using linear regression analysis they examined the relationship between return premium and firm size and the differential between information among small and large stocks and found evidence that size effect does not exist separately but there was evidence of a joint size-firm neglect effect. They also tested for size effect in January and non-January months using simple regression analysis model and found evidence of statistically significant size effect in almost all the months of the year including January. From this study that was based on the developed markets of the USA, the anomalies of size and January effects are derived for examination in the NSE as an emerging market.

This study is included in this research as it tested size and neglected stocks effect whose proxy is market capitalization of the listed stocks. It is also included in this research for employing simple regression analysis in establishing the January effect and for employing market capitalization to test for size effect. The Elfakhani and Zaher (1998) study focused on the USA markets where tax loss selling activities occur in the months of December and January every year which creates seasonality patterns in the month of January unlike the Kenyan market where such activities are non-existent. The period of study was also outside the one of the current research. The period covered by the study differed from that of the current research.

Borges (2009) studied calendar effects in Europe that included 17 countries in the continent for the period of 1994 to 2007 and focused on country stock market indices. A simple regression model that captured the period of focus against other periods grouped together was employed say Monday and non-Monday in the case of Monday effect. The findings indicated that returns tend to be lower in the months of August and September in a weak manner but generally calendar effect anomaly was non-existent across the board. This study is employed in this research due to the regression methodology of testing for calendar effects in which the period of interest forms the constant while the other periods lumped together form the independent variable with the dependent variable being the mean stock returns for all the periods in the week or year. This study focused on country stock market index returns while the current research focused on individual stock log

returns. The periods of study is not relevant as it overlapped the current research period but is not identical.

De bondt and Thaler (1985) studied overreaction of stock markets and hypothesized that changes in dividends alone are not large enough to explain the observed excess volatility in stock prices which were found to be highly correlated with changes in the following year earnings. They employed monthly stock return data from the NYSE during the years 1926 to 1982 and formed portfolios with 35 to 50 stocks which were used in experiments consisting of formation and holding periods and involved the strategy of buying past losers and at the same time selling past winners. The findings indicated that the loser – winner portfolios earned cumulative returns of 10.5% a month subsequent to the formation date and earned 24.6%, 36 months subsequent to the formation date. They attributed these findings to the fact that investors place too much emphasis on recent economic information which they overreact to and causing stock prices moving away from their fundamental values. They also found that low P/E firms earn higher risk adjusted returns compared with high P/E ratio firms which they regarded as a potential indicator of the overreaction anomaly. The De Bondt and Thaler (1985) methodology involved top ranked stocks being deducted from bottom ranked stocks to establish negative abnormal returns in a formation period and are subsequently observed for reversal in a test period. The methodology is different from that applied in the current research that is based on the alternative definitions of consistent stock performance. The

overreaction study of De bondt and Thaler (1985) study focused on the USA market which differs from the NSE which is the focus of the current study. The period of study of De bondt and Thaler (1985) is also unrelated to that of the current research.

Detlev (1990) tested overreaction anomaly in the German stock market and involved 41 stocks that had equity value of at least 100 million DM during the years 1973 to 1989. Monthly returns were computed and adjusted for dividends, stock splits and other usual events. Excess returns were computed as actual returns less index returns. The stocks were ranked in the formation periods of 1, 2, 3 and 4 years and observed during test periods of similar horizons as the formation periods. After the ranking the top 5 formed portfolios of winner stocks and the bottom 5 formed portfolios of loser stocks. Spearman rank correlation methodology was employed and the coefficients were tested at 5 % level of confidence. The results revealed that in the short run especially 1 year horizon, there was evidence of under reaction while in the long run 4 and 5 years, there was evidence of overreaction. These results of the Detlev (1990) study were consistent with those of De bondt and Thaler (1985). This study is employed in the current research due to the Spearman rank correlation methodology of testing for overreaction anomaly. The Detlev (1990) study did not focus on consistency of stock performance but focused on overreaction anomaly. The study was not based on the NSE but focused on the German stock market. The period of study is also outside the study period of the current research.

Jegadeesh and Titman (2001) studied profitability of momentum strategies. They distinguished winners and losers based on the magnitude of periodic returns where the winner stocks were categorized as those with the largest periodic return rankings while losers were categorized as those with the lowest periodic return rankings. They had data from NYSE, AMEX and NASDAQ and hypothesized that momentum strategies yield positive returns in any post ranking period while behavioral models researchers indicated contrarian behavior in stock returns. They examined the returns of winner and loser stocks in the 60 months following the formation date over a sample study period from 1965 to 1998 and found that momentum portfolios yield significant positive returns in the initial 12 months following the formation period and the cumulative returns in months 13 to 60 was negative hence consistent with the behavioral models and inconsistent with the Conrad and Kaul (1998) hypothesis. This study differs from the current research as it employed the zero cost methodology of establishing abnormal returns that involved buying winners (top ranked stocks) and selling losers (bottom ranked stocks). The Jegadeesh and Titman (2001) study focused on momentum anomaly which is closely related but not identical to consistency of stock which is the focus of the current research. The period of study of Jegadeesh and Titman (2001) is outside the study period of the current research. They concentrated on USA stock market while the current research focuses on the Kenyan market.

Lishenga (2011) tested the profitability of momentum strategy using all stocks listed in the NSE for the period 1995 to 2007 and used the results of the relative strength strategy to evaluate the influence on momentum profits by transaction costs, calendar effect, risk factors and other reported momentum characteristics. The results showed that NSE exhibits medium term return continuation over the entire sample period and the sub periods and that the momentum is an anomaly which was consistent with evidence from elsewhere. This implies that NSE exhibited momentum anomaly during years 1995 - 2007. The Lishenga (2011) study employed arithmetic returns which significantly overstate financial performance (Henry and Kannan, 2008) which perhaps explains the significant momentum anomaly findings during the study period between years 1995-2007. The Lishenga (2011) study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The period of study overlapped with that of the current research but was not identical. The current research did not assume dummy values when the problem of missing stock prices is encountered due to thin trading in the NSE.

2.4 Stock Valuation Theory

There are 3 major valuation models including: asset based valuation, discounted cash flow (absolute valuation) and relative valuation (price multiple) models. Asset based valuation models were initially developed by Graham and Dodd in 1934 who suggested that the value of stocks is based on the market value of the existing tangible assets of the

firm, the current earnings from assets of the firm and the growth of the firm. The absolute valuation or discounted cash flow models initially developed by Modigliani and Miller in 1961, postulate that stocks of a firm are worth the amount of all future cash flows to the owner of the asset discounted at an opportunity cost rate that reflects the risk of the investment (Froidevaux, 2004).

The weaknesses of the asset based and discounted cash flow models which has unrealistic assumptions led to the development of the relative valuation model which was initially popularized by Fama and French in 1992 and advocated for relative valuation of assets based on how similar assets were priced in the market which was based on the economics law of one price which states that 2 similar assets should sell for the same price. The main methods applied in the relative valuation model include price earnings ratio which should be computed in comparison with P/E ratios of similar firms in the market. Book to market ratio is an explanatory variable in the Fama and French 3 factor asset pricing model (Froidevaux, 2004).

Value effect postulates that investors are likely to undervalue the value companies which are characterized by high book to market (B/M) ratios but after the market corrects itself, such companies promise excess stock returns above the average market return. Growth firms as based on low B/M ratios on the other hand are characterized by strong past performance with market values exceeding their intrinsic values. They have high retained

profits and low dividend payout ratios but after the market corrects itself the growth companies yield significant negative returns (Fama and French, 2004).

Based on the relative valuation or price multiple model approach, firms with low price to earnings (P/E) ratios relative to those of other firms in the same industry are also deemed to be undervalued and are expected outperform firms with high P/E ratios in terms of risk adjusted returns (De bondt and Thaler, 1985). Interpretation of P/E ratio is industry based so that P/E of a firm should be compared with that of the industry in which the firm belongs to for meaningful interpretation to be made (Kelly *et al.*, 2008). The uncertainty surrounding the intrinsic value of consistently performing stocks necessitated the development of the fourth specific objective.

2.4.1 Past Studies on Stock Valuation

Chou *et al.* (2011) studied value premium and the January effect amongst large and small firms and used the returns of portfolios based on size and B/M ratios. They defined value premium as the difference between the returns on high B/M ratio stocks also regarded as value stocks and low B/M ratio stocks also regarded as growth stocks. The researcher tested whether the value premium observed among the large and small stocks were different in the January and non-January months. They examined the turn of the year effect on the value premium by analyzing the B/M portfolios during the first and last ten days of a calendar year. Data was obtained from non-financial firms listed in the NYSE,

AMEX and NASDAQ within the CRSP database from 1963 to 1995. The results indicated evidence that value premium and also large stocks possessed a significant value premium in the month of January that was driven by sale of loser stocks at the turn of the year and that past performance played a key role in the observation of the results. From this study that was based on the developed markets of the USA, the anomalies of value, size and January effects are derived for examination in the NSE as an emerging market. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The period of study is also outside the study period of the current research.

Piotroski (2000) studied value investing by using historical financial statement information to separate winners and losers. He defined winner stocks as those consisting of strong high to book market (B/M) ratio firms that earn positive market adjusted returns within two years following portfolio formation. He ranked all firms with sufficient data to identify book to market quintile and size tercile cutoffs. The prior year's distribution was used to classify firms into B/M quintiles and the size classification of small, medium and large were determined using prior year market capitalizations. He used twenty year data from 1976 to 1996 and established that mean return earned by the high B/M ratio firms can be increased by at least 7.5% annually through selecting strong high B/M firm and an investment strategy that buys expected winners and shorts expected losers was able to generate a 23% annual return between 1976 and 1996. From this study, B/M value is

derived for the purpose of development of a multi-regression model. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research the period of study also did not relate to that of the current research.

Kelly *et al.* (2008) examined the existence of low P/E effect as an anomaly in the Australian capital market by using the portfolios of 1310 industrial firms over a 9 year period from 1998 to 2006. The ordinary least squares method was employed to establish the relationship between excess portfolio returns and excess market return. The results indicated that low P/E anomaly such that stocks with low P/E ratio lead to excess returns in the Australian capital market. The stock price to equity (P/E) ratio measures the payback or recoupment period of the investment in a stock and hence a low P/E ratio is beneficial to investors (De Bondt and Thaler, 1985). From this study that was based on the developed markets of Australia, the anomaly of P/E effects is derived for examination in the NSE as an emerging market. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The period of study overlapped the one of the current research but was different. The cluster sampling was employed in the Kelly *et al.* (2008) study resulting in the analysis of only industrial stocks unlike in the current research that analyses data for all sectors of the NSE.

2.5 Theory on Underlying Firm Characteristics

In order to determine whether an individual is a superior investment analyst, one should examine the performance of numerous securities that the analyst consistently recommends over time against the performance of a set of randomly selected stocks of the same risk class or average market index performance. The stock selections of a superior analyst should consistently outperform the randomly selected stocks or the average market index performance (Copeland, 2005). Some fund managers use fundamental analysis in stock selection by trying to understand a company's business before they can purchase its stock. This is done through in depth research to identify whether a company has strong features in the form of a monopoly position, talented management, promising research and development, defensible strategic niche and care for the environment. Quantitative fund management uses preset or predetermined models to select stocks without consulting a fund manager's subjective opinions or overriding the results generated from the models. These models are considered efficient as they can evaluate a large number of stocks on a timely basis using fewer investment professionals (Zhao, 2006).

Fundamental analysts focus on deriving the intrinsic value of the firms using information outside the stock including underlying firm characteristics (Siqueira et al., 2012). This involves studying economic, industry and company data in an attempt to identify the intrinsic or fundamental value of stocks although such efforts are in vain if markets are weak form efficient (Fama, 1991). This research focuses on establishing whether the

following underlying firm characteristics influence consistent stock performance: book value of assets, price to book ratio, debt to equity ratio, earnings per share, dividend per share, capital expenditure, volume of corporate event news, liquidity ratio, sales growth and volume of stocks traded. The uncertainty surrounding the relationship between underlying firm characteristics and consistent stock performance necessitated the development of the fifth specific research objective.

2.5.1 Past Studies on Underlying Firm Characteristics

Albanis and Batchelor (1999) who studied 651 stocks between the years 1993 to 1997 and employed 15 key balance sheet items to predict whether a particular share was high performing or low performing. They initially ranked the stocks based on performance and the high performing stocks were identified as those whose returns were ranked in the first 25% while low performing stocks were identified as those whose returns fell below the top 25% in the ranking. The key financial statement items included: sales revenue, earnings, total profits, tax paid, total assets, total liabilities, current assets, current liabilities, current debtors, total capital employed, shareholders equity, dividends paid, market capitalization, book value of assets and total debt. The researchers used data for a period of two years to predict the high or low performance of a stock for the next 12 months. The results of their experiments revealed that statistical classification methods like the linear discriminant analysis can identify ex ante portfolio of shares that will

consistently outperform an equally weighted benchmark index by hit rate of 60%. From this study, predictor variables of sales revenue, earnings, total profits, tax paid, total assets, total liabilities, current assets, current liabilities, current debtors, total capital employed, shareholders equity, dividends paid, market capitalization, book value of assets and total debt are derived as underlying firm characteristics. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research. Rather the study was interested prediction of stock returns using underlying firm characteristics. There is a mismatch between the study period of the current research and that of Albanis and Batchelor (1999) study.

Chiang and Chieh (2006) studied the comparison between the conventional and rigid crisp stock screening models and non-conventional and flexible fuzzy stock screening models using 475 stock data from Taiwan Stock Exchange to establish the prediction ability of the models. The conventional crisp screening criteria that contained 5 screening rules based on price earnings ratio, earnings growth rate, market value, return on equity and price to book ratio was tested. If a stock did not meet a preset set criteria in the crisp model even if on borderline it would be screened out unlike in the flexible fuzzy model which was more accommodating. The results indicated that the fuzzy screening model was superior in terms of investor expectations. From this study, price earnings ratio, earnings growth rate, market value, return on equity and price to book ratio are derived as underlying firm characteristics. This study did not focus on consistency of stock

performance in the NSE which is the focus of the current research but focused on stock screening models. The period of study was not related with that of the current research.

Elleuch (2009) studied whether it was possible to predict returns using the fundamental analysis that was based on historical information. The research used 108 observations were based in the Tunisian Stock Exchange during the years 1995 to 2001. The study employed independent variables that included: return on assets, cash flow over total assets, accruals to total assets, leverage to average total assets, liquidity and assets turnover ratios. The discriminant analysis technique was employed and the model was able to outperform and underperform the average market performance and hence able to discriminate between the winner and loser stocks in the market. From this study, turnover, leverage to average total assets and liquidity are derived as underlying firm characteristics. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research but focused on prediction of stock returns using multi-regression models. The period of study is also mainly outside the study period of the current research.

Mohanram (2005) studied the separation of winners from losers among low book to market stocks using financial statement analysis. He combined traditional fundamental measures of earnings and cash flows with measures tailored for growth firms including earnings stability, intensity of research and development, capital expenditure and

advertising to create an index which he named G-score. He then ranked firms annually and firms with G-score greater or equal to 10th percentile in the year formed the high G-score or winner firms while firms with G-score of less or equal to 10th percentile in the year formed the low G-score or loser firms. Data was drawn from COMPUSTAT data base during the period 1978 to 2001. He established that firms with the highest G-score firms earn mean adjusted returns of 3.1% in the first year after portfolio formation while firms with lowest G-score earned -17.5% earnings indicating that a long-short strategy based on G-score earns significant excess returns. Further the results were inconsistent with a risk based explanation as returns were positive most of the years and firms with lower risk earn less returns. From this study, earnings stability and capital expenditure are derived as underlying firm characteristics. This study did not focus on consistency of stock performance in the NSE which is the focus of the current research. The study rather focused on discriminating between winner and loser stocks using underlying firm characteristics during a study period that mainly did not overlap with that of the current research.

Siqueira *et al.* (2012) studied effect of fundamental variables on annual stock returns in the Brazilian stock market using discriminant analysis technique. They employed accounting ratios of: price to earnings, price to book, dividend yield, market value, earnings per share, return on equity, net profit margin, debt ratio and liquidity ratios. All stocks traded were employed during the study period from January 2006 – December

2010. The findings revealed that the discriminant analysis model had predictive power of 70% to 88.24%. This study is employed in the current research for the purpose of deriving price to earnings, price to book, dividend yield, market value, earnings per share, return on equity, net profit margin, debt ratio and liquidity ratios as underlying firm characteristics. This study focused on prediction of stock market return and not consistency of stock performance in the NSE which is the focus of the current research. The period of study was partly related to the study period in the current research although not identical.

