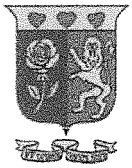

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# Stock Market Overreaction and the Size Effect: Evidence from the Nairobi Securities Exchange

Abdulrahman Hussein
071851

Submitted in partial fulfillment of the requirements for the Degree of Bachelor of Business Science in Finance at Strathmore University

School of Finance and Applied Economics
Strathmore University
Nairobi, Kenya

November 2015

## DECLARATION

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



Candidate ..... Abdulrahman Hussein .....

Signature ..... .....

Date ..... 8/12/15 .....

This Research Project has been submitted for examination with my approval as the Supervisor.

Supervisor ..... ISHMAEL MAINA .....

Signature ..... .....

Date ..... 8th DECEMBER 2015 .....

School of Finance and Applied Economics

Strathmore University

## ACKNOWLEDGEMENTS

I would like to thank Almighty God for taking me through the BBS Finance course culminating in this project.

This project would not have been possible without the support of my supervisor and mentor, Mr. Ishmael Maina. I am grateful for his support, encouragement and understanding throughout the course of the project, and indeed the four years at the University.

I would also like to thank my family, friends and colleagues for their support during the course of this project.

# Table of Contents

# Abstract

*Investors have traditionally been viewed as economically rational individuals who make decisions based on all available information. More recent studies propose that investors are irrational and systematically overreact to good and bad information events. Several anomalies have been identified that deviate from rational behavior, which offer opportunities to make abnormal returns. This paper tests for the overreaction phenomenon, a market anomaly previously presented by De Bondt and Thaler (1985,1987) whereby past losers significantly outperform past winners following overreaction to extreme earnings by investors. The test examines the movement of returns of stocks listed on the Nairobi Securities Exchange over 36 months subsequent to extreme earning years. The test involved forming two portfolios, one of extreme good performers and the other of extreme poor performers during the base year. Performance of these portfolios was analyzed from the year of portfolio formation for 5 overlapping sample periods. As a control, the paper also examines whether the difference between losers and winners is actually a size effect as proposed by Zarowin (1989). Portfolios were formed based on firm size and their performance was analyzed for 36 months subsequent to portfolio formation over 5 overlapping sample periods. The results are however not consistent with either proposition. There was no statistically significant difference between the two portfolios in each case, and therefore the findings do not support both investor overreaction to earnings and the size effect in the NSE.*

Key Words: overreaction, size effect, Nairobi Securities Exchange

# List of Abbreviations

| | |
|---|---|
| EMH | Efficient Market Hypothesis |
| OH | Overreaction Hypothesis |
| US | United States |
| NSE | Nairobi Securities Exchange |
| JSE | Johannesburg Stock Exchange |
| NYSE | New York Stock Exchange |
| CRSP | Centre for Research in Security Prices |
| PAT | Profit after Tax |
| PERF | Earnings Performance Measure |
| MVEQ | Market Value of Equity |
| AAR | Average Abnormal Returns |

# List of figures



# List of Equations

# List of tables

# Introduction

## Background Information

The Efficient Market Hypothesis (EMH), refined by Eugene Fama (1970), states that in efficient markets, all relevant information is completely reflected in the price of financial assets and that change in the prices of financial assets cannot be predicted, because prices follow a random walk. The information is impounded in the prices correctly and instantaneously as it becomes known (White, Sondhi, & Fried, 2012) and since new information is considered to be unpredictable, forecasting stock prices would be impossible. This would mean that higher returns will only be achieved by exposure to more risk as the Capital Asset Pricing Model states, and therefore abnormal profit opportunities would not exist.

As convincing as the EMH sounds, in reality abnormal returns have been observed even after adjusting for extra risk factors. Studies done by DeBondt and Thaler (1985), Banz (1981), Albert and Henderson (1995), Shiller (2003), Baker et al (2011) and Aduda and Muimi (2011) among others, have been conducted to attempt to explain irrationality of investors and further attempt to outperform markets by forecasting stock returns and developing appropriate investment strategies. EMH has been challenged by the documentation of different investor patterns under behavioural finance, a field that focuses on the proposition of psychology-based theories and tries to explain the inefficient character of markets by taking economics, sociology and psychology into account (Shiller, 2003). Finance names them as anomalies in stock market and the basis for naming them anomalies is that they could not be explained in classical financial framework (Szyszka, 2007). Behavioural finance proves that not only do prices reflect sensible information, but also reactions on price movements which depend on the expectations of investors (Shiller, 2003). It assumes that investors are 'normal' and not rational and that markets are not efficient, even if they are difficult to beat (Statman & Klimek, 2008).

The Overreaction Hypothesis (OH), first documented by DeBondt and Thaler (1985), shows that past prices can forecast future movements in prices and therefore profitable investment strategies can be created to take advantage of overreaction effect. The authors suggested, using US data, that prior losers outperform prior winners over a long term period of the same length of time, following the physiological study of Kahneman and Tversky (1982), who argue that investors tend to overweight recent information and underweight prior information. In their views, when a company has experienced a string of good news or a period of growth, investors may incorrectly believe that the growth will continue and this pushes the stock's price higher than it is justified by the news. Likewise, when a company has experienced a string of bad news, investors may incorrectly believe that the trend will continue and this pushes the stock's price lower than it is justified by the news. The stock prices later reverse when investors realize the mistakes they have made. More specifically, the authors show that going long a portfolio consisting of stocks that have performed badly in the past (extreme prior losers) and going short

a portfolio consisting of stocks that have performed very well in the past (extreme prior winners) will produce abnormal (contrarian) profits, in the long run, due to excessive investor optimism and pessimism, i.e. investor overreaction to information.

DeBondt and Thaler attribute overreaction to the market's inefficient response to market information but Zarowin (1989) later finds that size effects account for differences in the performance of poor against large firms with extreme earnings in the US market. He documents that when poor earners are matched with good earners of equal size there is little difference in return behaviour and when poor (or good) earners of disparate sizes are compared, small firms outperform large firms, and smaller winners outperform larger losers. This is in contrast with DeBondt and Thaler (1987) who maintained that the winner-loser effect is not primarily a size effect. The size effect was first introduced by Banz (1981) who showed that the common stock of small cap firms have on average higher returns than the common stock of large cap stocks. Small-cap stocks are considered riskier than large-cap stocks and therefore investors require a premium to hold them, which presents opportunities to outperform the market.

Local studies have shown evidence of overreaction at the Nairobi Securities Exchange (NSE). Aduda and Muimi (2011) found that over a 9-year period between 2001 and 2009, the loser portfolio outperformed the winner portfolio by about 35.92%. The study confirmed long-term overreaction in the market and was consistent with studies by Werah (2006) that confirmed investor irrationality at the NSE as a result of anomalies. The main purpose of this study is to contribute to the long-term overreaction literature by using stock data from the NSE, Kenya's only exchange and Eastern Africa's financial hub. First, the study attempts to empirically investigate evidence of long-term stock market overreaction over a period between January 2005 and December 2014, to investigate the consistency of the anomaly over a different time period. This study also attempts to investigate whether size has any effect on the performance of loser against winner stocks. Previous studies by Ndung'u (2003) shows that the size effect is weakly exhibited in the NSE using stock data for the period between 1996 and 2002.

With 63 listed companies, the NSE provides a suitable platform to test the existence of investor overreaction. The NSE 20-Share Index (NSE-20), the oldest of the stock market's barometers, is a price weight index calculated as a mean of the shares of 20 public, listed companies, selected based on a weighted market performance. The index is a good proxy for the whole market since these 20 companies represent over 80% of the entire exchange as measured by market capitalisation, and is the only index that was used before 2008, making it the most suitable for this study as the benchmark portfolio.

## Problem Statement

DeBondt and Thaler (1985) attribute overreaction to the market's inefficient response to market information. Further studies have however challenged this assumption. Zarowin (1989), found that that it is the size effect that drives the Winner vs. Loser phenomenon rather than the assumed investor overreaction. Size effect refers to the tendency of small capitalization shares to outperform the large capitalization shares over the longer horizons (Maheshwari & Dhankar, 2014). Aduda and Muimi (2011) found evidence of long-term overreaction to the performance of companies listed on the Kenyan market using data from the period between 2001 and 2009. They found that the loser portfolio outperformed the winner portfolio by an average of about 35.92% over the study period. The study does not however address whether the difference between the winner and loser portfolios is a result of the size effect as proposed by Zarowin (1989). To my knowledge, further studies on the Kenyan market have yet to reflect on this and the consistency of the overreaction anomaly over a different period has also not been investigated.

## Research Objectives

Using stock data for the period between 2005 and 2014, the study focuses on the following objectives:

- To determine whether the winner-loser phenomenon exists on the NSE as a result of long-term overreaction to earnings information.
- To determine whether size has any effect on the difference in performance of loser and winner stocks in the NSE.

## Research Questions

The study's research questions are:

- Does the market overreact to earnings information in the NSE?
- Does size have an effect on the difference in performance of loser and winner stocks in the NSE?

## Justification of the Study

In the current competitive market it's imperative that investors be able to identify investment strategies that will promise superior performance in a particular stock market. Understanding why prices move up and down is of critical importance to them in formulating their investment strategies to take advantage of market anomalies. In markets where investors overreact to information, a contrarian strategy can be employed whereby the investor goes against prevailing market trends by buying losing stocks and selling them when the prices reverse. The investor determines the market's consensus about a company or sector and then bets against it. The risk, of course, is that the consensus is right, which results in wrong bets and losses for the contrarian investor. It is even more important for the investors to know whether price reversals are primarily as a result of the size effect rather than overreaction. The findings of this research are important to investors, portfolio managers, research analysts and other stock market players who invest or advise based on trading expectations, which can therefore be used as basis for making investment decisions in the Kenyan capital market.

Investors could gain high returns if they could estimate the future direction of share prices with a certain level of confidence. The overreaction theory fascinates investors, because it promises opportunities to make excess profits from simple rules based only on the direction and size of sudden, abnormal movements in share prices. Academic analysts, too, are interested in the possibility of price reversals because such a pattern directly conflicts with the EMH. Evidence from analysing overreaction to information in a developing and emerging market will also shed more light on whether the theory of efficient markets is supported, or contradicted by the various empirical findings. Therefore, further studies of the overreaction and size phenomena have significant implications not only for the investors but also for financial academics and practitioners.

# Literature Review

## Theoretical Framework

A market is said to be efficient if security prices already reflect the total set of information available about the underlying company. When changes happen to this information set, through press releases or other forms of news announcements, it affects the underlying company and the value of their stock shifts to reflect this new set of information (Harger, Elshahat, & Horvath, 2012). The essence of the EMH is associated with the idea that prices follow a random walk (Malkiel, 2003). This random walk theory is built on the assumption that price changes are random. So, if prices are fair and thus reflecting all the available information in the market, they should only change in response to new information. Keeping the random walk theory in mind it seems useless to investigate the ability of valuation parameters to forecast market returns (Ez-Zaitouni, 2012).

The observed abnormal returns in financial markets prove that prices do not always represent their intrinsic value. A field of finance that focuses on the proposition of psychology-based theories to explain stock market anomalies is Behavioural Finance. It contradicts the EMH on the idea that prices incorporate all the relevant information that is available in the market. Prices may reflect not only sensible information but also reactions on the price movements. This latter is also known as a 'price-to-price feedback theory', in which prices increase irrationally further as expectations of investors grow. The feedback theory disproves the major assumption made by the EMH that investors act rationally as predictions are based on the closest match to past returns which may lead to mispriced securities (Shiller, 2003).

Throughout the years, many prediction methods have been developed attempting to outperform markets by forecasting stock returns. Many of these patterns in stock prices are based on firm characteristics and valuation parameters (Malkiel, 2003). For example, Fama and French (1988) found a significant relationship between the return on the aggregate market and the dividend yield (dividend/price ratio). The evidence provided by Fama and French (1988) is backed by the intuition that expected returns are higher when stock prices are low relative to dividends, and vice versa. High dividends imply lower expected returns and thus have a negative influence on the growth rate of stocks. In addition to dividend yields, other discovered anomalies are the low-risk anomaly (Baker, Bradley, & Wurgler, 2011), size effect (Banz, 1980), value effect (Campbell & Shiller, 2001), overreaction (DeBondt & Thaler, 1985, 1987) and calendar effects such as the January effect (Keim & Donald, 1986).

One major attribution to the belief that stock prices are predictable, resulting in arbitrage possibilities, is the tendency of stock prices to overreact. Overreaction was first described by De Bondt and Thaler (1985), they documented that stocks from the NYSE with poor return performance (losers) in the past 3-5 years achieved higher returns in the next 3-5 years than those with good historic performance (winners) in the last 3-5 years. They cited that this is

evidence that investors underpriced the value of the company and once the forces of rational investors outweighed the irrational investors, the true-value of the underlying company was once again reflected in the market price of the stock (Harger, Elshahat, & Horvath, 2012). The theory consists of two propositions: investors often respond to new information with an exaggerated shift in price that reflects excessive enthusiasm or fear; and, after assessing the new data more carefully, investors correct or adjust the exaggeration by moving the stock's price in the opposite direction.

The hypothesis treats abnormal returns as forecasting variable for future performance. De Bondt and Thaler (1985) show evidence that previous losers show excess returns of 25% over a 3-year period in comparison to the winner stocks. Investors following the contrarian strategy use historical data to distinguish loser stocks and winner stocks. They earn excess returns by going long on the loser stocks and short on the winner stocks. The opposite occurs when investors underreact to information due to their conservatism. In this case prices deviate from their intrinsic value as a result of misperceptions that the change is temporary. Because the change is perceived to be temporary, investors tend to react cautiously whereby stock prices change too slowly (Fama, 1998). The conservative character of people seems to be more apparent when the data is not representative of an underlying model. This phenomenon is also known as underreaction. In this case investors may earn excess returns by buying past winners and selling past losers i.e. following a momentum strategy.