2.6 CHAPTER SUMMARY

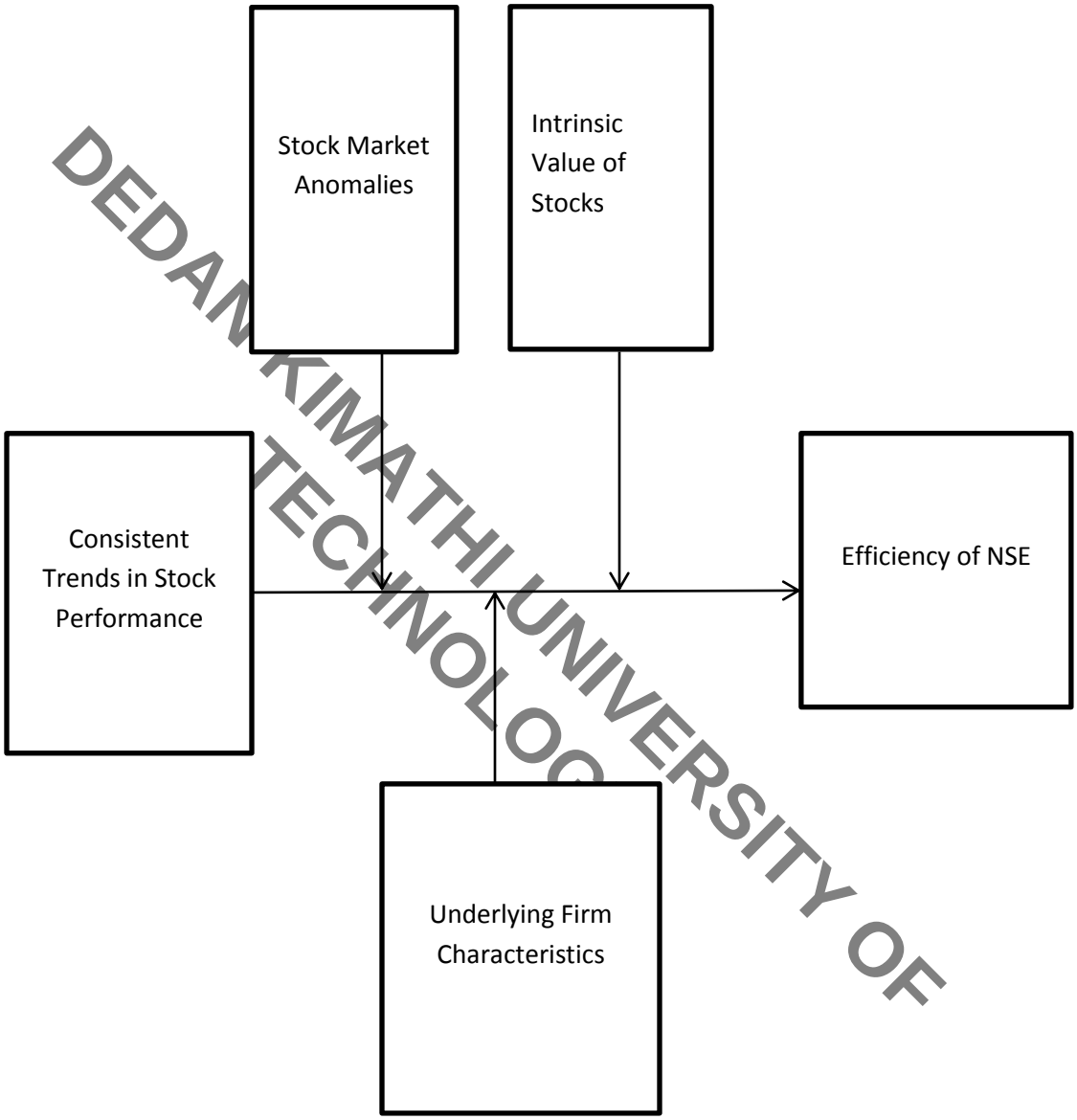
This first section of the chapter documented theoretical and conceptual literature review and past empirical studies that surround consistent stock performance.

Table 2.6.1 Summary of Knowledge Gaps

Study Focus	Authors	Knowledge Gaps
Consistent stock Log and Abnormal Returns	1. Alwathainani (2011), 2. Grinblatt and Moscowitz (2004), 3. Watkins (2003),	Existence of Consistent log and abnormal returns of stocks in NSE. Existence implies an anomaly
Significance of abnormal Returns of	1. Olweny (2012), 2. Larson and Madura	Whether consistently performing stocks in NSE

consistently performing stocks	(2003 3. Aduda and Chemarum (2010), 4. Ndegwa and Kiweu (2013)	yield significance of abnormal returns which is an anomaly
Volatility of stock prices of consistently performing stocks	1. Magnusson and Wydick (2005) 2. Owido *et al.* (2013) 3. Piotroski (2000)	Whether consistently performing stocks in NSE yield low volatility which is an anomaly
Serial correlation of consistently performing stocks	1. Mlambo and Biekpe (2007)	Whether consistently performing stocks in NSE yield positive or negative serial correlation which is an anomalous
Market Anomalies	1. Elfakhani and Zaher (1998), 2. Borges (2009), 3. De Bondt and Thaler, (1985), 4. Detlev (1990), 5. Jegadeesh and Titman (2001) 6. Lishenga (2011)	Whether consistently performing stocks in NSE yield are influenced by stock market anomalies of size, calendar and overreaction
Intrinsic Value of Stocks	1. Chou *et al.* (2011), 2. Kelly et al. (2008), 3. Asness (2003) 4. Piotroski (2000)	Whether consistently performing stocks in NSE are under or over valued
Underlying firm Characteristics	1. Albanis and Batchelor (1999), 2. Chiang and Chieh (2006), 3. Elleuch (2009), 4. Mohanrum (2005), 5. Siqueira *et al.* (2012)	Whether consistently performing stocks in NSE are influenced by underlying firm characteristics

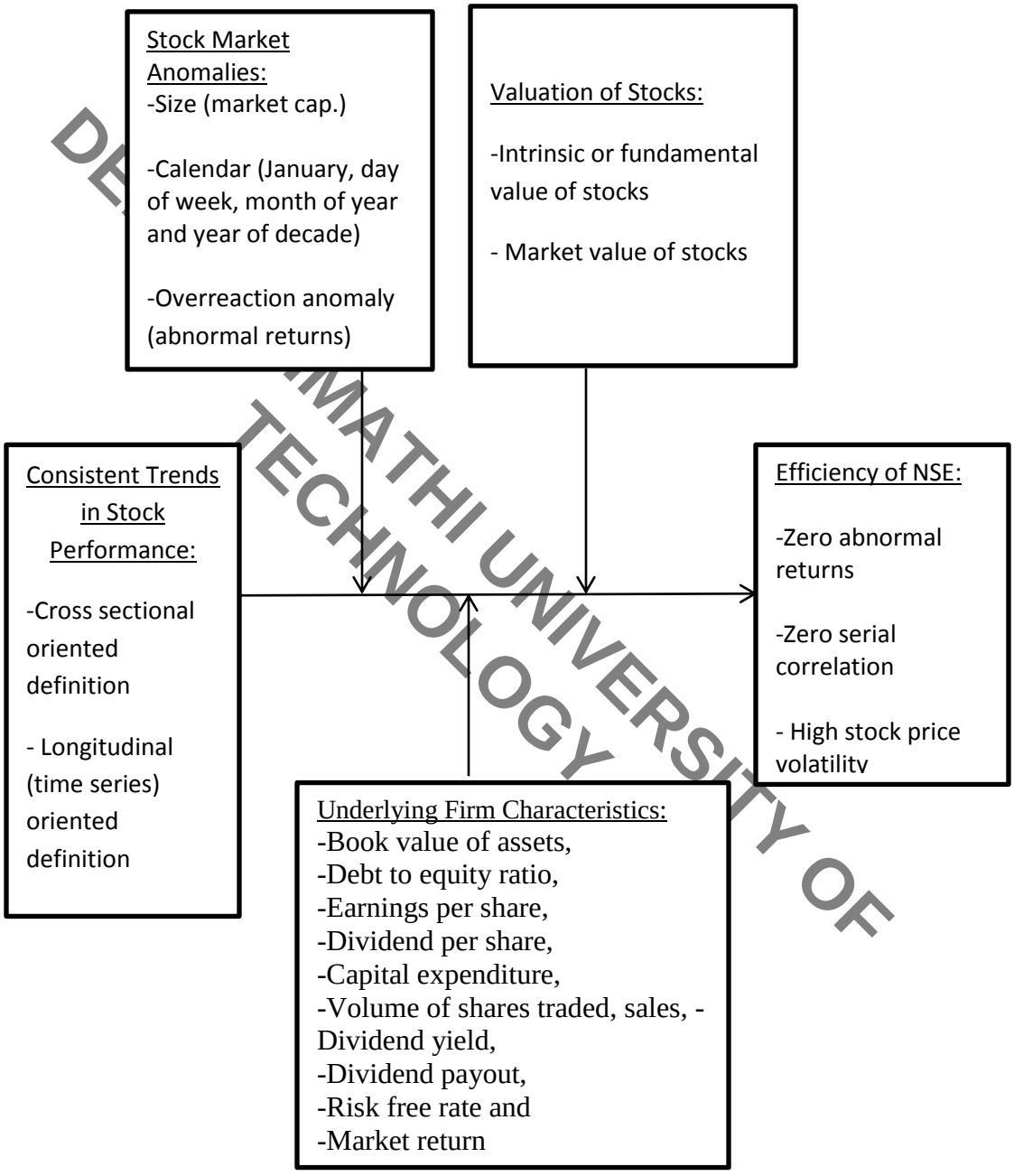
Figure 2.7 Conceptual Framework



Independent variable Moderating variables Dependent Variable

Developed in this research

Figure 2.8 Operational Framework



Independent variable Moderating variables Dependent Variable

Developed in this research

2.7 Research Gap

Alwathainani (2011) defined consistent stock performance based on repetitive top and bottom ranking of stocks during a period while Grinblatt and Moscowitz (2004) and Watkins (2003) defined consistent stock performance based on repetitive positive and negative stock returns for 2/3rds of the period. The combined effect of the alternative definitions of consistent stock performance in the NSE has not been studied in the past and hence a gap in literature and the first motivation behind this research. Past studies have not related consistent stock performance in the NSE to the theory of efficient markets as measured by zero abnormal returns, zero serial correlation and high stock volatility that is commensurate with the release of new information and this forms the second gap and motivation behind this research.

Past studies have not established whether the phenomenon of consistent stock performance in the NSE is related to stock market anomalies and this forms the third gap and motivation behind this research. Past studies have not established whether consistently performing stocks are under or overvalued which forms the fourth gap and motivation behind this research. The underlying firm characteristics that significantly influence consistently performing stocks have not been identified by the past studies and hence the fifth gap in literature and motivation behind this research.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the following subsections: research design, population, sample of study, data collection and data analysis.

3.2 Research Design

This research employs mixed research design method as follows: in order to establish the existence of consistent stock performance in the NSE, the research uses the applied research approach. The research then compares alternative definitions of consistent stock performance for similarity of results using causal-comparative research approach. The resultant common consistent performers are then tested for significance of abnormal returns, variation of abnormal returns with time, serial correlation of log returns and the relationship between consistent stock performance with stock valuation and underlying company features using the quantitative correlational research design (Mugenda and Mugenda, 2003).

3.3 Population of Study

Currently there are 58 listed companies in the NSE that are categorized into ten sectors of the economy including: agricultural, automobile and accessories, banking, commercial

and services, construction and allied, energy and petroleum, insurance, investment, manufacturing and allied and telecommunication and technology sectors. In the study period between years 2001 to 2010, the NSE had 56 listed companies that formed its population. During the study period there were major events that may have affected the NSE including 2 general elections in Kenya in years 2002 and 2007 which were both adversely affected by violence especially in year 2007. There was also the phasing out of the open outcry trading system in favor of the automated trading system (ATS). The ATS made enforcement of regulations easier to through detection of offences faster than before during the manual system. The NSE was reorganized and listed companies were categorized into Alternative Investment Market (AIM) that housed infrequently traded stocks and Main Investment Market (MIM) that housed the frequently traded stocks and further consisted of 4 sectors including: Agricultural, Commercial and Services, Finance and Investment and Industrial and Allied.

The research employs balanced panel data consisting of monthly closing stock price data for the decade of years 2001 to 2010 that is expected to have 120 months for the 32 companies that constitute the sample. The closing average stock price data is chosen as it represents the most current valuation of firms before trading continues in the following day.

3.4 Sample of Study

In this research the purposive sampling method is employed to avoid the problem of thin or infrequent trading that is common in emerging markets and which is characterized by numerous zero and large non-zero returns that are unrealistic and that lead to non-normal distributions (Cowan and Sergeant, 1996). The aim of employing the purposive sampling method is to have an informative sample that contains the required observations that can be studied without disruption by new listings, delisting or suspension from the NSE during the study period (Mugenda and Mugenda, 2003). The weaknesses of the purposive sampling method are mitigated by having a large sample size of 32 stocks relative to the population size of 56 stocks. The resultant sample from employing of purposive sampling method is superior than one that could have been generated by employing random sampling method which risked generating a sample that consists of stocks that did not exist for at least 80% of the study period, or stocks that were seriously affected by the problem of infrequent or thin trading.

The study sample focused on company stocks that are actively and continuously traded in the NSE for at least 80% of the study period out of 120 months or 2500 days expected from January 2001 to December 2010. The 80% threshold, according to Cronbach' alpha rates as good (Gliem and Gliem, 2003). Inactively traded stocks are affected by the problem of thin or infrequent trading and are omitted from the research which is consistent with the case deletion solution to thin or infrequent trading problem (Scheffer, 2002). Companies on suspension from trading in the NSE during the study period or the

companies listed for less than 80% of the study period are also omitted from the study to avoid disruption when studying the consistent stock performance. Out of the population of 56 NSE listed companies, only 32 fitted the sample selection criteria and hence became the study sample as per appendix 5.

3.4.1 Validation of Results

From the 32 stocks that form the research sample, 5 stocks are selected randomly from the inconsistently performing stocks which are from the balance of stocks left after consistent winners and losers are selected. The 5 stocks are for the purpose of validating results of tests carried out on consistent winners and consistent losers.

3.5 Data Collection

This research involves secondary data that is collected from published annual reports of companies listed in the NSE. More secondary data is in the form of daily closing average stock prices of listed companies that is drawn from the NSE offices for the study period.

3.5.1 Thin or Infrequent Trading Problem of Data Collection in NSE

Data collection efforts can be affected by the problem of infrequent or thin trading which occurs when stocks do not trade at every consecutive interval (Dia, 2011). Thinly traded stocks are likely to cause numerous zero and large non-zero returns which then result in non-normal distributions (Cowan and Sergeant, 1996). The solutions to the problem of thin trading include the deletion of cases with missing data and focusing on cases with

complete data. The imputation of the missing data from the available data from past periods is another solution although it is regarded creation of dummy data that is not the real data (Scheffer, 2002). This research does not create dummy values in case of infrequent trading but will process real data only to ensure that the results are relevant to stock market participants.

3.6.1 Data Analysis

This section covers test of normality of the distribution of monthly closing stock price data, the identification of consistent stock performance in the NSE, tests of weak form efficiency including: test of abnormal returns, volatility and serial correlation of consistently performing stocks. Additional tests seek to establish the relationship between consistent stock performance and stock market anomalies and the intrinsic value of consistently performing stocks. The influence that underlying company characteristics have on consistently performing stocks is also tested in this section.

3.6.1 Normality Test

The monthly closing stock price data for the 10 year study period is subjected to normality tests using the Kolmogorov-Smirnov test to evaluate the normality of the distribution which is a condition that should exist before sample results can be generalized to the entire population and before application parametric tests on the data (Bai and Serena 2005; Mugenda and Mugenda 2003).

The parametric tests employed in this research include: t-test when studying the significance of abnormal returns, standard deviation and range tests when studying stock return volatility. Simple regression analysis tests when studying the relationship between consistent stock performance and market anomalies and stock valuation. Multi-regression tests are employed when studying the influential underlying firm characteristics on consistent stock performance. All these parametric tests assume normality of the data distribution (Ambrosio and Kinniry, 2009).

3.6.2 Distribution of Stock Returns

The aim of statistical analysis is to establish summary measures that describe the important features of a distribution of values including: averages, dispersion, skewness and kurtosis. The averages describe the typical size of the distribution of values and are determined by the measures of central tendency including the arithmetic mean, median or middle value and mode which is the value that occurs most (Lucey, 2002). The purpose of establishing the normality of a distribution is to enable inferences to be made to a population from the results of sample testing (Mugenda and Mugenda, 2003).

Normal distribution is established by observing the skewness also referred to as the statistical third moment which should have a zero value and kurtosis also referred to as the statistical fourth moment which should have a value of three if data is normally

distributed. Skewness determines the lopsidedness or asymmetry of the distribution while kurtosis determines the peakedness of distributions whether they are mesokurtic meaning normal or platykurtic meaning flatter than normal or leptokurtic meaning more peaked than normal (Lucey 2002; Ezra 2009).