The overreaction hypothesis has generated much interest in subsequent years. Specific studies question the strong finding of DeBondt and Thaler of a stock market overreaction on grounds of varying betas, size differences between winner and loser stocks and bidask spread bias. Chan (1988) rejects the overreaction hypothesis by arguing that DeBondt and Thaler fail to control for time-varying risk, and when properly controlled the hypothesis disappears. Specifically, he argues that stocks with a series of negative abnormal returns will experience an increase in their equity betas, and thus increase their expected returns. This is because equity beta is a function of gearing. Likewise, the 'winner' stocks which experience a series of positive abnormal returns have reduced betas and lower expected returns. Ball and Kothari (1989) make a similar claim. They suggest that negative serial correlation in relative returns is due almost entirely to variation in relative risks, and therefore expected relative returns, through time.

In addition to studies of individual equities, including DeBondt and Thaler (1985) and Fama and French (1988), which found evidence of price reversals following large changes, other research, such as Cox and Peterson (1994), disputes that view. They examine the role of the bid-ask bounce, market liquidity, and overreaction in explaining price reversals in the three-day period immediately following large one-day declines. They argue that price reversals are caused by the bid-ask bounce. However, they note that the degree of reversals tends to decline through time. Choi and Jayaraman (2008) also found that stock price reversal is not a result of overreaction, but cannot also be simply explained by bid-ask bounce.

Zarowin (1990) claims that firm size can explain this overreaction (firm size effect). He argues that losers tend to be smaller than winners and when size is controlled there is no significant difference in test period performance. He also analyses the periods when losers are smaller than winners, and periods when winners are smaller than losers. The results indicate that when losers are smaller, they outperform the winners. When winners are smaller, they outperform the losers. Therefore, Zarowin concludes that losers' superior performance over winners during the 3-year test period is due, not to overreaction, but to size discrepancies. Thus in order to ascertain whether there is an independent overreaction effect, a size adjustment is necessary.

Other criticisms of overreaction studies include the impact of bid-ask spread bias (Conrad & Kaul, 1993). This is a particular problem with small firms or low-priced stocks which have proportionally bigger bid-ask spreads and high chances of non-trading; bid-ask spread may induce spurious autocorrelation. However, the above critiques of overreaction have not gone unchallenged. DeBondt and Thaler (1987) and Chopra, Lakoniskok and Ritter (1992) reject the explanation that the winner-loser effect is explained by changes in beta. They argue that differential risk between winner and loser portfolios are insufficient to explain the excess returns identified in their study. Chopra et al (1992) provide evidence which is consistent with the overreaction hypothesis, and they reject Zarowin's explanations based on size effect as do Albert and Henderson (1995). Conrad and Kaul's arguments have been challenged by Loughran and Ritter (1996), in relation both to the impact of the return metric and the suggestion that low-priced stocks drive overreaction effects. Their general conclusion is that the findings of Conrad and Kaul may have been overstated.

The size effect was first introduced by Banz (1981) in which he shows that the common stock of small-cap firms have on average higher returns than the common stock of large cap stocks. He found that risk adjusted stocks returns are a decreasing function of firm size such that larger firms stocks have lower returns than smaller firms stocks. Thus the returns for the small firms were higher. He suggests that size may be a proxy for other factors that were not tested in his model. He pointed out the neglected firm effect as one of these. A great part of the theoretical foundation to the size anomaly is based on information arguments. Securities to which less information is available in the market are associated with higher risk levels. Therefore, in order to attract investors to hold these securities premiums should be provided. Since small-cap stocks are considered less transparent and thus riskier, it follows that there would appear to be opportunities to outperform the market (Barry & Brown, 1984).

Furthermore, small companies are usually the ones that market analysts do not take in consideration when analysing the market. Arbel and Strebel (1983) found a strong correlation between higher abnormal returns and neglected firms i.e. to which little information is available. They emphasize on the strong effect to companies with smaller capitalization. This neglected firm effect could also be viewed as a cause of the information problem, and thus resulting in higher premiums.

In the local context, Aduda and Muimi (2011) tested for investor rationality in the NSE and their results were consistent with the notion of overreaction, showing that investors overreact to both good and bad news. Several studies done at the NSE have posted mixed results in as far as the small firm effect is concerned. For instance, Oluoch (2003) failed to detect any existence or prevalence of the anomaly at the market and Mghendi (2012) found that small-sized firms have a significant positive influence on the monthly returns of companies at the NSE thus showing existence of small firm effect.

## Empirical Studies

The first evidence of market overreaction and superior investment returns achieved by using contrarian investment strategy which calls for buying today's "losers" and selling today's "winners" was found by De Bondt and Thaler (1985, 1987). Their study showed that the U.S. stock market tend to overreact to some big news events regardless of whether the events are positive or negative, and the overreaction leads to abnormal price movements. The study was based on monthly return data for New York Stock Exchange (NYSE) common stocks, as compiled by the Center for Research in Security Prices (CRSP), between January 1926 and December 1982. The main conclusions were that the best (worst) performing portfolios in the NYSE over a three-year period tended to under (over)-perform over the following three-year period. Loser portfolios of 35 stocks outperformed the market by, on average, 19.6%, thirty-six months after portfolio formation and winner portfolios, on the other hand, earn about 5.0% less than the market. An interesting fact, mentioned by De Bondt and Thaler, is an asymmetry in the overreaction: its size is bigger for undervalued than for overvalued stocks.

Zarowin (1989) challenged the De Bondt and Thaler's (1985) findings and evidence on stock market overreaction in the light of size phenomenon and proposed that it is the differential size that drives the winner vs. loser phenomenon rather than the assumed investor overreaction. He tested the OH by examining firms' stock returns over the 36 months subsequent to extreme earnings years. His study was based on monthly return data for NYSE common stocks, between 1971 and 1981. Although the poorest earners outperformed the best earners by a statistically significant 16.6% over the 36 months, this result was found to be primarily due to difference in size between the two groups. When poor earners were matched with good earners of equal size, there was little difference in return behaviour. When earners of disparate sizes were compared, small firms outperformed large firms, and small winners also outperformed large losers. Zarowin therefore concludes that the winner-loser effect is primarily a size effect and not due to market overreaction.

Jegadeesh and Titman (1995) found evidence of market overreaction as a source of most contrarian profits as opposed to delayed reactions (lead-lag effect). The study examined stock price reactions to different types of information using a sample period of 1963 to 1990 on firms traded on the NYSE and the American Stock Exchange. Evidence suggested that stock prices overreact to firm-specific information, but react with a delay to common factors. They concluded

that the primary source of observed contrarian profits is the reversal of firm-specific component of returns which can be interpreted as corrections of prior overreactions.