Normal distribution is used to characterize a series of values including stock returns and the distribution is centered at the mean while the standard deviation determines the width so that a series of values that are not be well distributed will tend to exhibit excess kurtosis implying that extreme values are more prevalent than those of a normal distribution which then causes a fat tailed distribution. Skewness in the distribution is likely and is caused by the likelihood of frequently big price depreciations than the frequently big price appreciations (Raju and Ghosh, 2004).

However in the past, the distribution of stock returns has been proven to be non-normal in terms of being leptokurtic or heteroscedastic even though the traditional mean-variance framework assumes that investors have a perception of risk is that it is symmetrical around the mean return with the underlying assumption being that stock returns are normally distributed (Rachev *et al.*, 2007). Arithmetic returns are also known to be often positively skewed (Mishra, 2005). The alternative logarithmic returns are superior as they avoid the problem of the data being non-normally distributed by being leptokurtic and heteroscedastic (Mobarek and Keasey 2000; Mishra 2005).

The student t-distribution that is generally used in standardized form and is similar to the normal distribution except for the heaviness of tails which is variable and controlled by a shape parameter nu that is inversely related to the heaviness of the tails whereby a large number of greater than 30 provides a good approximation of the normal distribution. It was found to be an excellent fit of the daily percentage returns and the lognormal distribution whose properties include: values do not go below zero, the natural logarithm of negative numbers is undefined and the distribution has a longer right tail that allows for extreme values was found to be nearly normal for the sum of continuously compounded returns (Egan, 2007). If the NSE is normally distributed, then parametric tests can be employed and the results can be inferred on the entire population.

3.6.3 Measures of Stock Performance

The financial performance of an investment can be measured by the periodic capital gain or loss computation which is the difference between end of period wealth and the initial investment as measured by a country's currency, which is modeled as follows (Copeland et al., 2005):

Rate of investment return (R) = (W – I) / I (1)

Where: W = end of period wealth as measured by a country's currency

I = initial investment

Stock return as a proxy of a stock performance can be measured as the periodic capital gain or loss in addition to the periodic dividend yield in a model referred as holding period yield or arithmetic return formula as follows (Cuthbertson, 2005):

Rate of arithmetic stock return (R_1) = ($P_1 – P_0 + D_1$) / P_0 (2)

Where: R_1 = rate of return for current period

P_1 = price of current period

P_0 = price of previous period

D_1 = dividend income for current period

The arithmetic return can also be computed using the following formula excluding for the effects of dividend yield (Ultsch, 2010):

Rate of arithmetic stock return (R_1) = (P_t / P_{t-1}) – 1 (3)

Where: R_1 = rate of return for current period

P_t = closing price for the day divided

$P_{t–1}$= closing price if the previous day minus one.

Rate of logarithmic stock return (R_1) = Ln (P_t / P_{t-1}) – 1 (4)

Where: Ln = natural logarithm

R_1 = rate of return for current period

P_t = closing price for the current day

P_{t-1}= closing price if the previous day

This research has employed the logarithmic returns as they are known to be analytically more tractable when linking together the sub-period returns to form longer intervals (Mobarek and Keasey, 2000). This means that the returns of longer periods can be derived by adding the log ratios of the intermediate periods (Ultsch, 2010). Statistically the log ratios are more likely to be normally distributed which good for analysis using standard statistical techniques (Mobarek and Keasey, 2000) while the arithmetic returns are often positively skewed (Mishra, 2005).

3.6.4 Tests of Existence Consistent Stock Log Returns in the NSE

The first research objective tests whether consistent stock log returns are present in the NSE during years 2001 to 2010. In stock markets that are efficient in the weak form, there should be no trends in stock returns that can be exploited by participants repeatedly unless there is an anomaly that is yet to be exploited.

During the study period frequency tests are employed to assess consistent stock performance based on repeated positive and negative log stock returns for $2/3^{rds}$ of the study period as per the definition by Grinblatt and Moscowitz (2004) and Watkins (2003) which is longitudinal or time series oriented. Frequency tests are also employed to assess consistent stock performance based on the repeated top or bottom ranking of stocks

during the study period definition by Alwathainani (2011) which is cross sectional oriented.

3.6.5 Tests of Existence of Consistent Abnormal Returns

The first research objective also tests whether consistently performing stocks yield consistent abnormal returns. Stock markets are not testable without some equilibrium model also referred to as asset pricing model which yields estimated or predicted or normal returns for comparison with actual returns for the purpose of establishing abnormal returns also known as alpha. Ideally abnormal and excess returns should be zero if the market is at least weak form efficient which implies that no investor should generate returns that are above market returns (Fama, 1991). In such markets, the intrinsic value of stocks is equal to their market value which implies that abnormal returns are zero. However irrational investors ho base decisions of fads and misinformation can drive stock prices away from their intrinsic values which cases mispricing and potential abnormal returns (Engel and Morris, 1991).

The capital asset pricing model (CAPM) is a mean model that is employed to generate normal. Abnormal returns are then generated by deducting the normal returns from actual stock returns as follows (Fama, 1991):

$$AR = R_t - [R_f + (ER_m - R_f) * B_i] \quad (5)$$

Where: R_t – periodic stock price changes

AR – abnormal return measured

R_f – riskless rate

ER_m – expected market price change

B_i – stock beta

CAPM despite its widespread usage in academics is criticized for making numerous assumptions about perfection of markets. Alternative asset pricing models include the constant mean return model which assumes that the mean return of a security is constant through time which is unrealistic. However, the constant mean return model is perhaps the simplest of the normal return computing models and often yields results that are similar to those of more sophisticated models and is computed as (Mac Kinlay, 1997):

Constant mean return = Total actual returns / Number of periods (6)

Abnormal returns = Actual returns – constant mean return (7)

Market model improves on the constant mean model and advocates for a linear relationship between returns of securities to those of the market portfolio. The models dependent variable is estimated stock returns while the independent variable is the stock

market returns. Studies have shown that market model produces returns that are similar to those of complex models and it as follows (Mac Kinlay, 1997):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_t \quad (8)$$

Where R_{it} = Normal Return

α_i = Constant term

β_i = Intercept or beta

R_{mt} = Market return

ε_t = error term

The Fama and French 3 factor model is widely used in empirical research and add variables of size and value to the CAPM model as they are deemed to yield high returns that are not captured by CAPM. The model is as follows (Fama and French, 2004):

$$R_{it} = R_{ft} + \beta_{im}(ER_{mt} - R_{ft}) + \beta_{is}(SMB_t) + \beta_{ih}(HML_t) + \varepsilon_{it} \quad (9)$$

Where: R_{it} = Normal stock return

R_{ft} = Risk free rate

α_i = Constant term

β_i = Intercept or beta

R_{mt} = Market return

E = expected

ε_t = error term

SMB = small size stock returns minus big size stock returns

HML = high book to market ratio minus low book to market ratio stocks

The 3 factor model, market model and CAPM are critiqued for employing market portfolio at their heart yet the market portfolio is deemed as elusive since there is ambiguity as to the assets that should be legitimately included or excluded into it (Fama and French, 2004).

The arbitrage pricing theory (APT) model is a multi-factor model that employs macroeconomic factors in the normal stock return prediction model which may include: interest and inflation rates, GDP growth rates and does not require identification of the market portfolio return as a factor. It is based on the law of one price which states that 2 identical items cannot sell at different prices. APT modeled as follows (Gillete, 2005):

$$R_i = \alpha_i + \beta_i F_i + \varepsilon_i \quad (10)$$

Where: R_{it} = Normal stock return

α_i = Constant term

β_i = Factor sensitivities

F_i = Factors such as interest rates, inflation rates and GDP growth rates

ε_t = error term

The APT model has been criticized for having marginal additive value over the market model since the most influential factor in APT model behaves like market factor. This makes the other factors have little value explanatory power in the model despite their inclusion (Mac Kinlay, 1997).

Excess returns that are above the risk free rate are computed as follows (Gillette, 2005):

Excess returns = actual returns – risk free rate (11)

Excess returns can that are above the market return are computed as follows (Albanis and Batchelor, 1999):

Excess returns = actual returns – market return (12)

This research employs the market model to establish abnormal returns due to its simplicity and ability to generate results that are similar to complex asset pricing models (Mac Kinlay, 1997). There is also no perfect asset pricing model that is able to precisely describe normal returns (Fama, 1998). The market model improves on the constant mean model and does not make numerous assumptions like other asset pricing models which

are unrealistic (Mac Kinlay, 1997). Once the abnormal returns are generated other tests are performed including significance tests and consistency of abnormal stock returns (Watkins 2003; Grinblatt and Moscowitz 2004).

3.6.6 Tests on whether the alternative cross sectional and longitudinal definitions of consistent stock performance yield similar stocks.

Within the first research objective this research also tests whether the alternative cross sectional and longitudinal definitions of consistent stock performance yield similar stocks. This is in order to eliminate redundancies of arising from the application of the alternative definitions simultaneously. Frequency and comparison tests are carried out on the independent results of consistent stock performing stocks based on the alternative definitions.

Redundancy in the alternative definitions of consistent stock performance is eliminated by evidence of similar stocks appearing simultaneously within the independent results of consistent stock performance. The identical stocks resulting from the alternative definitions in this research are termed as consistent winners stocks and consistent losers if they meet the threshold of daily stock returns that are in excess of 10% (Larson and Madura, 2003). If the threshold of Larson and Madura (2003) is not met, the resultant stocks are termed as consistent best and worst performers and this implies that the

resultant stocks are the best or worst performers but the performance is marginal and lacks the magnitude of winner or loser performance.

3.6.7 Tests of existence of a relationship between consistent stock performance and efficiency of NSE during the study period.

A market that is weak form efficient should exhibit zero abnormal returns (Larson and Madura, 2003); zero serial correlation of stock returns (Cuthbertson, 2005) and high stock price volatility that is commensurate with release of relevant news about the stocks (Watkins, 2003). The second specific research objective seeks to tests of existence of a relationship between consistent stock performance and efficiency of NSE during years 2001 to 2010. The specific tests include tests of significance of abnormal returns, volatility and serial correlation.

3.6.7.1 Significance of Abnormal Returns

The second research objective seeks to establish whether a relationship between consistent stock performance and efficiency of NSE during the study period. This is achieved by testing whether abnormal returns from consistently performing stocks are significantly different from zero. In markets that are efficient, abnormal returns should be zero to prevent any investor from outperforming the market (Fama, 1998). In this

research, student t-test method is employed to test statistical significance of abnormal returns generated by consistently performing stocks (Alwathainani, 2004). In this research, abnormal returns are determined by employing the market model (equation 8) due to its simplicity and ability to yield acceptable results when compared to other asset pricing models (Mac Kinlay, 2007).

Larson and Madura (2003) in an event study set a threshold of at least 10% for daily stock returns (sign ignored) when determining daily winner and loser stocks. The 10% threshold is employed in this research in determination of outstanding consistent stock performers who are then termed as consistent winner and loser stocks. The 10 year monthly stock log return data from consistently and inconsistently performing stocks are converted to daily data and subjected to the threshold of at least 10%. Consistent stock performance that fails to meet the 10% threshold is simply regarded as consistent best or worst performance and are deemed to lack magnitude.

3.6.7.2 Significance of Volatility of Stock Prices

The second research objective seeks to establish whether a relationship between consistent stock performance and efficiency of NSE during the study period. This is achieved by testing the significance of volatility of stock prices. Watkins (2003) postulated that consistency is the absence of volatility. High volatility in stock prices that

is commensurate with release of news about stocks is a feature of efficient stock markets which implies randomness in the occurrence of stock prices (Cuthbertson, 2005).

In financial economics when volatility varies with time it is referred to as heteroscedasticity and implies high volatility. When volatility does not vary with time it is termed as homoscedasticity and it represents low volatility (Biglova *et al.*, 2004). The time varying volatility is measured by testing whether the error term in a time series varies with time. The error term represents the difference between the actual and estimated dependent variable (Gujarati and Porter, 2010). In this research is measured using abnormal returns are the equivalent of the error term as they are derived from the difference between the actual return and the estimated return (Gillete, 2005).

In this research, heteroscedasticity thus implies randomness and unpredictability of abnormal returns which vary with time and imply high stock price volatility and the lack of consistent stock performance. Homoscedasticity refers to volatility that is constant over time and hence it is lower volatility that is predictable and the presence of consistent stock performance (Biglova *et al.*, 2004). The null hypothesis for the test of volatility with time is homoscedasticity which assumes constant variation of abnormal returns about the zero mean and implies lack of variation of abnormal returns with time. The

alternative hypothesis for the volatility with time test is heteroscedasticity which assumes abnormal returns vary with time (Gujarati, 2006).

Volatility with time or heteroscedasticity is measurable using the Spearman's rank correlation coefficient which if significant, indicates volatility with time or heteroscedasticity (Gujarati 2006; Mukras 1996). The Spearman's rank correlation methodology requires initial determination of the absolute abnormal returns (error term of the market model) and the market risk premium (independent variable of the market model). The absolute abnormal returns and market risk premium are then ranked independently and the differences between the independent rankings are squared before testing for significance by employing t-test of significance (Gujarati 2006; Mukras 1993). The Spearman's rank correlation coefficient equation is then employed as below (Gujarati, 2006):

$$Rs = 1 - 6 [\sum di^2] / n (n^2 - 1) \quad (28)$$

Where Rs = Spearman's rank correlation coefficient

di = difference between 2 ranks of independent variable (market return) and residuals (abnormal returns)

n = number of months

Once volatility with time is tested by employing Spearman ranks volatility tests, the results are compared with those of conventional volatility models of standard deviation and range of stock returns for validation purpose. A new stock return volatility metric referred to as proportional volatility metric innovated form the requirements volatility model is also applied in testing stock return volatility and its results are validated by those of standard deviation and range (Sweeney, 2006).

In the field of computer science, requirements are the foundations of the software development process as they provide the basis for estimating costs and schedules and development and testing of specifications. The success of any software development process is directly related to the quality of its requirements which change throughout the development cycle in terms of additions, deletions and modifications and thus impact on the cost and quality of the resultant product (Singh and Vyas, 2012).

There is no standard definition of requirements volatility as it expresses the changing nature of requirements over a system development cycle as the needs of stakeholders evolve (Singh and Vyas, 2012). In terms of software documentation, requirements volatility refers to the amount of changes to a requirements document over time and is an important risk factor in software projects (Loconsole, 2008). There is an inverse relationship between requirements volatility and the cost and time schedule of software

development projects. This implies that the high requirements volatility is associated with low cost and time scheduling (Singh and Vyas 2012; Loconsole 2008). The requirements volatility that is as follows (Singh and Vyas 2012; Loconsole 2008; Zowghi *et al.* 2006):

$$\text{Requirements volatility} = \frac{\text{Number of changed words in a file}}{\text{Number of words per file}} \quad (14)$$

The proportional runs volatility model being a non-parametric test does not depend to measures of central tendency that are associated with normally distributed data (Raju, 2009). The model's numerator is the number of runs in a series of abnormal return observations while the denominator is the total number of abnormal return observations during a period as follows (Author):

$$\text{Proportional Runs Volatility} = \frac{\text{Number of runs in a series of abnormal returns}}{\text{Total number of abnormal returns in the series}} \quad (15)$$

A run refers to an uninterrupted sequence of either positive or zero or negative numerical observations in a series hence when two or more consecutive numerical observations are similar, a run is said to arise. There is an inverse relationship between the number and the length of runs (Gujarati, 2006). Numerous short runs in a series of abnormal returns will result in high volatility which is associated with efficient markets and thus inconsistent

stock performance. If few long runs occur in a series of abnormal returns, the results will be low volatility and hence consistent stock performance (Gujarati 2006; Watkins, 2003). The results of the proportion of runs are validated by alternative conventional techniques such as ANOVA, standard deviation and range volatility models.

The standard deviation is a measure of volatility utilizes all the data under consideration and determines the dispersion from the mean. It is the most commonly employed volatility metric and it summarizes the probability of seeing extreme values in returns so that when standard deviation is large, there is a high probability of seeing large positive or negative returns (Schwert, 1990). It makes the underlying assumption that the distribution of stock returns is symmetrical or normal and is computed as follows (Sweeney, 2006):

$$\delta = \sqrt{(xi - \bar{x})^2 / n} \qquad (16)$$

Where: δ refers to standard deviation, xi refers to periodic stock returns, $\bar{x}$ refers to the mean stock return and n refers to the number of periods. Variance as a measure of volatility also measures dispersion from the mean and is the square of standard deviation. Range as a measure of volatility utilizes only the highest and lowest observations in a series and has the drawback of being vulnerable to outliers. It is computed as follows (Sweeney, 2006):

Range = highest observation – lowest observation (17)

3.6.7.3 Serial Correlation of Stock Returns

The second specific research objective seeks to tests of existence of a relationship between consistent stock performance and efficiency of NSE during years 2001 to 2010. The specific tests include tests of serial correlation of stock returns. Consistently performing stocks are expected to exhibit positive serial correlation so that stock returns in a period of a certain sign (positive or negative) are followed by stock returns of the same sign in the following period which is an anomaly contradicting efficient market hypothesis (Watkins, 2003). Positive serial correlation is associated with under reaction to news by investors and hence momentum anomaly and consistent stock performance (Khan, 2011).

The popular tests of serial or auto correlation include the runs test and the Augmented Dickey Fuller (ADF) tests and Durbin Watson test. This research employs the runs serial correlation test whose null hypothesis states that there is randomness whose proxy is zero serial correlation in a time series and the alternative hypothesis non-randomness whose proxy is positive or negative serial correlation. Positive serial correlation is evidenced by fewer and longer runs and is thus associated with momentum anomaly. Negative serial

correlation is evidenced by many shorter runs and is associated with reversal or contrarian anomaly (Adolph, 2007).

In this research, the runs serial correlation test is employed for being a parametric test that does not require the test data to be normally distributed and is thus suitable for stock return data which is usually leptokurtic and positively skewed (Mishra, 2005). Serial correlation is modeled as follows (Napper, 2008):

$$\text{Serial correlation } (t_1, t_{-1}) = \text{covariance } (t_1, t_{-1}) / \sigma\, t_1\, \sigma\, t_{-1} \quad (18)$$

Where:

$$\text{covariance } (t_1, t_{-1}) = \sum (R_t - ER_t)*(R_{t-1} - ER_{t-1}) \quad (19)$$

t = current period

t_{-1} = previous period

σ = standard deviation

E = Expected

R = Returns

In case the series of returns is serially correlated, runs test clearly indicates whether the series is positively or negatively serially correlated. Negative serial correlation which is evidenced by numerous and short runs is deemed to occur when the actual number of runs exceeds the expected number of runs. Positive serial correlation which is evidenced

by few and long runs is deemed to occur when the actual number of runs is less than the expected number of runs in a series. When actual number of runs is equal to the expected, then no serial correlation is regarded to exist in the series and it is evidence of randomness which is an indicator that the stock market is efficient (Adolph, 2007).

The expected number of runs in a series is a proxy of randomness and is estimated as follows (Adolph, 2007):

$$\text{Expected No. of Runs } (\mu) = [2*n_1*n_2) / N] + 1 \quad (20)$$

Where: n_1 = no. of positive returns in the series

n_2 = no. of negative returns in the series

N = total no. of returns in the series

The null hypothesis in a runs test of serial correlations indicates the non-existence of serial correlation and is tested by employing the Z test for the purpose of rejecting or not rejecting the null hypothesis after generating Z-statistics and p-values as follows (Adolph, 2007):

$$Z = [\,|\text{actual runs} - \text{expected runs}| - 0.5] / \delta \quad (21)$$

Where: $\delta = \sqrt{2*n_1n_2(2*n1*n2-N) / N^2(N-1)}$ (22)

n_1 = no. of positive returns in the series

n_2 = no. of negative returns in the series

N = total no. of returns in the series

The other popular tests of serial or auto correlation include the Durbin Watson (DW) and the Augmented Dickey Fuller (ADF) tests of unit root or stochastic process in a time series. The null hypothesis of Durbin Watson test states that there is no serial correlation in a time series while the alternative hypothesis states that there is serial correlation. The Durbin Watson test is able to detect first order serial correlation and has difficulty in detecting serial correlation at higher levels hence the need for ADF test. The formulae for Durbin Watson statistic is as follows (Vogelvang, 2005):

$$DW = \sum (e_t - e_{t-1})^2 / \sum e_t^2 \quad (23)$$

Where: e_t = error or residual term at time period t

e_{t-1} = error or residual term at a previous period time t-1 or lagged once

e = actual dependent variable y - predicted dependent variable $\hat{y}$

A robust test to apply to test for serial correlation is the Augmented Dickey Fuller (ADF) test whose null hypothesis states that there is a unit root or stochastic process in the time series consisting of stock returns and hence the series is non-stationary or random and

unpredictable while the alternative hypothesis states that there is no unit root or stochastic process in the series which is then regarded as non-random, stationary and predictable (Vulic, 2010).

If a time series has a unit root it means that it has a stochastic process and hence random cannot be used for stock return prediction purposes. If a series lacks a unit root it means that it has no stochastic process and hence it is non-random can be used for stock return prediction purposes (Oprean, 2012). The ADF statistic tests for the unit root or stochastic or random process in the time series data through application of an autoregressive process given as modeled below (Vogelvang, 2005):

$y_t - y_{t-1} = \alpha_0 + \alpha_1 y_{t-1} + \varepsilon_t$ or (24)

$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \varepsilon_t$ (25)

Where H0: $\alpha_1 = 0$: series has a unit root

H1: $\alpha_1 < 0$: series has no unit root

y_t = dependent variable = daily stock price changes

y_{t-1} = one lag of daily stock price changes

α = coefficient

ε_t = error term at time t

$\Delta = 1^{st}$ difference operator

The decision criteria for ADF test is that the null hypothesis of existence of a unit root in the time series should not be rejected if the ADF test statistic is greater than the critical values (tau) at 1%, 5% and 10% levels. The non-rejection of the null hypothesis is an indicator of the existence of mean reversion in the series that causes it to be non-stationary. Alternatively the null hypothesis should be rejected if the ADF test statistic is less than the critical values (tau) at 1%, 5% and 10% levels which means that the time series is stationary and mean reversion in stock prices was non-existent (Vulic, 2010).

In this research, the runs test is employed to test serial correlation due to its simplicity and the fact that it is non-parametric and hence suitable for non-normally distributed data such as stock returns (Mishra, 2005).

3.6.8 Tests of Relationship between Consistent Stock Performance and Stock Market Anomalies

The third specific objective seeks to establish whether consistently performing stocks in the NSE are related to the common market anomalies during the study period. The common stock market anomalies tested are size effect, calendar effects and overreaction anomaly. Size effect advocates that small sized firms in terms of market capitalization earn higher risk adjusted returns compared to large firms (Gadhi and Lustig 2010 and Elfakhani and Zaher 1998). In this study, market capitalization forms the independent

variable and stock log returns of consistently performing stocks form the dependent variable in a simple regression model. The consistently performing stocks are initially separated into small and large market capitalization stocks alongside the respective abnormal returns before the simple regression is run (Fama and French, 2004).

$$L_n R_t = \alpha + \beta M + \varepsilon \quad (26)$$

Where $L_n R_t$ = stock log returns

α = constant

β = coefficient

M = market capitalization

ε = error term

Calendar anomalies advocates that positive or negative stock returns can be associated with some specific time periods which include: day of the week and month of the year effects (Latif *et al.* 2011). The calendar anomalies are tested in this research by employing simple regression analysis as follows (Borges, 2009):

$$R_t = \alpha + \beta D + \varepsilon \quad (27)$$

Where: R_t = mean abnormal return for the study period

α = mean return for the periods not of interest (such as non-January)

β = abnormal returns of period of interest relative to period not of interest (such as January relative to non-January)

D = period of interest (such as month of January)

The significance of the period of interest D is then measured using t-test.

Momentum anomaly which is associated with under reaction to news by investors postulates that stocks can experience a return continuation effect in the short run. Thus stocks experiencing positive or negative returns continue to experience the same returns for some time hence forming a predictable trend and a stock market anomaly (Lo and McKinlay, 2003).

Behavioral finance advocates propose that momentum profits can be explained by under reaction of investors to news while contrarian or reversal profits can be explained by overreaction by investors to news. Both momentum and reversal profits denote trends or patterns in stock returns. Behavioral finance practitioners who believe that extreme returns in a direction are followed by returns in the opposite direction for overreaction hypothesis while for under reaction hypothesis, extreme returns in a direction are followed by returns in the same direction (Nosfinger, 2008). The overreaction anomaly postulates that large abnormal returns can be earned by a strategy that involves buying past losers and selling past winners which is an anomaly that contradicts weak form stock market efficiency. Under reaction anomaly postulates that profits can be generated by a

strategy that involves buying past winners and selling past losers (De bondt and Thaler, 1985).

The overreaction and under reaction anomaly can be tested by employing the Spearman's rank correlation coefficient test. The extreme winner and loser stocks are initially established after ranking stocks in descending order during the formation period. The performance of the winners and losers as measured by abnormal returns during the formation period is then compared with the performance during the holding period to check for abnormal return same sign continuation or reversal of the signs. The same sign continuation implies momentum and under reaction while reversal in sign implies overreaction.

Spearman's rank correlation coefficient is then employed which if positive and significant is an indicator of the presence of momentum anomaly and if negative and significant is an indicator of the presence of contrarian or reversal profits (Detlev, 1990). The Spearman's rank correlation coefficient equation is the employed as below (Gujarati, 2006):

$$Rs = 1 - 6 [\sum di^2] / n (n^2 - 1) \quad (28)$$

Where Rs = Spearman's rank correlation coefficient

di = difference between 2 ranks of independent variable (market return) and residuals (abnormal returns)

n = number of months

In this research the formation and holding periods consist of 12, 36 and 60 months.

3.6.9 Tests of Valuation of Consistently Performing Stocks

The fourth specific research objective seeks to determine the intrinsic value of consistently performing stocks. Value anomaly postulates that investors are likely to undervalue the stocks with high book to market (B/M) ratios which are termed as value stock. Investors are also likely to overvalue the growth stocks which are characterized by low book to market (B/M) ratios. When the market subsequently corrects itself the undervalued value stocks earn above the average market returns as their prices rise towards the intrinsic value while the overvalued growth stocks earn below the average market returns as their price fall towards the intrinsic value (Fama and French, 2004). In this research, consistently performing stocks are initially separated into stocks groups of high B/M ratios and of low B/M ratios before regression analysis is carried out. The stock log returns of consistently performing stocks form the dependent variable and B/M ratios form the independent variable in a multi-regression regression model.

It is also postulated that stocks with low price to earnings (P/E) ratios outperform those with high P/E ratios. Low P/E ratio stocks relative to other stocks in their industry are deemed to be undervalued while high P/E ratio stocks relative to other stocks in the same industry are deemed to be overvalued (De Bondt and Thaler, 1985). In this research, consistently performing stocks are initially separated into stocks groups of high P/E ratios and of low P/E ratios before regression analysis is carried out. The stock log returns of consistently performing stocks form the dependent variable and P/E ratios form the independent variable in a multi-regression regression model as follows (Fama and French, 2004):

$$L_n R_t = \alpha + \beta_1 (B/M) + \beta_2 (P/E) + \varepsilon \quad (29)$$

Where $L_n R_t$ = stock log returns

α = constant

β_i = coefficients

B/M = book to market ratio

P/E = price to earnings ratio

ε = error term

3.6.10 Test of the Underlying Firm Characteristics

The fifth research objective seeks to establish the underlying firm characteristics that significantly influence consistent stock performance in the NSE. Fundamental analysts do not believe that the market is its own best predictor and hence the need for economic, industry and company data that is separate from the securities market to predict the future price trends (Siqueira *et al.*, 2012). By establishing the fundamental or intrinsic value of a stock, an analyst can be able to derive abnormal returns from stocks and thus outperform the market which is contrary to weak form efficiency as the underlying features of companies are past information that is already incorporated in the stock prices and should not aid in predicting future performance (Fama, 1991).

The multi-regression technique is employed for the purpose of establishing the underlying firm characteristics with significant influence on consistently performing stocks. This is due to its ability to test the significance of relationship between a dependent variable and numerous independent variables simultaneously while at the same time is able to test the goodness of fit of the whole model through the R^2 statistic as follows (Sweeney, 2006):

$$Y_t = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + - - -+ B_nX_n + U_t \quad (30)$$

Where: Y_t = Abnormal Returns

B_0 = Constant

B_n = Weights or coefficients

X_n = Independent or predictor variables

U_t = Error term

The log stock returns of consistently performing stocks, constitutes the dependent variable in the multi-regression model. The independent or predictor variables drawn from the underlying features of the listed companies under study include: book value of assets, debt to equity ratio, earnings per share, dividend per share, capital expenditure, volume of shares traded, sales, dividend yield, dividend payout, risk free rate and market return all which are drawn from relevant past studies.

Unlike in experimental sciences where observations in a research are generated under controlled conditions, in economics and finance it is possible to find some general inter correlation among the explanatory variables a phenomenon known as multi-collinearity which becomes a problem when the it is high among the explanatory variables. The problem of multi-collinearity arises from the presence of interdependence or lack of independence among explanatory variables in a multi-regression model which can lead to a breakdown of the multi-regression model, which then will possess large standard errors and difficulty in determining the coefficient estimates in the model (Brooks, 2004).

For the purpose of model building, a common practice is to start with a full model that has many independent variables and then discarding the statistically insignificant variables after running the model which has the purpose of reducing the risk of omitting some important variables as the appropriateness of variables to be used in stock selection is of concern (Sorensen, 2000).

3.6.11 Operationalization of Variables

This section covers how the key variables are operationalized in the research

Table 3.6.9.1: Operationalization of Variables

Variable	**Operational Definition**
Consistent Trends	1. Stocks that rank repeatedly at the top or bottom respectively based on returns in the study period (Cross sectional oriented definition). 2. Stocks with repetitive outstanding positive or negative returns respectively for 2/3rds of the study period (longitudinal or time series oriented definition). 3. Consistent best and worst performers from the combined cross sectional and time series oriented definitions.
Stock performance	1. Monthly stock log returns

	2. Monthly abnormal stock returns: actual stock log returns less predicted or estimated stock returns. 3. Monthly excess stock returns: actual stock returns less the NSE index log returns
Winner Stock	Stock whose daily positive returns exceeds 10%
Loser Stock	Stock whose daily negative returns exceeds 10%
Efficient Market Hypothesis	Weak form stock market efficiency is represented by randomness in the occurrence of stock prices whose features are: zero abnormal returns, zero serial correlation and high stock price volatility.
Volatility of abnormal returns with time	Assessed using 1. Spearman's rank correlation, 2. Standard deviation, 3. Range and 4. Proportional runs model (innovated from requirements volatility model of computer science).
Serial or auto-correlation of abnormal returns	1. Correlation of current month stock returns against those of past months. 2. Negative serial correlation implies positive stock returns in a period is followed by negative returns in the next period and hence reversal.

	3. Positive serial correlation implies that positive stock returns in a period are followed by positive stock returns in the next period and negative stock returns in a period are followed by negative stock returns in the next period hence momentum. 4. Zero serial correlation implies randomness and unpredictability.
Stock market anomalies	1. Size anomaly: measured using market capitalization. 2. Calendar anomalies: measured by significance of abnormal returns occurring within calendar months and years during the study period. 3. Momentum anomaly: measured by assessing return continuation effect during formation and holding periods of 3, 6, 12, 36 and 60 months. 4. Overreaction anomaly: measured using Spearman's rank correlation.
Intrinsic value of stocks	1. Value anomaly: measured using book to market ratio. 2. P / E anomaly: measured using price to earnings ratio
Underlying firm	1. Book value of assets,

characteristics	2. Debt to equity ratio, 3. Earnings per share, 4. Dividend per share, 5. Capital expenditure, 6. Sales, 7. Risk free rate, 8. Market return, 9. Volume of stocks traded, 10. Dividend yield, 11. Dividend payout

CHAPTER FOUR: ANALYSIS AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter contains the findings of both descriptive statistics about establishing consistent stock performance and inferential statistics on the tests done including normality, one sample student t-test, analysis of variance, correlation and multi-regression modeling.

4.2 General Description of the Data Analyzed

The stock price change data is tested for normality of distribution after eliminating outliers to ensure that inferences could be drawn from the sample of 32 companies to the population of 56 companies and to ensure that parametric tests are suitable for application on the sample data (Bai and Serena, 2005). Based on the log stock returns data the normality test results for all the 6 consistent best performers, 4 worst performers and 5 inconsistent performers reveal that they are normally distributed. The null hypothesis of non-normal distribution is rejected for all the 15 stocks whose p-value is 0.00 which is significantly lower than 0.05 level of confidence as per Table 4.2.1. This implies parametric tests can be employed and that the results can be generalized to the population (Mugenda and Mugenda, 2003).