The empirical evidences presented so far was concentrated mainly on US stock market. However, as the case in most other financial studies, once the phenomenon has been detected in the US market, it is further tested in other financial markets. It is important to examine the overreaction effect in international equity markets as the strength of overreaction effect may depends on various market characteristics and the evidences of overreaction effect in different markets and time periods would make for a strong argument against data mining.

In the UK Stock market Campbell and Limmack (1997) and Dissanaike (1997) found evidence in favour of overreaction hypothesis. Clare and Thomas (1995) carried out a study on UK data between 1955 to 1990 drawn from a random sample of up to 1,000 stocks in any one year. The portfolios were formed using stock return data taken from the London Business School LSPD tapes that consisted of end month dividend adjusted returns on all stocks listed on the London Stock Exchange since January 1955. It was found that losers outperformed previous winners over a two-year period by a statistically significant 1.7% per annum, showing a very weak overreaction effect in UK stock market. They concluded that these abnormal returns were due to the size effect, as claimed by Zarowin (1989).

Alonso and Rubio (1990) reported the presence of strong overreaction in Spanish equity market for the time period between 1967 and 1984. Overreaction in Spanish stock market was found to be systematic, with winners losing as much as losers winning and the effect gets stronger when longer formation and testing periods were used. In contrast, Forner and Marhuenda (2000) reported the results against the overreaction effect in Spanish equity market for the sample period from January 1963 to December 1997. The discrepancies between the studies were due to different methodology and sample period used. Alonso and Rubio used both non overlapping formation and test period, in contrast to non-overlapping test periods only by Forner and Marhuenda.

Swallow and Fox (1998) also confirmed the presence of overreaction effect in New Zealand stock market. The study attempted to determine whether New Zealand capital markets are efficient by investigating investor rationality and overreaction to good and bad information events. Loser portfolios outperformed the market by an average of 34.5% and the winners outperformed the market by only 1.5%, 36 months after portfolio formation. The results also indicated that overreaction is more significant among large firms in the New Zealand Market although the portion of large firms experiencing overreaction is much less than small firms.

Bacmann and Dubois (1998) also reported that the standard contrarian strategy in all states of nature, lead to smaller yet significant profits in France. They further reported that the profits computed were stronger when market was strongly bullish. However, in Australian and Canadian

stock markets, the evidence in favour of overreaction effect was found to be weak. Brailsford (1992) using the Australian stock market data revealed that there exists no mean reversion in the returns of extreme portfolios. Kryzanowski and Zhang (1992) investigated the overreaction effect in Canadian Stock Market and found results inconsistent with overreaction effect using the test and formation period of 1, 2, 3, 5, 8 and 10 years. Baytas and Cakici (1999) examined the seven developed US, Canadian, Japanese, French, Italian, German and UK stock markets and found strong evidence of overreaction effect in two and three year period for all countries except US and Canada.

Strong evidence in favour of the effect was also observed in Asian stock markets that include: India, Malaysia, Sri Lanka and China stock markets. Ahmad and Hussain (2001) reported the overreaction effect and seasonality in the stock returns of Malaysia Kuala Lumpur Stock Exchange (KLSE). Strong asymmetric overreaction effect was also observed by Wu (2004) in China stock market, Gunasekarage and Power (2005) for Colombo stock exchange (Sri Lanka), Locke and Gupta (2009) and Tripathi and Aggarwal (2009) for Indian stock market. In addition, a small number of studies also reported evidences in favour of overreaction effect in the Middle-East stock exchanges. These include Dhouib and Abaoub (2007), Bildik and Gulay (2007) for Turkey, Saleh (2007) for Jordan and Ismail (2012) for Egyptian stock market.

In the African context, Page and Way (1992) reported results that were consistent with OH and and indicated substantial weak form inefficiencies in the South African stock market in the long-term. The study outlined empirical research into the overreaction hypothesis on the Johannesburg Stock Exchange (JSE) using data over the period July 1974 to June 1989 for two hundred and four relatively well traded securities. Portfolios of prior losers outperformed prior winners by about 20% over the 3 years after portfolio formation.

Hsieh and Hodnett (2011) report that mean reversals due to investor overreaction on the JSE are found to be stronger for the past winner and loser portfolios with longer formation periods. Similar to the results of De Bondt and Thaler (1985) and Page and Way (1992), the loser portfolios exhibit stronger mean reversals than their winner counterparts over the examination period. The delayed mean reversals for the winner portfolios was attributable to behavioural biases such as fear of regret or being reference dependent, which cause investors to hold on too long to the past winners.

The strength of mean reversals was found to be cyclical and fluctuates around the South African business cycle. The results also suggested that contrarian investing could be a safe haven during the financial market turmoil due to their low correlations with the market during the economic downturn. The regression analysis supported the argument that mean reversals were more likely to take place when investors are less confident about the future prospects of the economy. In addition, the results also suggested that, there exists a saturation point for the past winners and a loser to continue their trends and the mean reversal take place once that saturation point is reached.

Overall, the results of studies in the Middle East and Africa violate the weak version of EMH and confirm the possibility of stock returns on the basis of historical recordings without using any accounting data in respective stock markets. However, there are some important caveats to this conclusion. Firstly, many of the studies in emerging markets reported non-significant results in favour of overreaction effect; still they claimed them to be economically significant. Secondly, small sample composition of several studies including Dhouib and Abaoub (2007) of 30 stocks and Bildik and Gulay (2007) of less than 100 stocks, raises doubts on the reliability of the results. Further, studies such as Ahmad and Hussain (2007), Bildik and Gulay (2007) and Dhouib and Abaoub (2007), includes ten years or less data, are also unlikely to yield reliable results.

In South America, Da Costa (1994) came up with the findings in agreement to overreaction hypothesis in Brazilian stock market. The empirical results were found to be consistent with overreaction effect. Moreover, the overreaction effect in Brazilian stock market was found to be asymmetric in nature, as only the values of winner portfolio have reverted.

Aduda and Muimi (2011) reported the presence of overreaction in the Kenyan market for the time period between January 2001 and December 2009. Portfolios of stocks were formed on the basis of prior period performance as was the case with DeBondt and Thaler (1985), Zarowin (1989), Clare and Thomas (1995), Swallow and Fox (1998) and others. The portfolios were formed using stock return data taken from 56 companies listed on the NSE and an equally weighted arithmetic average rate of return on all NSE listed securities served as the market index. They found that the loser portfolio outperformed the winner portfolio by about 35.92%.

# Methodology

## Research Design

The paper adopts a longitudinal survey design. A longitudinal study is a correlational research study that involves repeated observations of the same items over long periods of time (Sekaran, 1992). It involves tracking changes over time on a broad range of population members, which is desirable for comparative purposes. The given study is largely descriptive therefore sample statistics are used to make generalization about population parameters.

This study focuses attention on the performance of different companies at NSE as well as the movement of their share price to determine whether there is any evidence of the overreaction hypothesis.