Table 4.2.1: Normality Test Results

S/N	Consistent best performers	N	Mean	Std. Deviation	Absolute	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
1	CO.17	118	0.03	0.12	0.22	2.37	**0.00**
2	CO.9	118	0.02	0.13	0.24	2.65	**0.00**
3	CO.28	118	-0.01	0.26	0.27	2.97	**0.00**
4	CO.22	118	0.01	0.18	0.23	2.53	**0.00**
5	CO.5	118	0.01	0.20	0.31	3.37	**0.00**
6	CO.16	118	0.01	0.11	0.26	2.82	**0.00**
S/N	**Consistent worst performers**						
1	CO.3	118	-0.01	0.24	0.24	2.62	**0.00**
2	CO.23	118	0.00	0.13	0.19	2.03	**0.00**
3	CO.26	118	0.00	0.14	0.24	2.59	**0.00**
4	CO.15	118	0.01	0.18	0.19	2.09	**0.00**
S/N	**Inconsistent Performers**						
1	CO.1	118	0.00	0.20	0.21	2.28	**0.00**
2	CO.8	118	0.01	0.17	0.24	2.57	**0.00**
3	CO.14	118	0.02	0.25	0.22	2.37	**0.00**
4	CO.24	118	-0.02	0.26	0.31	3.32	**0.00**
5	CO.31	118	0.02	0.16	0.27	2.91	**0.00**

4.3 Identification of Consistent Stock Performance in the NSE

In response to the first research objective of establishing the existence of consistent stock performance in the NSE, log stock returns are ranked annually for the 10 year study period to establish the most commonly ranked stocks amongst the top and bottom which are termed as the best and worst consistently performing stocks respectively as per the

definition by Alwathainani (2011). The results reveal that there are 12 stocks ranking consistently among the top 40% of 32 stocks in the study sample as per Table 4.3.1. These results support the occurrence of consistent stock trends in the NSE as per the definition by Alwathainani (2011) which is an anomaly as the NSE is weak form efficient.

Table 4.3.1: Descriptive Statistics on Consistently Top Ranked Stocks

S/N	Consistently Top Ranked Stocks	Rate of Repeated Top Ranking
1	CO.17	0.53
2	CO.9	0.52
3	CO.28	0.50
4	CO.10	0.48
5	CO.22	0.48
6	CO.32	0.47
7	CO.6	0.46
8	CO.14	0.45
9	CO.21	0.45
10	CO.5	0.44
11	CO.16	0.43
12	CO.1	0.42

In response to the first research objective of establishing the existence of consistent stock performance in the NSE, frequency tests are employed to establish stocks with the most

common positive and negative log stock returns during the 10 year study period as per the definition by Grinblatt and Moscowitz (2004), Watkins, (2003). In this research such stocks are labeled as the best and worst consistently performing stocks.

The results reveal that no stock out of the sample of 32 stocks meets the strict threshold of consistent positive or negative stock returns for 2/3rds of the study period. The strict threshold requirement is relaxed and the top ranked 12 stocks which constitute 40% of the 32 stocks in the sample as per the definition by Alwathainani (2011) are selected as the stocks with consistent positive returns as per table 4.3.2. The non-existent consistent positive stock returns imply that the NSE is weak form efficient and will not allow for trends to persist.

Table 4.3.2: Descriptive Statistics on Consistent Positive Stock Returns

S/N	Consistent Positive Stock Returns	Rate of Repeated Positive Returns
1	CO.5	57.6
2	CO.7	56.8
3	CO.28	56.8
4	CO.11	55.9
5	CO.16	55.9
6	CO.17	55.1
7	CO.22	55.1
8	CO.9	54.2

9	CO.13	54.2
10	CO.19	54.2
11	CO.6	53.4
12	CO.12	53.4

The results of testing for consistently bottom ranked stocks reveal that there are 12 stocks ranking consistently among the bottom 40% of 32 stocks in the study sample as per Table 4.3.3. These results support the occurrence of consistent stock trends in the NSE as per the definition by Alwathainani (2011). Such consistent trends constitute an anomaly as the NSE is weak form efficient.

Table 4.3.3: Descriptive Statistics on Consistently Bottom Ranked Stocks

S/N	Consistent Bottom Ranked Stocks	Rate of Repeated Bottom Ranking
1	CO.3	0.56
2	CO.23	0.49
3	CO.26	0.49
4	CO.4	0.48
5	CO.30	0.47
6	CO.1	0.46
7	CO.27	0.46
8	CO.14	0.45
9	CO.22	0.44

10	CO.10	0.43
11	CO.15	0.43
12	CO.21	0.43

The results of searching for stocks with consistent negative returns reveal that no stock out of the sample of 32 stocks meets the strict threshold of consistent positive or negative stock returns for 2/3rds of the study period. The strict threshold requirement is relaxed and the bottom ranked 12 stocks which constitute 40% of the 32 stocks in the sample as per the definition by Alwathainani (2011) are selected as the stocks with consistent negative returns as per table 4.3.4. The non-existent consistent negative stock returns imply that the NSE is weak form efficient and will not allow for trends to persist.

Table 4.3.4: Descriptive Statistics on Consistent Negative Stock Returns

S/N	Consistent Negative Stock Returns	Rate of Repeated Negative Returns
1	CO.26	51.7
2	CO.23	50.8
3	CO.14	49.2
4	CO.1	48.3
5	CO.2	47.5
6	CO.3	47.5
7	CO.15	47.5
8	CO.21	47.5

9	CO.25	47.5
10	CO.6	45.8
11	CO.12	44.9
12	CO.10	44.1

4.4 Short Term Consistent Stock Performance in the NSE

In response to the first research objective consistent stock performance is tested in the NSE in short and intermediate terms of quarterly, semi-annual, annual and 5 year horizons. The results as per table 4.4.1 reveal that consistent stock trends are not present in the NSE during all the time horizons as the threshold of 66.67% is not met (Grinblatt and Moscowitz 2004; Watkins, 2003). The lack of consistent trends in stock performance supports the weak form efficiency status of the NSE.

Table 4.4.1: Descriptive Statistics on Consistent Stock Performance in the Short and Intermediate Terms

S/N	Consistent Positive Returns	Quarterly rate of positives	Semi-annual rate of positives	1 year rate of positives	5 years rate of positives
1	CO.17	0.59	0.59	0.59	0.59
2	CO.9	0.57	0.58	0.57	0.58
3	CO.28	0.58	0.58	0.57	0.58

4	CO.22	0.52	0.52	0.52	0.53
5	CO.5	0.49	0.49	0.49	0.49
6	CO.16	0.54	0.54	0.54	0.54
	Mean	**0.55**	**0.55**	**0.55**	**0.55**
S/N	**Consistent Negative Returns**	**Quarterly rate of negatives**	**Semi-annual rate of negatives**	**1 year rate of negatives**	**5 years rate of negatives**
1	CO.3	0.56	0.57	0.57	0.57
2	C0.23	0.50	0.49	0.49	0.49
3	CO.26	0.53	0.54	0.53	0.53
4	CO.15	0.60	0.6	0.6	0.59
	Mean	**0.55**	**0.55**	**0.55**	**0.55**
S/N	**Inconsistent Returns**	**Quarterly rate of positives**	**Semi-annual rate of positives**	**1 year rate of positives**	**5 years rate of positives**
1	CO.1	0.46	0.49	0.44	0.48
2	CO.8	0.63	0.54	0.53	0.53
3	CO.14	0.53	0.46	0.48	0.49
4	CO.24	0.63	0.59	0.55	0.56
5	CO.31	0.54	0.51	0.49	0.53
	Mean	**0.56**	**0.52**	**0.50**	**0.52**

4.5 Consistent of Abnormal Returns

In response to the first research objective of whether consistent stock exists in the NSE, the results as per table 4.5.1 reveal that there are no consistent abnormal returns that appear for 66.67% of the period (Grinblatt and Moscowitz 2004; Watkins 2003). This

implies that an investor cannot generate abnormal returns consistently in the NSE as it is weak form efficient.

Table 4.5.1: Descriptive Statistics on Consistent Abnormal Returns

S/N		Proportion of positives	Proportion of negatives
	Consistent best performers		
1	CO.17	0.49	0.51
2	CO.9	0.50	0.50
3	CO.28	0.51	0.49
4	CO.22	0.53	0.47
5	CO.5	0.51	0.49
6	CO.16	0.45	0.55
	Mean	**0.50**	**0.50**
	Consistent worst performers		
1	CO.3	0.53	0.47
2	C0.23	0.45	0.55
3	CO.26	0.45	0.55
4	CO.15	0.51	0.49
	Mean	**0.49**	**0.52**
	Inconsistent performers		
1	CO.1	0.43	0.57
2	CO.8	0.48	0.52
3	CO.14	0.42	0.58
4	CO.24	0.59	0.41
5	CO.31	0.39	0.61
	Mean	**0.46**	**0.54**

The first research objective focuses on whether consistent stock performance is existent in the NSE. Frequency of occurrence of excess returns over market returns are carried out to test whether investors can consistently outperform the NSE. The results as per table 4.5.2 reveal that there are no consistent excess returns above market returns that appear for 66.67% of the period (Grinblatt and Moscowitz 2004; Watkins 2003). This implies that no investor can beat the NSE consistently as it is weak form efficient.

Table 4.5.2: Descriptive Statistics on Consistency of Excess Returns over Market Returns

S/N	Consistent best performers	Proportion of positives	Proportion of negatives
1	CO.17	0.58	0.42
2	CO.9	0.58	0.42
3	CO.28	0.53	0.47
4	CO.22	0.59	0.41
5	CO.5	0.52	0.48
6	CO.16	0.46	0.54
	Mean	**0.54**	**0.46**
	Consistent worst performers		
1	CO.3	0.42	0.58
2	C0.23	0.48	0.52
3	CO.26	0.40	0.60
4	CO.15	0.51	0.49
	Mean	**0.45**	**0.55**
	Inconsistent performers		
1	CO.1	0.45	0.55
2	CO.8	0.53	0.47
3	CO.14	0.47	0.53
4	CO.24	0.47	0.53

5	CO.31	0.47	0.53
	Mean	**0.48**	**0.52**

4.6 Test whether the alternative cross sectional and time series oriented definitions of consistent stock performance yield similar stocks.

In the first research objective this research also tests whether the alternative definitions of consistent stock performance yield similar stocks in order to eliminate redundancies arising from studying the alternative definitions independently. When the strict threshold of identifying consistent stock performance that requires repeated stock returns for at least 2/3rds of the research period is applied, similarity of results from the alternative definitions is not achieved. However when the threshold is lowered to 50% of the research period (Gliem and Gliem, 2003) the results reveal that there are 6 consistent best performers and 4 consistent worst performers out of 32 stocks in the sample as per table 4.6.1. The probability of identifying a consistent best performer in the NSE is thus 6/32 which amounts to 0.1875 and the probability of identifying a consistent worst performer in the NSE is 4/32 which amounts to 0.125. The weak performance implies marginal consistent stock performance in the NSE which is to a large extent weak form efficient.

Table 4.6.1: Descriptive Statistics on similarity of resultant stocks from alternative cross sectional and time series oriented definitions of consistent stock performance

S/N	Consistent best performers
1	CO.17
2	CO.9

3	CO.28
4	CO.22
5	CO.5
6	CO.16
S/N	**Consistent worst performers**
1	CO.3
2	CO.23
3	CO.26
4	CO.15

4.7 Significance of Abnormal Returns of Consistent Stock Performers

In response to the third specific research objective on whether the abnormal returns from consistent stock performance are significantly different from zero, t-tests are performed. The results reveal that there are no significant abnormal returns from consistently and inconsistently performing stocks as all the stocks have p-values that are above 0.05 level of confidence at 95% level of significance as per table 4.7.1. This implies that the NSE is weak form efficient and it does not allow for significant abnormal returns to be generated by investors.

Table 4.7.1: Results of Significance of Abnormal Returns

One-Sample Test						
	Test Value = 0					
	t	df	**Sig. (2-tailed)**	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Consistent marginal winners						
CO.17	-0.34	117.00	**0.73**	0.00	-0.02	0.02

CO.9	-0.09	117.00	**0.93**	0.00	-0.02	0.02
CO.28	-0.57	117.00	**0.57**	-0.01	-0.06	0.03
CO.22	-0.22	117.00	**0.83**	0.00	-0.04	0.03
CO.5	-0.16	117.00	**0.87**	0.00	-0.03	0.03
CO.16	-0.37	117.00	**0.71**	0.00	-0.02	0.01
Consistent marginal losers						
CO.3	-0.13	117.00	**0.90**	0.00	-0.04	0.04
CO.23	-1.62	117.00	**0.11**	-0.02	-0.04	0.00
CO.26	-0.49	117.00	**0.63**	-0.01	-0.03	0.02
CO.15	-0.17	117.00	**0.86**	0.00	-0.03	0.03
Inconsistent performers						
CO.1	-0.08	117.00	**0.93**	0.00	-0.04	0.03
CO.8	-0.01	117.00	**1.00**	0.00	-0.03	0.03
CO.14	-0.22	117.00	**0.83**	0.00	-0.05	0.04
CO.24	-0.14	117.00	**0.89**	0.00	-0.05	0.04
CO.31	-0.01	117.00	**0.99**	0.00	-0.03	0.03

In response to the third specific research objective on whether the excess returns above market returns from consistent stock performance are significantly different from zero, t-tests are performed. The results reveal that there are with the exception of one stock, no significant abnormal returns from consistently and inconsistently performing stocks as all the stocks have p-values that are above 0.05 level of confidence at 95% level of significance as per table 4.7.2. This implies that it is not possible for investors to beat the NSE as it is already weak form efficient and no investor can use past information and variables to outperform the market.

Table 4.7.2: Results of Significance of Excess Returns above Market Returns

One-Sample Test						
	Test Value = 0					
	t	df	**Sig. (2-tailed)**	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Consistent best performers						
CO.17	2.338	117	**.021**	.02492	.0038	.0460
CO.9	1.200	117	**.232**	.01288	-.0084	.0341
CO.28	-.328	117	**.744**	-.00780	-.0549	.0393
CO.22	.057	117	**.955**	.00102	-.0342	.0362
CO.5	.028	117	**.977**	.00042	-.0291	.0299
CO.16	.808	117	**.421**	.00695	-.0101	.0240
Consistent worst performers						
CO.3	-.742	117	**.459**	-.01441	-.0528	.0240
CO.23	-.908	117	**.366**	-.00949	-.0302	.0112
CO.26	-1.124	117	**.263**	-.01153	-.0318	.0088
CO.15	-.029	117	**.977**	-.00042	-.0293	.0285
Inconsistent performers						
CO.1	-.175	117	**.862**	-.00297	-.0366	.0307
CO.8	-.328	117	**.744**	-.00780	-.0549	.0393
CO.14	.583	117	**.561**	.01263	-.0303	.0555
CO.24	-1.069	117	**.287**	-.02492	-.0711	.0212
CO.31	.656	117	**.513**	.00941	-.0190	.0378

The results of testing the magnitude of abnormal returns reveal of the 6 consistent best performers, 4 consistent worst performers and 5 inconsistent performers have daily stock log returns of less than the threshold of 10% the determines winning and losing performance as indicated in table 4.7.3 (Larson and Madura, 2003). This implies that

abnormal returns of consistently performing stocks lack magnitude which is in conformity with the weak form efficiency status of NSE.

Table 4.7.3 Descriptive Statistics on the Magnitude of 10 Year Stock Log Returns of Sample Stocks

S/N		10 year stock Log Returns
	Consistent best performers	
1	CO.17	0.03
2	CO.9	0.02
3	CO.28	-0.01
4	CO.22	0.01
5	CO.5	0.01
6	CO.16	0.01
	Mean	**0.01**
S/N	**Consistent worst performers**	
1	CO.3	-0.01
2	CO.23	0.00
3	CO.26	0.00
4	CO.15	0.01
	Mean	**0.00**
	Inconsistent performers	
1	CO.1	0.00
2	CO.8	0.01
3	CO.14	0.02
4	CO.24	-0.02
5	CO.31	0.02
	Mean	**0.01**

4.8 Volatility of Abnormal Returns

The third research objective seeks to establish whether a relationship exists between consistent stock performance and efficiency of NSE through testing volatility of stock prices. The results of Spearman rank volatility test regresses stock abnormal returns as the residuals of stock prices against the market log returns as the independent variable based on the market model (equation 8) which is the applicable asset pricing model in this research. This is to test for volatility of the residuals with time or heteroscedasticity (Gujarati, 2006).

The null hypothesis is zero volatility with time and the results reveal that the consistent best performers exhibit low volatility with time as evidenced by a higher p-value than 0.05 level of confidence. The consistent worst performers and inconsistently performing stocks exhibit high volatility with time as evidenced by p-values of 0.038 and 0.001 respectively which are lower than 0.05 level of confidence as per table 4.8.1. These results imply that consistent best performing stocks do not generate stock prices randomly but do so in a pattern which is an anomaly as NSE is weak form efficient. The high volatility of consistent worst performers and inconsistently performing stocks conforms to weak form efficiency status of NSE.

Table 4.8.1: Results of Spearman's Rank Volatility with Time Test

	Consistent best performers	**Consistent worst performers**	**Inconsistent performers**

Correlation Coefficient	0.111	0.142	0.103
P-Value	**0.825**	**0.038**	**0.001**
Observations No.	118	118	118

Descriptive statistics on volatility and stock return results for the 10 year study period reveals that the best performers have the highest total stock log returns of 159% followed by the inconsistent performers with total stock log returns of 96% while the worst performers have the least returns of -21% as per table 4.8.2. The inconsistent performers have the highest volatility as measured by standard deviation and range metrics of 0.21% and 185% respectively while the consistent best and worst performing stocks have similar volatility in terms of standard deviation and range as per table 4.8.2.

The proportional runs volatility model indicates that the consistent worst performing stocks has the highest volatility followed by inconsistent performers and the lowest volatility relates to the consistent best performing stocks as per table 4.8.2. These results are similar to those of Spearman's rank correlation as the difference between the results for the consistent and inconsistent performers appears marginal as per table 4.8.2.

Table 4.8.2 Descriptive Statistics on Volatility of Log Stock Returns

S/N	**Best performers**	**Total Log Returns**	**Standard Deviation**	**Range**	**Proportional runs**

1	CO.17	3.82	0.12	0.77	0.36
2	CO.9	2.33	0.13	0.77	0.38
3	CO.28	-0.11	0.26	2.78	0.36
4	CO.22	0.87	0.17	1.36	0.31
5	CO.5	0.97	0.20	2.28	0.33
6	CO.16	1.68	0.10	0.66	0.31
	Mean	**1.59**	**0.16**	**1.44**	**0.34**
S/N	**Worst performers**				
1	CO.3	-0.86	0.23	2.40	0.52
2	CO.23	-0.26	0.13	0.81	0.53
3	CO.26	-0.52	0.13	0.81	0.39
4	CO.15	0.82	0.17	1.67	0.42
	Mean	**-0.21**	**0.16**	**1.42**	**0.46**
S/N	**Inconsistent**				
1	CO.1	0.45	0.19	1.59	0.47
2	CO.8	2.13	0.17	1.52	0.39
3	CO.14	2.34	0.25	2.51	0.53
4	CO.24	-2.03	0.26	2.54	0.34
5	CO.31	1.92	0.15	1.09	0.34
	Mean	**0.96**	**0.21**	**1.85**	**0.41**

However when analysis of variance (ANOVA) tests are carried out for the results generated by proportional volatility model are significantly different from those of standard deviation, and range metrics with a p-value of 0.029 which is lower than the 0.05 level of significance as per table 4.8.3. ANOVA results also indicate that there is a significant difference in the volatilities of the best and worst performers with a p-value of 0.026 which is lower than 0.05 level of confidence. However there is no difference in the volatility of inconsistent performers and the worst performers stocks as the p-values are higher than 0.05 level of confidence as per table 4.8.3. Grinblatt and Mosowitz (2004)

postulated that consistent loser stocks have negligible impact on returns. These results indicate that the proportional runs volatility metric has the potential for measuring stock return volatility.

Table 4.8.3 Results of ANOVA of Volatility and Stock Returns

ANOVA	**Standard deviation**	**Range**	**Proportional runs**
p-value	0.416	0.635	0.029
Post Hoc ANOVA	Best performers	Worst performers	Inconsistent performers
Best performers	-	0.026	0.18
Worst performers	0.026	-	0.469

4.9 Serial Correlation of Stock Returns

The third research objective seeks to establish whether a relationship exists between consistent stock performance and efficiency of NSE through testing serial correlation of stock log returns. After employing the runs serial correlation test the results indicate that the null hypothesis of zero serial correlation is not rejected in all the consistently performing and inconsistently performing stocks as the p-values are greater than 0.05 level of confidence as per table 4.9.1. These results imply that NSE is weak form efficient as there is zero serial correlation for all the consistently performing and inconsistently performing stocks

Table 4.9.1: Results of Runs Test of Serial Correlation of Stock Price Changes

Consistent best performers	Total Cases	Number of Runs	Z statistics	**Asymp. Sig. (2-tailed)**
CO.17	118	66	1.113	**0.266**
CO.9	118	63	0.558	**0.577**
CO.28	118	64	0.861	**0.389**
CO.22	118	60	0.013	**0.990**
CO.5	118	62	0.373	**0.709**
CO.16	118	58	-0.370	**0.712**
Consistent worst performers				
CO.3	118	69	1.722	**0.085**
CO.23	118	61	0.236	**0.813**
CO.26	118	70	1.882	**0.060**
CO.15	118	58	-0.119	**0.905**
Inconsistent				
CO.1	118	56	0.904	**0.366**
CO.8	118	46	-0.769	**0.442**
CO.14	118	62	1.529	**0.126**
CO.24	118	40	-0.417	**0.677**
CO.31	118	40	-0.695	**0.487**

4.10 Relationship Between Consistent Stock Performance and Stock Market Anomalies

The fourth research objective seeks to establish if there is a relationship between consistently performing stocks and common stock market anomalies of size, calendar effects and overreaction anomalies.

4.10.1 Results of Size Anomaly

Size effect is tested by regressing the book to market ratio (proxy for size) as the independent variable against the monthly log stock returns as the dependent variable for the consistently and inconsistently performing stocks during the study period. The results reveal that there is no significant effect for both the consistently and inconsistently performing stocks with p-values that are greater than the 0.05 level of confidence. This implies that consistent stock performance is not caused by the size of stocks listed in the NSE as per table 4.10.1.

4.10.1 Results of Size Anomaly

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Consistently performing stocks	(Constant)	.008	.006		1.244	**.214**
	B_M	-.001	.004	-.008	-.266	**.790**
inconsistent performers	(Constant)	.011	.012		.920	**.358**
	B_M	-.002	.005	-.019	-.473	**.636**

4.10.2 Results of Calendar Anomalies

Monthly seasonality effect is tested by regressing the average log stock returns as the dependent variable against monthly log stock returns as the independent variables. The

test results of calendar effect or anomaly that stock returns are significant only in the month of June during the study period with p-value 0.005 which is significantly less than the critical value 0.05 at 95% level of significance. Stock returns are not significant for all the other months as shown in table 4.10.6. During the month of June, the Kenyans file their tax returns with the Kenya Revenue Authority and perhaps the reason behind the significant abnormal returns during the month.

Table 4.10.2.1 Results of Monthly Seasonality Effect Tests

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	JAN	.044	.028	.489	1.584	.152
2	FEB	.128	.068	.557	1.896	.095
3	MAR	.017	.062	.098	.278	.788
4	APR	.011	.130	.031	.087	.933
5	MAY	.000	.067	-.001	-.002	.998
6	**JUN**	.240	.063	.803	3.817	**.005**
7	JUL	.045	.143	.112	.318	.759
8	AUG	.035	.055	.216	.627	.548
9	SEP	.217	.162	.429	1.344	.216
10	OCT	-.097	.094	-.342	-1.029	.334
11	NOV	-.072	.125	-.198	-.571	.584
12	DEC	.087	.349	.088	.249	.810

When calendar effects are studied on an annual basis, the results indicate that annual log returns are significant in the years 2001 and 2003 as per table 4.10.6 with p-values of 0.018 and 0.016 respectively which are lower than 0.05 level of confidence. In the rest of

the years, the log returns are insignificant and have p-values which are greater than the 0.05 level of significance.

Table 4.10.2.2 Results of Annual Seasonality Effect Tests

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.087	.023		3.827	.005
	yr2001	.293	.099	.723	2.960	**.018**
	yr2002	-.017	.183	-.033	-.094	.928
	yr2003	.266	.088	.730	3.023	**.016**
	yr2004	-.092	.102	-.303	-.898	.395
	yr2005	.294	.133	.617	2.215	.058
	yr2006	.002	.103	.008	.022	.983
	yr2007	.106	.047	.627	2.275	.053
	yr2008	.170	.148	.377	1.152	.283
	yr2009	.575	.277	.592	2.076	.072
	yr2010	.348	.213	.500	1.632	.141

When calendar effects are studied on a daily basis, the results indicate that there is no day of the week anomaly as the p-values for all the days of the week are higher than 0.05 level of confidence as per table 4.10.6.3.

Table 4.10.2.3 Results of Day of the Week Seasonality Effect Tests

Coefficients				
Model	Unstandardized Coefficients	Standardized Coefficients	t	**Sig.**

		B	Std. Error	Beta		
1	MON	.025	.107	.082	.234	**.821**
2	TUE	.103	.087	.386	1.184	**.270**
3	WED	-.048	.210	-.081	-.231	**.823**
4	THU	.111	.069	.492	1.600	**.148**
5	FRI	.089	.128	.237	.691	**.509**

4.10.3 Results of Overreaction Anomaly

The results of overreaction behavioral finance hypothesis tests after employing Spearman's rank correlation method (Detlev, 1990) indicate that during 12, 36 and 60 months formation and holding periods, there is strong under reaction or momentum anomaly in 12 months formation and holding periods for consistent worst performers with p-value and correlation coefficient (r) of 0.01 and 0.711 respectively which are significant and higher than 0.05 levels of confidence as per table 4.10.8. For the other periods there is weak evidence of either overreaction or under reaction anomalies as the p-values are higher than 0.05 level of confidence as per table 4.10.8.

Table 4.10.3 Results of Overreaction Hypothesis Tests

Formation-Holding Periods	**Best performers**	**Worst performers**	**Inconsistent performers**
12 months	p-value = 0.978 r = 0.01	**p-value = 0.01** **r = 0.711**	p-value = 0.172 r = -0.422
36 months	p-value = 0.346 r = 0.162	p-value = 0.444 r = -0.132	p-value = 0.089 r = -0.288

60 months	p-value = 0.572 r = 0.076	p-value = 0.112 r = 0.211	p-value = 0.298 r = 0.139

4.11 Test of Intrinsic Value of Consistent Stock Performance

High book to market (B/M) ratio is associated with undervalued stocks with are expected to rise in value after the market corrects itself subsequently (Fama and French, 2004). In this research the monthly log returns (dependent variable) are regressed against the B/M ratio of the best, worst and inconsistently performing stocks (independent variable). The results reveal that there is no significant relationship between consistent stock performance and B/M ratio since the p-values of 3 groups are higher than the 0.05 level of significance as evidenced in table 4.11.1. This implies that consistent stock performance is not caused by the value of the stocks listed in the NSE.

Table 4.11.1 Results of Book to Market Valuation Tests

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	**Sig.**
Best performers	(Constant)	.009	.011		.824	**.410**
	B_M	-.001	.016	-.004	-.093	**.926**
Worst performers	(Constant)	-.001	.012		-.057	**.955**
	B_M	-.002	.007	-.013	-.321	**.749**
Inconsistent performers	(Constant)	.011	.012		.946	**.344**

	B_M	-.002	.005	-.020	-.491	**.624**

Low price to earnings (P/E) ratio is associated with undervalued stocks with are expected to rise in value after the market corrects itself subsequently (Kelly *et al.*, 2008).

In this research the monthly log returns (dependent variable) are regressed against the P/E ratio of the best, worst and inconsistently performing stocks (independent variable).

The results reveal that there is no significant relationship between consistent stock performance and P/E ratio since the p-values of 3 groups are higher than the 0.05 level of significance as displayed in table 4.11.2. This implies that consistent stock performance is not caused by the value of the stocks listed in the NSE.

Table 4.11.2 Results of Price to Earnings Ratio Valuation Tests

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	**Sig.**
Best performers	(Constant)	.024	.016		1.488	**.137**
	P_E	-.001	.001	-.038	-.999	**.318**
Worst performers	(Constant)	.007	.008		.920	**.358**
	P_E	.000	.000	-.018	-.396	**.692**
Inconsistent performers	(Constant)	.000	.010		.019	**.985**
	P_E	.000	.001	.024	.587	**.557**

4.12 Underlying Firm Characteristics

In response to the ***fifth research objective of identifying the underlying firm characteristics that significantly influence consistent stock performance,*** the consistently performing stocks multi-regression model is developed as follows (Sweeney, 2006):

Stock log returns = 0.012 - 0.277 Dividend Yield Ratio + 0.013 Dividend Payout Ratio – 0.035 risk free rate + 0.846 market return – 0.001 volume of shares traded + ε (31)

These results of multi-regression model (12) indicate that the independent variables of book value, dividend yield, dividend payout, market return and volume of shares traded are powerful predictors of stock log returns of consistently performing stocks with p-values that are less than 0.05 level of confidence as per table 4.12.1.

4.12.1 Underlying Firm Characteristics of Consistently Performing Stocks

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	.012	.011		1.050	.294
	Book value	.000	.000	.088	2.339	**.020**
	Dividend yield	-.277	.134	-.061	-2.060	**.040**

	Dividend payout	.013	.010	.041	1.365	.172
	Debt to equity	.000	.000	.024	.832	.406
	Risk free rate	-.035	.046	-.021	-.760	.448
	Market return	.846	.069	.336	12.286	**.000**
	volume	-.001	.000	-.135	-3.600	**.000**

The results of test of goodness of fit of the consistently performing stocks multi-regression model indicate that it is a very poor fit with R^2 of 0.131 and adjusted R^2 of 0.126 as per table 4.11.2. This implies is that the underlying company features are not related to the returns of consistently performing stocks.

Table 4.12.2 Goodness of Fit of the Stock Selection Model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.362	**.131**	**.126**	.16336

The summarized research findings reveal that NSE is weak form efficient as per table 4.12.

Table 4.13 Summary of Findings and Interpretation

Specific research objectives	Findings	Implications
1. To identify existence of consistency of stock trends in the NSE	12/32 top ranked stocks 12/32 bottom ranked stocks 12/32 stocks with positive returns for 2/3rds of time 12/32 stocks with negative returns for 2/3rds of time 6/32 consistent best performing stocks 4/32 consistent worst performing stocks	NSE is weak form efficient and prevents consistent stock trends from occurring.
2. To establish existence of a relationship between consistent stock performance and efficiency of NSE	Abnormal returns are not significant Stock price volatility is low for consistent best performers and high for consistent worst performers and inconsistent performers Zero serial correlation of consistent and inconsistently performing stocks	NSE is weak form efficient and prevents: significant abnormal returns serial correlation of stock returns and high stock price volatility
3. To establish if consistent stock performance is related to common market anomalies	There is no significant evidence of size effect and overreaction or under reaction	NSE is weak form efficient but is not related to common stock market anomalies
4. To establish whether valuation of stocks influences consistently performing	Valuation as measured by B/M and P/E ratios does not influence consistent stock performance	NSE is weak form efficient is is not predictable form past information or variables

stocks		
5. To identify the underlying firm variables with significant influence on consistently performing stocks	The underlying firm characteristics with significant influence include: book value, dividend yield, market returns and volume of shares traded. However, the entire model is a bad fit.	NSE is weak form efficient but is not free from influence of some past variables

CHAPTER FIVE: DISCUSSIONS, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this section the results reported in chapter 4 are discussed in light of the theory of finance and empirical studies done in the past including the results of: normality, identification of consistent stock trends in the NSE, possibility of consistently performing stocks based on alternative definitions yielding similar stocks, test of significance of abnormal returns, volatility test of abnormal returns, serial correlation of log returns, stock market anomalies and underlying firm characteristics.

5.2 Identification of Consistent Stock Performance

The first research objective seeks to test whether consistent stock trends are present in the NSE. The results reveal weak presence of consistently performing stocks as per tables 4.3.1 to 4.3.4 with the frequency of repeated positive and negative stock returns falling below the threshold of 66.67% (Grinblatt and Moscowitz 2004; Watkins 2003). When the consistent stock performance is studied during short and intermediate the results also reveal the absence of consistently performing stocks as per table 4.4.1, with the frequency of repeated positive and negative stock returns falling below the threshold of 66.67% of the study period (Grinblatt and Moscowitz 2004; Watkins 2003). When daily stock log

returns data is employed the phenomenon of consistent stock performance is also absent as per Appendix 1 with frequency of repeated positive and negative stock returns falling below 40% of the study period which is lower than the threshold of 66.67% (Grinblatt and Moscowitz 2004; Watkins 2003).

The implication of absence of consistent performance in the NSE is that that the market is weak form efficient hence trend analysis efforts are in vain as stock prices occur in a random manner (Fama, 1991). The lack of strong presence of consistent stock trends in the NSE contradicts the past studies on the phenomenon in the developed markets by Grinblatt and Moscowitz (2004), Watkins (2003). These results also agree with the joint hypothesis problem that markets are efficient and any evidence of inefficiency should be traced in the asset pricing model that is tested jointly with the market efficiency (Fama, 1991).

5.3 Consistency of Abnormal Returns

The first research objective of also seeks to establish whether consistently performing stocks yield consistent abnormal returns. The results revealed that for the 10 year study period, there are no consistent abnormal returns that appear for 66.67% of the period (Grinblatt and Moscowitz 2004; Watkins 2003) as per table 4.5.1. These results are in conformity with the theory of EMH which postulates that in markets that are efficient, abnormal returns should not arise. They are also in conformity with those of past research

on efficiency of the NSE which is proven as weak form efficient by (Mlambo *et al.* 2007 and Magnusson and Wydick 2005). These results also agree with the joint hypothesis problem that markets are efficient and any evidence of inefficiency should be traced in the asset pricing model that is tested jointly with the market efficiency (Fama, 1991).