## Population and Sampling

Change in annual profit after tax (PAT) values will be used as an earnings measure for portfolio formation purposes for the period between 2005 and 2011 and end-of-month closing values of the stock prices and the NSE-20 Index, will be used to estimate monthly excess returns from January 2008 through December 2014. The 10-year period is chosen for the study based on availability and currency of data. The study will also analyse monthly returns since this is the most popular frequency in the literature. Using data of a frequency lower than this (such as quarterly returns) is likely to introduce smoothing effects, thus, wiping out any meaningful results. Daily returns are avoided because of unnecessarily too much noise that accompanies them, and the complexity of dealing with weekends and public holidays.

The target population of this study was all the companies listed on the NSE as at December 2014. This formed the population of study. The sampling frame adopted in the study was obtained from the NSE list of listed companies that have been listed since January 2005. This was because the study analysed stock returns for listed companies over a period of nine years.

## Data Collection

The data used for this study will be mainly from secondary sources. The NSE provides a spread sheet at the close of business every trading day that details the highest, lowest and volume weighted average price of each share, number of shares traded, market capitalization, dividend announcements, and closing values for the various indices including the NSE-20. The NSE also provides a database of company financial reports from which earnings values will be extracted.

## The Empirical Model

For the empirical analysis, company earnings in the form of annual PAT for the period between 2005 and 2012, and monthly closing prices of NSE-listed companies for the period between January 2008 and December 2014 are employed. The basic strategy is to form portfolios of firms that are characterised by extreme (good vs. bad) earnings performance and to compare the subsequent stock returns of the poorest versus the best earners. As we are using 10 years data we will repeat this analysis 5 times at starting from January 2005. We divide a sample period into two sub-periods. The whole sample period consists of 72 months in which earnings data from the first 36 months is used to form portfolios of good and bad stocks based on returns and the next 36 months are considered as the test period whereby we check for overreaction by observing the difference in the excess returns of the two portfolios based on monthly closing prices.

### Portfolio Formation

Portfolios of stocks are formed on the basis of prior period earnings performance as was the case with DeBondt and Thaler (1985), Zarowin (1989), Clare and Thomas (1995), Swallow and Fox (1998), Aduda and Muimi (2011) and others. To determine the ranking of stocks, the study uses a model used by DeBondt and Thaler (1985) and Zarowin (1989) who used monthly return data for NYSE common stocks as compiled by the CRSP of the University of Chicago. Using data from company financial reports, we compute:

*Equation 1: PERF*

$$PERF_{it} = \frac{\Delta x_{it}}{\sigma_{\Delta x_t}}$$

Where

$x_T$ = earnings for year T

$\Delta x_{it}$ = change in earnings from year T-3 to year T, and

$\sigma_{\Delta xi}$ = the standard deviation of the firm's earnings changes over the 3 previous years.

$PERF_{it}$ is an earnings performance metric for this study because it captures to what extent a firm's earnings change is an outlier observation. The choice of using a 3-year period to calculate the standard deviation represents a trade-off between having enough observations to calculate this statistic versus having enough to conduct the tests. On each of the relevant portfolio formation dates (January 2008, January 2009, ... , January 2012), firms are ranked by $PERF_{it}$ and sorted into five portfolios, with an equal number of firms per portfolio. Portfolio 1 includes the top 5 firms with the worst measures (loser portfolio) and portfolio 5 includes the top 5 firms with the best earnings performance (winner portfolio). This study concentrates on the extreme portfolios 1 and 5 (loser portfolio L and winner portfolio W respectively). Thus, the portfolios were formed conditional upon past earnings behaviour prior to t = 0, the portfolio formation date.

Both portfolios are equally volume weighted and if a stock is de-listed, it was permanently dropped from the portfolio formation process for subsequent periods. This, therefore, implied a rebalancing of the portfolios after each sample period.

## Testing for Overreaction

To investigate the overreaction effect, we first compute the raw return of stocks on each month t ($r_{i,t}$) as the difference between the current month's and previous month's closing price (P) as follows:

*Equation 2: Monthly stock return*

$$r_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

The abnormal return (AR) on a stock is computed using a mean-adjusted returns model as follows:

*Equation 3: AAR*

$$AR_{i,t} = r_{i,t} - E(r_{i,t})$$

where $AR_{i,t}$ is the abnormal return on each stock i for month t; $r_{i,t}$ is the return of each stock i on month t and $E(r_{i,t})$ is the expected return on each stock i for month t. The expected return is assumed to be the return on the market index (NSE-20).

The second step of testing contrarian profits involves measuring the performance of winner and loser portfolios over the next 36 months. For both portfolios in each of the 5 overlapping three-year periods, the Average Abnormal Returns (*AARs*) is obtained by taking the average the selected stocks' monthly excess returns.

For portfolio W,

*Equation 4: Winner AAR*

$$AAR_{W,t} = \frac{1}{n}\sum_{t=1}^{n} AR_{i,t}$$

For portfolio L,

*Equation 5: Loser AAR*

$$AAR_{L,t} = \frac{1}{n}\sum_{t=1}^{n} AR_{i,t}$$

Where n= number of stocks in each portfolio

Test of Significance:

$AAR_W$ $(AAR_L)$ indicates how much monthly excess returns stocks in the winner (loser) portfolio earn for each month in test period. If markets are efficient and weak form of EMH is in force then $AAR_L - AAR_W$ must be equal to zero. The overreaction hypothesis implies that $AAR_W < 0$ and $AAR_L > 0$. Alternatively, the null hypothesis can be written as $AAR_L - AAR_W > 0$.

The test performed on the average portfolio is based upon forming a 'difference' portfolio, where $AAR_W$ was subtracted from $AAR_L$. The test compares the means of the winner and loser portfolio returns by checking for the significance of $\alpha$, the difference between the excess returns of the two portfolios. A simple t-test was carried out to check the significance of the constant $\alpha$ which indicated whether there is a significant difference in the means of the winner and loser stocks.

### Test for size effect

Portfolios of stocks are formed on the basis of market cap or market value of equity (MVEQ) as was the case with Zarowin (1989), for the 5 sample periods. On each of the relevant portfolio formation dates (December 2007, December 2008, ... , December 2011), firms were ranked by MVEQ and sorted into portfolios of equally volume-weighted 5 stocks each. Portfolio 1 includes the top 5 largest firms and portfolio 5 includes the top 5 smallest firms based on average MVEQ for the first 36 months of each sample period.

The second step involved measuring the performance of these two portfolios over the next 36 months of each sample period. For both portfolios in each of the 5 overlapping three-year periods, the Average Abnormal Returns (*AARs*) was computed, as was in the test for overreaction.

We then tested for the significance of $\alpha$, the difference between $AAR_1$ and $AAR_5$, the mean excess returns of small and large stocks, which checked for confirmation of Zarowin's findings i.e. the difference between winner and loser portfolios is primarily a size effect.