In markets that are weak form efficient, the existence of consistent abnormal returns is not possible and no participant is able to outperform the market al.l the time when information relating to stocks is accessible by many participants almost at the same time and it is then instantaneously being reflected in stock prices (Cuthbertson, 2005). In such efficient markets, abnormal returns should be zero as the markets correct themselves regularly and thus consistent abnormal returns would not be expected unless there is an anomaly (Reilly and Brown 2009; Gillette 2005).

5.4 Test whether the alternative cross sectional and time series oriented definitions of consistent stock performance yield similar resultant stocks.

The first research objective of also seeks to establish whether the alternative definitions of consistent stock performance yield similar stocks. The results indicate 6 consistent best performers and 4 consistent worst performers of 32 stocks in the study sample. This implies that the probability of identifying consistent best performer is 0.1875 (6/32) and the probability of identifying a consistent worst performer is 0.125 (4/32) as per table 4.6.1.

The weak results of consistently performing stocks yielding similar stocks from the alternative cross sectional and time series oriented definitions cast doubt on the occurrence of consistent stock trends in the NSE as an anomaly and conform to the findings of Mlambo *et al.* (2007) and Magnusson and Wydick (2005) all which indicate that NSE is weak form efficient. These results also agree with the joint hypothesis problem that markets are efficient and any evidence of inefficiency should be traced in the asset pricing model that is tested jointly with the market efficiency (Fama, 1991).

5.5 Significance of Abnormal and Excess Returns

The second research objective seeks to establish whether consistently performing stocks are related to efficiency of the NSE as evidenced by zero abnormal returns. The result indicate that no stock whether consistently or inconsistently performing yields significant abnormal returns. When significance of excess returns above market returns of consistently and inconsistently performing stocks are tested in the NSE, results reveal that only one stock Co.17 a best performer has significant excess returns while the other stocks do not as per table 4.7.2. In markets that are deemed to be efficient, abnormal returns of stocks should be zero which prevents any investor from outperforming others (Fama, 1991).

These results are in conformity with the theory of efficient markets but contradict those of Grinblatt and Moscowitz (2004) and those of Alwathainani (2011) which indicate that stocks with consistent positive returns have significant abnormal returns as they both employed arithmetic returns that yield significant financial performance in the long run (Henry and Kannan, 2008).

The results of magnitude of abnormal returns reveal that none of the consistently and inconsistently performing stocks meets the threshold of winning and losing by being in excess of 10% in terms of average daily log returns (Larson and Madura, 2003) as per table 4.7.3. These results also agree the NSE is weak form efficient and will not allow participants to significantly outperform the market (Fama, 1991).

5.6 Volatility of Stock Prices

The second research objective seeks to establish whether consistently performing stocks are related to efficiency of the NSE as evidenced by high volatility of stock prices that is commensurate with release of news. Spearman's rank correlation test indicates that the consistent best performers exhibit low volatility of stock prices but inconsistent performers and consistent worst performing stocks have high stock price volatility with time as per table 4.8.1. The low volatility of the consistent best performing stocks agrees with the view that consistent stock performance is a proxy for the absence of volatility

(Watkins, 2003). The high stock price volatility is evidence of weak form efficiency of NSE (Magnusson and Wydick 2005, Mlambo and Biekpe 2007).

The low volatility of abnormal returns implies non-randomness and predictability of stock returns. According to EMH, stock prices should exhibit randomness and thus high volatility with continued inflow of information (Stefan, 2009). The results of the proportional runs volatility metric indicate that it yields results similar to conventional stock return volatility models of standard deviation and range as per table 4.8.2 as per hence agrees with Sweeney *et al.* (2006); (Zogwhi *et al.* 2006 and Loconsole 2008).

5.7 Serial Correlation of Stock Price Changes

The second research objective seeks to establish whether consistently performing stocks are related to efficiency of the NSE as evidenced by zero serial correlation of stock returns. The runs serial correlation test results indicate that NSE exhibits no serial correlation as the null hypothesis of zero serial correlation is not rejected for all consistently and inconsistently performing stocks as per table 4.9.1. These results contradict those of Vulic (2010) which indicate that the Montenegrin stock market displayed predictability and non-randomness behavior. But the results agree those of Mlambo *et al.* (2007) and Magnusson and Wydick (2005) which indicate that the NSE is weak form efficient.

5.8 Stock Market Anomalies

The third specific research objective seeks to establish if consistently performing stocks are related to common stock market anomalies. The results of size effect test indicate that there is no significant anomaly in the consistent and inconsistently performing stocks as per table 4.10.1 The results contradict those of Elfakhani and Zaher (1998) and Chou *et al.* (2011) who found evidence that small size firms in terms of market capitalization experienced excess risk adjusted stock returns when compared to large firms.

5.8.4 Calendar Anomalies

The test results of relationship between consistent stock performance and seasonality effects indicate significant abnormal returns arising in the months of June. The annual seasonality test results revealed insignificant abnormal returns in years 2001 and 2003. These results agree with those of past research including Chou *et al.* (2011) and Vulic (2010) who found evidence that during the months of January, firms experienced excess returns perhaps relating to tax filing and payment period when investors liquidate their holdings to raise funds for tax payment.

The results of the overreaction anomaly results indicated that abnormal returns derived using Spearman ranks correlation method over formation and holding periods of 12, 36 and 60 months during the study period from year 2001 to 2010 revealed significant under reaction or momentum anomaly in the 12 month formation and holding periods as per

table 4.10.3. The other periods do not reveal significant evidence of either overreaction or under reaction.

These results agree partially with those of Lishenga (2011) that found presence of momentum anomaly in the NSE across all time horizons unlike current results which limited evidence of momentum and no evidence of reversal. The current research employed log stock returns that significantly limit the magnitude of stock returns in the long run (Henry and Kannan, 2008).

The lack of significant momentum profits conforms to the views of Watkins (2003) that momentum anomaly cannot exist in the absence of consistent stock performance although consistent stock performance can exist in without the presence of momentum. In this research there is weak consistent stock performance and perhaps the absence of momentum profits.

5.8.2 Valuation of Consistent Performing Stocks

The results indicate that there is no significant relationship between stock valuation and consistent stock performance stocks as measured by B/M and P/E ratios as per tables 4.11.1 and 4.11.2. These findings contradict those of Mohanram (2005) and Chou *et al.* (2011) who found significant evidence that value anomaly generates excess risk adjusted stock returns. The results also contradict those of Kelly *et al.* (2008) who found evidence

that P/E ratio has significant influence of stock performance in the Australian stock market.

5.9 Underlying Firm Characteristics

The fifth research objective seeks to identify the underlying company characteristics that significantly influence consistent stock performance. The multi-regression equation developed indicates that the most powerful predictor variables are book value, dividend yield, market return and volume of stocks traded. However the entire model is a poor fit with R^2 of 0.131 and adjusted R^2 of 0.126 as per table 4.11.2 which implies that consistent stock performance is not explained by the multi-regression model.

5.10 Conclusion

This research set out to establish whether consistent stock performance exists in the NSE during the research period between years 2001 and 2010. It also set out to establish whether consistent stock performance if it exists is related to weak form efficiency of NSE and the common market anomalies of size, calendar and overreaction. The research also set out to establish the valuation of consistently performing stocks and whether there are underlying firm characteristics that significantly influence consistent stock performance.

The findings show the NSE does not display strong presence of consistent stock performance during the research period. A requirement for consistent stock performance includes repeated positive or negative stock returns for 2/3rds of the research period. This requirement is not met by any stock in the sample but when it is lowered to 50% (Gliem and Gliem, 2003), 6 stocks qualify as consistent best performers while only 4 stocks qualify as consistent worst performers out of a sample of 32 stocks which implies that the probability of investors identifying consistent best and worst performers in the NSE is only 0.1875 and 0.125 respectively.

The findings also indicate that NSE exhibits insignificant abnormal returns, no serial correlation and generally high stock price volatility but with consistent best performers displaying low stock price volatility. Low volatility is a feature of consistent stock performance and a stock market anomaly. These findings imply that NSE is weak form efficient and hinders consistent stock price trends from occurring but just like other stock markets NSE cannot be efficient all the time. The test findings of common stock market anomalies of size, calendar and overreaction effects indicate that the size of firms does not influence consistent stock performance. The notable month of the year calendar anomaly is June which also the month when Kenyans file their tax returns. The notable year seasonality effect is in years 2001 and 2003. There is no day of the week effect. The results indicate that consistent stock performance is influenced significantly by under reaction by investors to news during 12 months formation and holding periods which

implies the presence of momentum effect in the NSE during this period. The findings indicate that the value of firms does not influence consistent stock performance but it is influenced by underlying firm characteristics of book value, dividend yield, market returns and volume of stocks traded. However the combined effect of these variables lacks predictive power. This implies that NSE is weak form efficient and prevents its prediction by use of strategies employing past information or variables. The overall conclusion is that consistent stock performance is not present in the NSE and that the NSE is weak form efficient.

5.11 Policy Recommendation

Stock market investors should not waste time searching for consistent stock performance anomaly in the NSE as it is not present and any abnormal returns from such trends are inconsistent and are generated by chance. Investors are advised to invest long term and perhaps search for alternative strategies of generating abnormal returns from the NSE other than employing past information and variables (Fama, 1991).

5.12 Suggestion for Further Study

There is need to study the consistency of stock performance in other stock markets in East Africa. There is also need to research on the relationship between volume of economic news and volatility of stock prices in the NSE.

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APPENDICES

Appendix 1: Descriptive Statistics on Consistent Daily Stock Log Returns

				Expected no. of	Proportion	Proportion
Best performers	**No. of positives**	**No. of negatives**	**No. of zeros**	**observations**	**of positives**	**of negatives**
Co.17	827	700	756	**2409**	**0.34**	**0.29**
Co.9	757	666	559	**2409**	**0.31**	**0.28**
Co.28	913	748	747	**2409**	**0.38**	**0.31**
Co.22	829	688	607	**2409**	**0.34**	**0.29**
Co.5	926	709	715	**2409**	**0.38**	**0.29**
Co.16	766	689	478	**2409**	**0.32**	**0.29**
Worst performers						
Co.3	742	684	442	**2409**	**0.31**	**0.28**
Co.23	885	804	623	**2409**	**0.37**	**0.33**
Co.26	780	800	543	**2409**	**0.32**	**0.33**
Co.15	735	746	664	**2409**	**0.31**	**0.31**
Inconsistent						
Co.1	478	444	362	**1284**	**0.37**	**0.35**
Co.8	621	593	517	**1731**	**0.36**	**0.34**
Co.14	829	804	522	**2155**	**0.38**	**0.37**
Co.24	597	497	516	**1610**	**0.37**	**0.31**
Co.31	333	310	395	**1038**	**0.32**	**0.30**

Appendix 2: Results of Runs Serial Correlation Test

	Test Value	Total Cases	Number of Runs	Z	**Asymp. Sig. (2-tailed)**
co1	0.00	118	56	0.90	0.366
co2	0.00	118	60	1.42	0.156
co4	0.00	118	38	-1.46	0.143
co6	0.00	118	41	0.16	0.869
co7	0.00	118	39	-0.39	0.696
co8	0.00	118	46	-0.77	0.442
co9	0.00	118	61	1.32	0.185
co10	0.00	118	32	-1.79	0.074
co12	0.00	118	40	-0.11	0.910
co13	0.00	118	44	-1.38	0.166
co14	0.00	118	62	1.53	0.126
co18	0.00	118	22	-3.75	**0.000**
co19	0.00	118	28	-2.39	**0.017**
co20	0.00	118	55	1.98	**0.047**
co21	0.00	118	59	1.74	0.082
co24	0.00	118	40	-0.42	0.677
co25	0.00	118	49	-0.44	0.657
co27	0.00	118	60	1.42	0.156
co29	0.00	118	40	-0.42	0.677
co31	0.00	118	57	0.79	0.429
co32	0.00	118	40	-0.70	0.487

Appendix 3: Statistics on NSE Investors

Category of Investors	No. of Equity Investors	No. of Shares Held	Proportion
Foreign Individuals	3,818	228,175,719	1.06%
Foreign Corporate	243	4,489,795,923	20.83%
East African Individuals	5,984	200,896,394	0.93%
East African Corporate	233	494,368,923	2.29%
Local Individuals	879,204	6,425,317,003	29.82%
Local Corporate	40,101	9,711,328,803	45.06%
	929,583	**21,549,882,770**	**100%**

Source: Capital Markets Authority, 2010

Appendix 4: Top 10 African Stock Markets by Market Capitalization (Size)

S/N	Country	US$ Billion
1	South Africa	799.2
2	Egypt	91.21
3	Morocco	56.4
4	Nigeria	47.75
5	Kenya	10.95
6	Ghana	10.91
7	Tunisia	8.2
8	Zambia	5.27
9	Mauritius	4.82
10	Botswana	4.28
Total Africa		**1048.16**

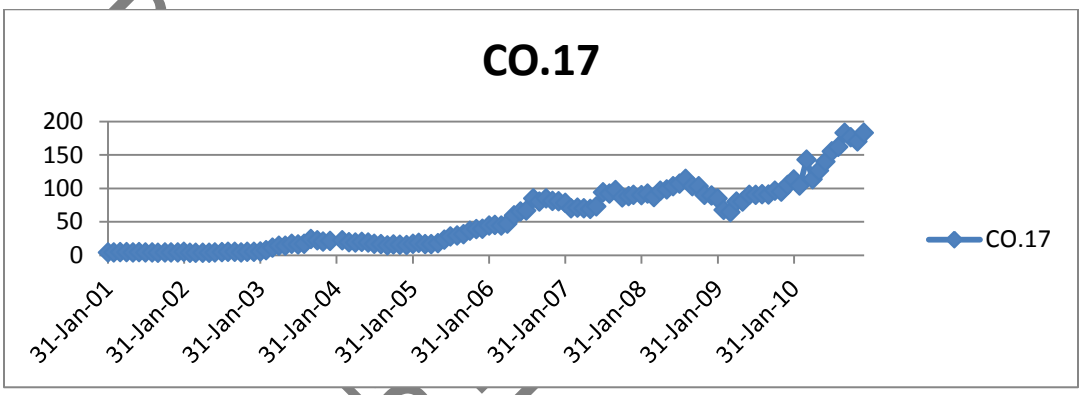
Source: Capital Markets Authority, 2010

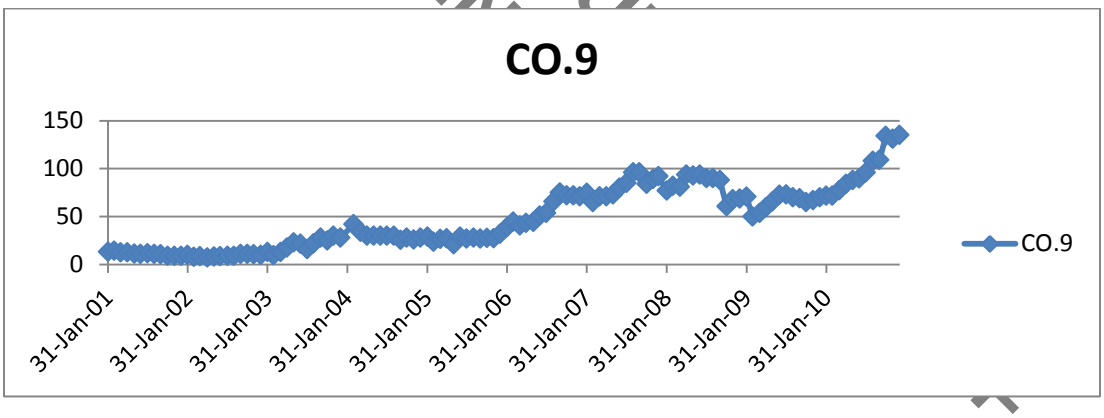
Appendix 5: List of Companies forming the Study Sample