# Data Analysis

The hypotheses to be tested in this study are stated below in their null form:
$H_1$: *There is no significant difference between the winner and loser portfolios as a result of overreaction to earnings information.*
$H_2$: *There is no significant difference between the winner and loser portfolios as a result of the size effect.*

## Test for Overreaction

Portfolio formation was carried out based on *PERF* ranking over 3 years and t-tests were performed to check the significance of the difference between the *AARs* of winner and loser portfolios over the subsequent three yeas using a 95% confidence interval. The results are set out below.

Period 1 (2005-2010)

*Table 1: Test 1 period 1 portfolios*

| Portfolio W | PERF | Portfolio L | PERF |
|---|---|---|---|
| **WPP Scangroup** | 2.45 | **Car & General** | -0.92 |
| **Diamond Trust Bank** | 2.45 | **KenolKobil** | -0.96 |
| **NIC Bank** | 2.43 | **Sasini** | -2.34 |
| **Bamburi Cement** | 2.43 | **Eveready** | -2.40 |
| **Centum** | 2.43 | **Olympia Capital** | -2.41 |

*Table 2: Test 1 period 1 t-test results*

| | *Portfolio W* | *Portfolio L* |
|---|---|---|
| **Mean** | 5.50% | -4.26% |
| **Variance** | 5.71% | 9.93% |
| **Observations** | 36 | 36 |
| **t Stat** | 1.48187 | |
| **P(T<=t) two-tail** | 0.14321 | |
| **t Critical two-tail** | 1.99714 | |

The results for this period show that on average the winner portfolio outperforms the loser portfolio by 9.76%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.14 is not significant at 5%.

Period 2 (2006-2011)

*Table 3: Test 1 period 2 portfolios*

| Portfolio W | PERF | Portfolio L | PERF |
|---|---|---|---|
| NIC Bank | 2.45 | Kenya Airways | -2.34 |
| Car & General | 2.45 | Eveready | -2.36 |
| Kakuzi | 2.45 | Mumias Sugar Co. | -2.44 |
| Co-operative Bank | 2.45 | Pan Africa | -2.44 |
| WPP Scangroup | 2.44 | B.O.C Kenya Ltd | -2.45 |

*Table 4: Test 1 period 2 t-test results*

| | *Portfolio W* | *Portfolio L* |
|---|---|---|
| Mean | 4.52% | -3.68% |
| Variance | 9.19% | 5.37% |
| Observations | 36 | 36 |
| t Stat | 1.29018 | |
| P(T<=t) two-tail | 0.20155 | |
| t Critical two-tail | 1.99713 | |

The results for this period show that on average the winner portfolio outperforms the loser portfolio by 8.20%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.20 is not significant at 5%.

Period 3 (2007-2012)

*Table 5: Test 1 period 3 portfolios*

| Portfolio W | PERF | Portfolio L | PERF |
|---|---|---|---|
| Uchumi Supermarket | 2.45 | EA Cables | -1.82 |
| Barclays Bank | 2.45 | Eveready | -2.01 |
| Standard Group | 2.45 | Centum | -2.06 |
| Kakuzi | 2.45 | Kenya Airways | -2.15 |
| Co-operative Bank | 2.44 | B.O.C Kenya Ltd | -2.32 |

*Table 6: Test 1 period 3 t-test results*

| | *Portfolio W* | *Portfolio L* |
|---|---|---|
| Mean | 0.26% | -7.93% |
| Variance | 4.28% | 3.55% |
| Observations | 36 | 36 |
| t Stat | 1.75619 | |
| P(T<=t) two-tail | 0.08349 | |
| t Critical two-tail | 1.99494 | |

The results for this period show that on average the winner portfolio outperforms the loser portfolio by 8.19%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.08 is not significant at 5%.

Period 4 (2008-2013)

*Table 7: Test 1 period 4 portfolios*

| Portfolio W | PERF | Portfolio L | PERF |
|---|---|---|---|
| TPS Eastern Africa | 2.45 | Unga Group | -2.04 |
| Uchumi Supermarket | 2.44 | Sameer Africa | -2.09 |
| Kenya Orchards | 2.44 | EABL | -2.15 |
| WPP Scangroup | 2.44 | B.O.C Kenya Ltd | -2.43 |
| Housing Finance | 2.43 | EA Cables | -2.45 |

*Table 8: Test 1 period 4 t-test results*

| | *Portfolio W* | *Portfolio L* |
|---|---|---|
| Mean | -0.74% | 0.51% |
| Variance | 3.75% | 3.46% |
| Observations | 36 | 36 |
| t Stat | -0.28006 | |
| P(T<=t) two-tail | 0.78025 | |
| t Critical two-tail | 1.99443 | |

The results for this period show that on average the loser portfolio outperforms the winner portfolio slightly by 1.25%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.78 is not significant at 5%.

Period 5 (2009-2014)

*Table 9: Test 1 period 5 portfolios*

| Portfolio W | PERF | Portfolio L | PERF |
|---|---|---|---|
| KPLC | 2.45 | Standard Group | -1.95 |
| Nation Media Group | 2.45 | Express Kenya | -2.00 |
| NIC Bank | 2.45 | Eveready | -2.25 |
| TPS Eastern Africa | 2.45 | Bamburi Cement | -2.29 |
| Olympia Capital | 2.45 | EA Portland Cement | -2.43 |

*Table 10: Test 1 period 5 t-test results*

| | *Portfolio W* | *Portfolio L* |
|---|---|---|
| Mean | -1.14% | 0.78% |
| Variance | 2.74% | 9.25% |
| Observations | 36 | 36 |
| t Stat | -0.33315 | |
| P(T<=t) two-tail | 0.74030 | |
| t Critical two-tail | 2.00487 | |

The results for this period show that on average the loser portfolio outperforms the winner portfolio slightly by 1.92%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.74 is not significant at 5%.

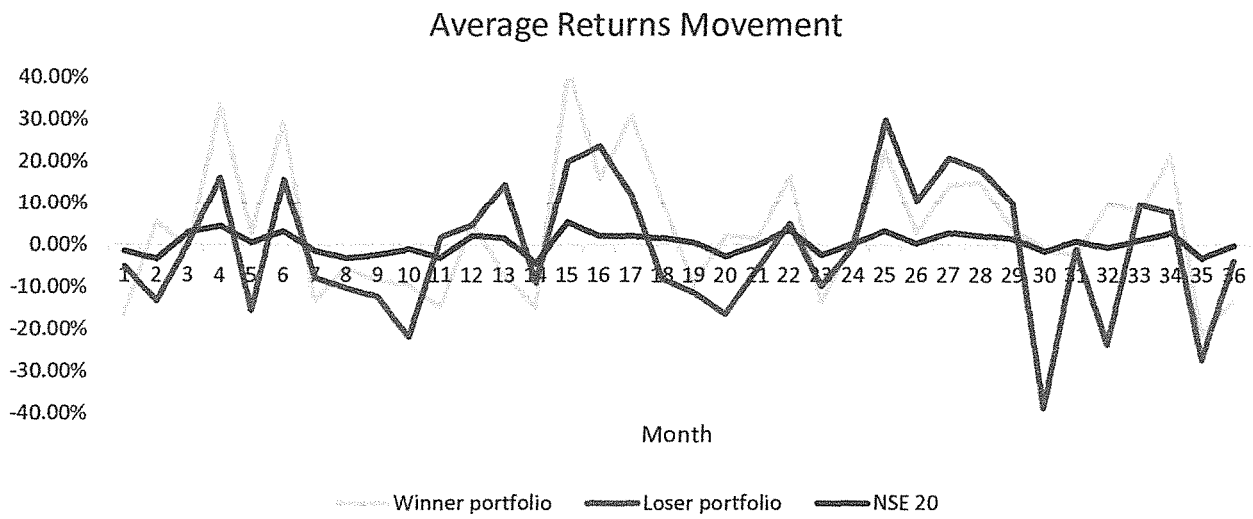


*Figure 1: Test 1 average returns*

The graph shows the movement of average returns of each portfolio and the market over the 5 sample periods. The returns of the two portfolios on average move together but exhibit spikes of different magnitudes. The characteristics displayed do not support the existence of the overreaction anomaly.

## Test for Size Effect

Portfolio formation was carried out based on average *MVEQ* over 3 years and t-tests were performed to check the significance of the difference between the *AARs* of portfolios with the largest and smallest stocks over the subsequent three years using a 95% confidence interval. The results are set out below.

Period 1 (2005-2010)

*Table 11: Test 2 period 1 portfolios*

| Portfolio 1 | MVEQ | Portfolio 5 | MVEQ |
|---|---|---|---|
| **EABL** | 104,469,200,171 | **City Trust** | 457,589,909 |
| **Bamburi Cement** | 66,663,520,175 | **Kapchorua Tea** | 445,968,000 |
| **KenGen Co.** | 62,697,270,834 | **Olympia Capital** | 350,666,667 |
| **Barclays Bank** | 48,933,613,080 | **Limuru Tea** | 144,700,000 |
| **Standard Chartered** | 48,519,057,304 | **Kenya Orchards** | 38,604,372 |

*Table 12: Test 2 period 1 t-test results*

| | *Portfolio 1* | *Portfolio 5* |
|---|---|---|
| **Mean** | 2.52% | -0.55% |
| **Variance** | 2.41% | 12.43% |
| **Observations** | 36 | 36 |
| **t Stat** | 0.47675 | |
| **P(T<=t) two-tail** | 0.63570 | |
| **t Critical two-tail** | 2.01063 | |

The results for this period show that on average the portfolio of large stocks outperforms the portfolio of small stocks by 3.07%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.64 is not significant at 5%.

Period 2 (2006-2011)

*Table 13: Test 2 period 2 portfolios*

| Portfolio 1 | MVEQ | Portfolio 5 | MVEQ |
|---|---|---|---|
| **EABL** | 112,772,330,909 | **Eaagads** | 497,093,625 |
| **Bamburi Cement** | 69,688,180,800 | **Olympia Capital** | 430,666,667 |
| **Barclays Bank** | 67,328,415,000 | **Kapchorua Tea** | 333,824,000 |
| **KenGen Co.** | 53,412,856,915 | **Limuru Tea** | 232,000,000 |
| **KCB Bank** | 51,357,819,253 | **Kenya Orchards** | 38,604,372 |

*Table 14: Test 2 period 2 t-test results*

| | *Portfolio 1* | *Portfolio 5* |
|---|---|---|
| **Mean** | -2.94% | 4.53% |
| **Variance** | 3.51% | 32.84% |
| **Observations** | 36 | 36 |
| **t Stat** | -0.74306 | |
| **P(T<=t) two-tail** | 0.46158 | |
| **t Critical two-tail** | 2.01808 | |

The results for this period show that on average the portfolio of small stocks outperforms the portfolio of large stocks by 7.47%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.46 is not significant at 5%.

Period 3 (2007-2012)

*Table 15: Test 2 period 3 portfolios*

| Portfolio 1 | MVEQ | Portfolio 5 | MVEQ |
|---|---|---|---|
| EABL | 120,461,293,564 | Marshalls EA | 420,998,351 |
| Safaricom Ltd | 108,666,666,667 | Olympia Capital | 414,000,000 |
| Barclays Bank | 78,983,586,000 | Eaagads | 325,589,625 |
| Bamburi Cement | 62,549,981,725 | Kapchorua Tea | 318,176,000 |
| Equity | 57,545,070,513 | Kenya Orchards | 38,604,372 |

*Table 16: Test 2 period 3 t-test results*

| | *Portfolio 1* | *Portfolio 5* |
|---|---|---|
| Mean | 0.14% | 0.74% |
| Variance | 3.80% | 27.78% |
| Observations | 36 | 36 |
| t Stat | -0.06444 | |
| P(T<=t) two-tail | 0.94891 | |
| t Critical two-tail | 2.01537 | |

The results for this period show that on average the portfolio of small stocks outperforms the portfolio of large stocks slightly by 0.60%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.95 is not significant at 5%.

Period 4 (2008-2013)

*Table 17: Test 2 period 4 portfolios*

| Portfolio 1 | MVEQ | Portfolio 5 | MVEQ |
|---|---|---|---|
| Safaricom Ltd | 171,333,333,333 | Express Kenya | 339,876,384 |
| EABL | 129,423,402,932 | Kapchorua Tea | 331,216,000 |
| Equity | 72,142,438,940 | Marshalls EA | 301,535,571 |
| Barclays Bank | 70,836,282,000 | Olympia Capital | 299,333,333 |
| Bamburi Cement | 61,340,117,475 | Kenya Orchards | 38,604,372 |

*Table 18: Test 2 period 4 t-test results*

| | *Portfolio 1* | *Portfolio 5* |
|---|---|---|
| Mean | 3.59% | -3.11% |
| Variance | 1.74% | 6.94% |
| Observations | 36 | 36 |
| t Stat | 1.36359 | |
| P(T<=t) two-tail | 0.17857 | |
| t Critical two-tail | 2.00665 | |

The results for this period show that on average the portfolio of large stocks outperforms the portfolio of small stocks by 6.70%. However, there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.18 is not significant at 5%.