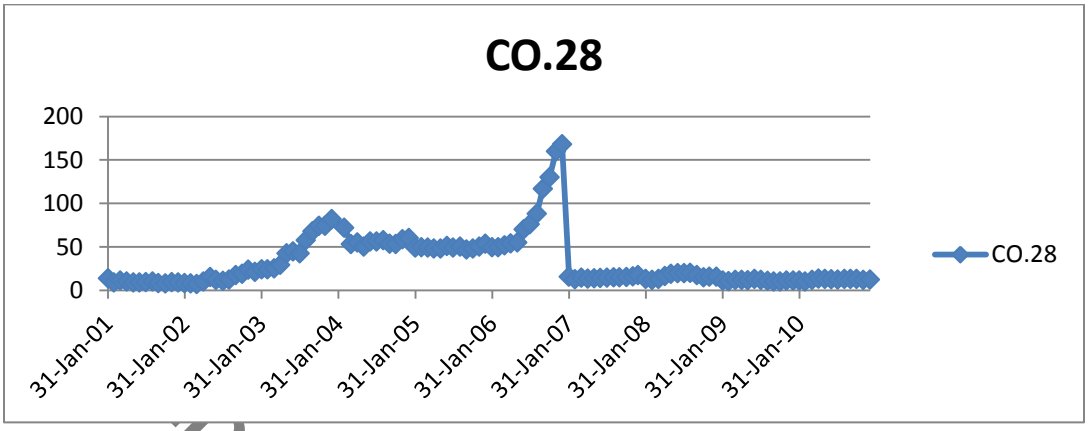
S/N	**Companies**
1	Kakuzi
2	Rea Vipingo
3	Sasini
4	CMC
5	Kenya Airways Ltd
6	Nation Media Group
7	TPS Serena
8	Barclays Bank
9	Centum
10	CFC Bank
11	Diamond Trust Bank
12	Housing Finance
13	Jubilee Insurance
14	Kenya Commercial Bank
15	National Bank of Kenya
16	NIC Bank
17	Pan Africa Insurance
18	Standard Chartered Bank
19	Athi River Mining
20	Bamburi Portland Cement
21	British American Tobacco
22	Crown Paints
23	Olympia
24	EA Cables
25	E A Portland Cement
26	EA Breweries
27	Kenya Oil
28	Mumias
29	Kenya Power
30	Sameer Group
31	Total Kenya
32	Unga Ltd

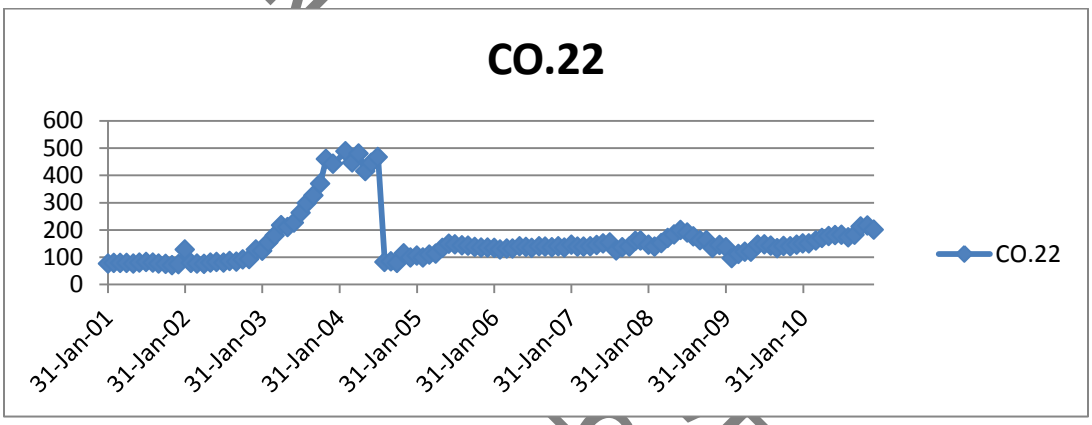
FIGURES ON VOLATILITY OF STOCK PRICES

Consistent Best Performing Stocks






CO.28
200
150
100
50
0
31-Jan-01
31-Jan-02
31-Jan-03
31-Jan-04
31-Jan-05
31-Jan-06
31-Jan-07
31-Jan-08
31-Jan-09
31-Jan-10
CO.28


CO.22
600
500
400
300
200
100
0
31-Jan-01
31-Jan-02
31-Jan-03
31-Jan-04
31-Jan-05
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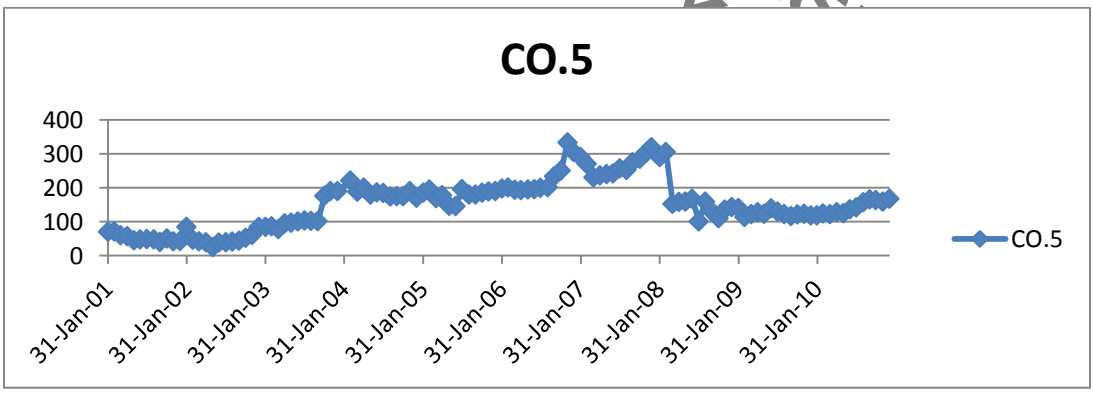
31-Jan-08
31-Jan-09
31-Jan-10
CO.22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300
200
100
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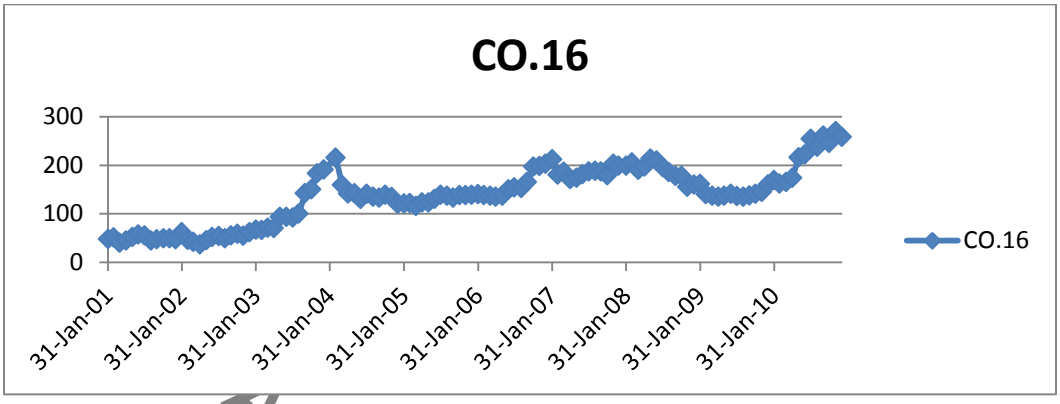
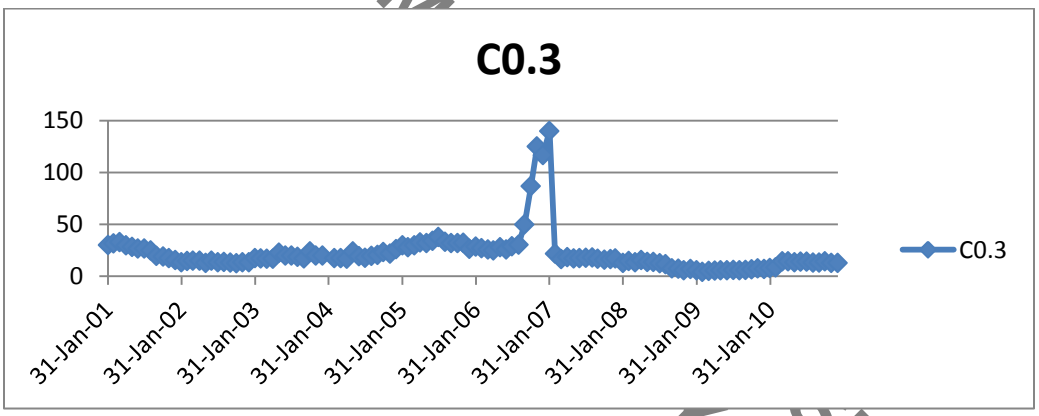
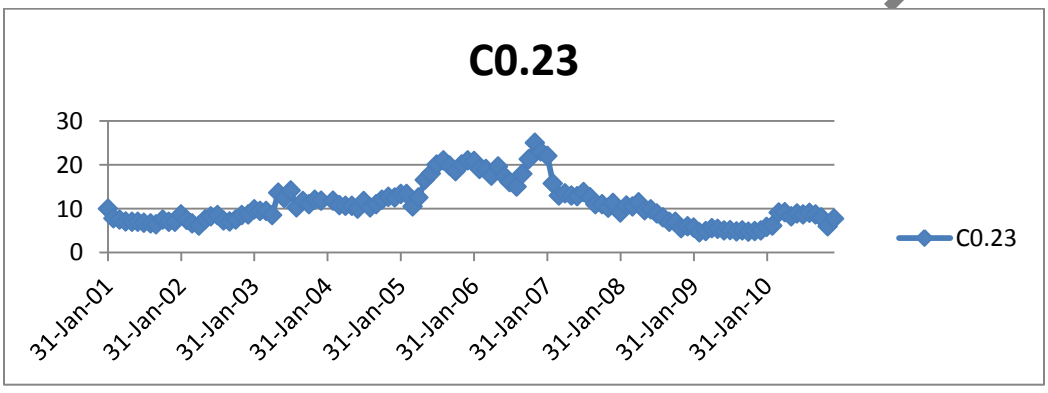
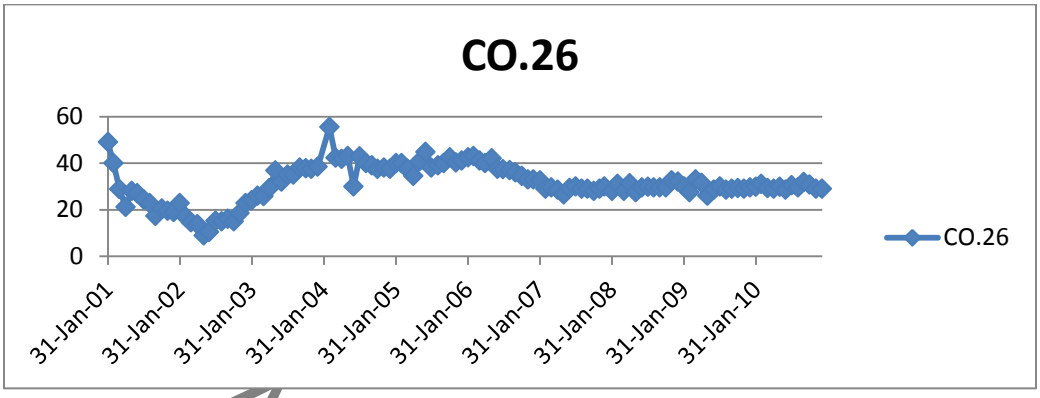
31-Jan-08
31-Jan-09
31-Jan-10
CO.5

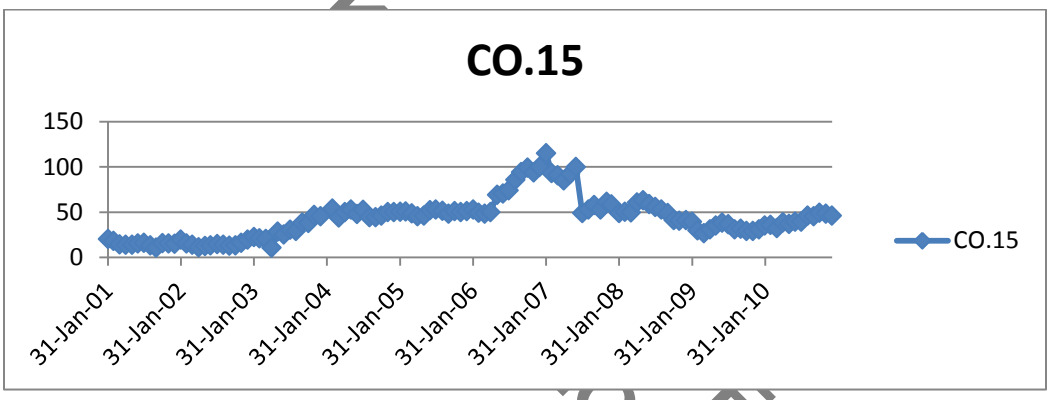


Consistent Worst Performing Stocks

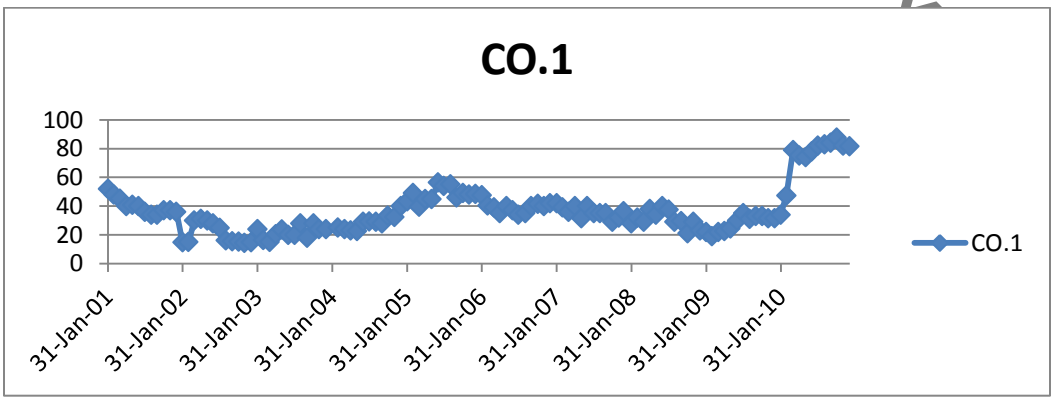


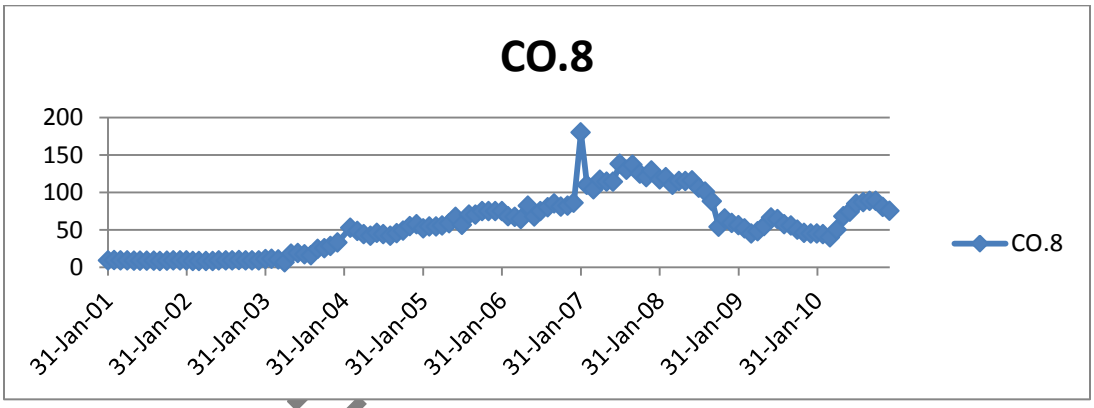






Inconsistently Performing Stocks




CO.8
200
150
100
50
0
31-Jan-01
31-Jan-02
31-Jan-03
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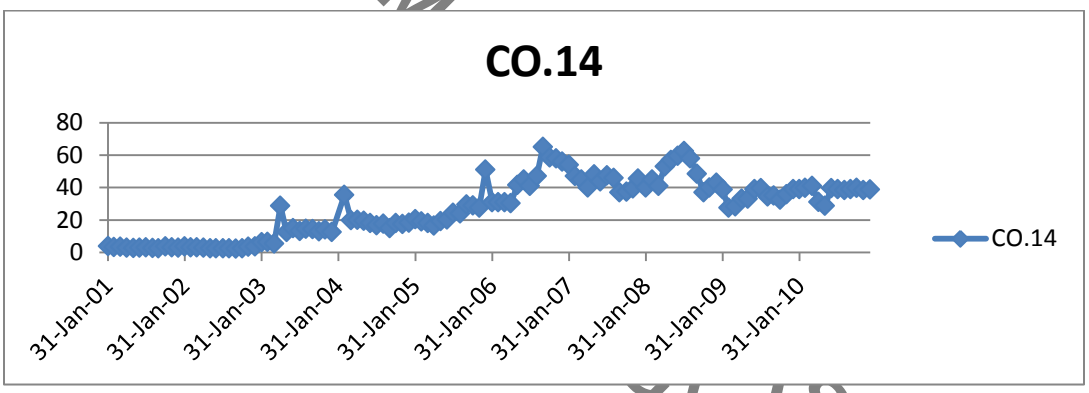
31-Jan-05
31-Jan-06
31-Jan-07
31-Jan-08
31-Jan-09
31-Jan-10
CO.8


CO.14
80
60
40
20
0
31-Jan-01
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31-Jan-03
31-Jan-04
31-Jan-05
31-Jan-06
31-Jan-07
31-Jan-08
31-Jan-09
31-Jan-10
CO.14