Period 5 (2009-2014)

*Table 19: Test 2 period 5 portfolios*

| Portfolio 1 | MVEQ | Portfolio 5 | MVEQ |
|---|---|---|---|
| **Safaricom Ltd** | 163,333,333,333 | **Limuru Tea** | 376,000,000 |
| **EABL** | 136,803,963,588 | **Express Kenya** | 232,484,888 |
| **Barclays Bank** | 71,605,749,600 | **Marshalls EA** | 231,968,892 |
| **Equity** | 70,908,179,933 | **Olympia Capital** | 208,666,667 |
| **Bamburi Cement** | 56,500,660,475 | **Kenya Orchards** | 38,604,372 |

*Table 20: Test 2 period 5 t-test results*

| | *Portfolio 1* | *Portfolio 5* |
|---|---|---|
| **Mean** | 4.44% | 19.27% |
| **Variance** | 1.53% | 80.81% |
| **Observations** | 36 | 36 |
| **t Stat** | -0.98019 | |
| **P(T<=t) two-tail** | 0.33354 | |
| **t Critical two-tail** | 2.02809 | |

The results for this period show that on average the portfolio of small stocks outperforms the portfolio of large stocks by 14.83%. However there is no significant difference between the two as indicated by t-test results. The t-stat is below the critical value and the p-value of 0.33 is not significant at 5%.

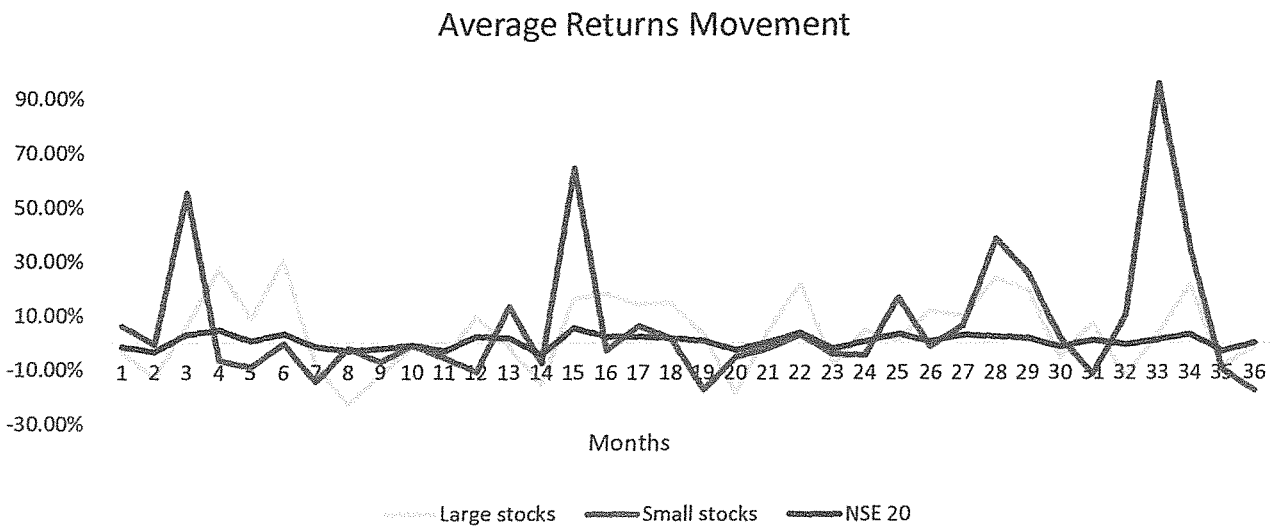


*Figure 2: Test 2 average returns*

The graph shows the movement of average returns of the portfolio of large stocks, the portfolio of small stocks and the market over the 5 sample periods. The portfolio of small stocks exhibits much larger positive spikes than the portfolio of large stocks. This is however not enough to prove the existence of the size effect in the market.

# Discussion

## Test for Overreaction

To ascertain whether there is overreaction to extreme earnings we check for the statistical significance of the differences between the winner and loser portfolios over the 36 months subsequent to portfolio formation. PERF is calculated on each eligible stock in the NSE and firms are ranked and sorted into portfolios where the best performed stocks make up the winner portfolio and the worst performed stocks make up the loser portfolio. Average monthly returns on these portfolios are computed and compared to the market return (average return on the NSE 20 index) to arrive at abnormal average returns (AARs). A two-tailed t-test is then performed on the AARs of each portfolio to check for a significant difference, assuming unequal variances. This process was repeated 5 times over different overlapping periods and the results are shown below.

*Table 21: Test 1 average t-test results*

| Period | P-value |
|---|---|
| 1 | 0.14321 |
| 2 | 0.20156 |
| 3 | 0.08349 |
| 4 | 0.78026 |
| 5 | 0.74031 |
| **Average** | **0.38976** |

The results indicate that over all the sample periods, there was no significant difference between the AARs of the two portfolios using a 95% confidence interval. An average p-value of 0.39 is statistically not significant and this leads us to not reject the null hypothesis. The findings do not support the overreaction to earnings hypothesis as opposed to the results of Aduda and Muimi (2011), who reported the presence of overreaction in the Kenyan market for the time period between January 2001 and December 2009.

## Test for Size Effect

To test whether it is size, and not overreaction to earnings that is responsible for the difference in losers and winners, as proposed by Zarowin (1989), we form two portfolios, one of large stocks and the other of small stocks based on MVEQ. We then check for the statistical significance of the differences between the two portfolios over the 36 months subsequent to portfolio formation. Average monthly returns on these portfolios are computed and compared to the market return (average return on the NSE 20 index) to arrive at abnormal average returns (AARs). A two-tailed t-test is then performed on the AARs of each portfolio to check for a significant difference, assuming unequal variances. This process was repeated 5 times over different overlapping periods and the results are shown below.

*Table 22: Test 2 average t-test results*

| Period | P-value |
|---|---|
| 1 | 0.63570 |
| 2 | 0.46158 |
| 3 | 0.94891 |
| 4 | 0.17857 |
| 5 | 0.33354 |
| **Average** | **0.51166** |

The results indicate that over all the sample periods, there was no significant difference between the AARs of the two portfolios using a 95% confidence interval. An average p-value of 0.51 is statistically not significant and this leads us to not reject the null hypothesis. The findings do not support the findings of Zarowin (1989) and Mghendi (2012) but are consistent with the findings of Oluoch (2003) who failed to detect any existence or prevalence of the size anomaly in the NSE.

# Conclusion

In this paper the Overreaction Hypothesis is tested using data from the NSE, under the methodology used by Zarowin (1989). This research paper has looked at overreaction by observing abnormal average returns over winner and loser portfolios formed based on earnings information over 5 sample periods. When testing the difference in means between the portfolios, no significant values for alpha have been found suggesting that the one portfolio does not earn significantly higher returns than the other. The NSE shows in general an efficient character with respect to how investors perceive earnings information, suggesting that no arbitrage possibilities exist and thus weakening the Overreaction Hypothesis. The paper also tests for the size effect in order to determine whether it is the primary cause of the difference between winner and loser stocks. Portfolios are formed based on market values and their abnormal average returns are examined over 5 sample periods. The results show no significant values for alpha suggesting that size does not contribute to price reversals. Investors cannot employ contrarian strategies based on earnings or size because they are not the factors responsible for price reversals. Further studies could be carried out to determine the factors that are responsible for the difference in winner and loser portfolios.

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