

**THE EFFECT OF STOCK SPLIT ON SHARE PRICES OF  
COMPANIES LISTED AT THE NAIROBI SECURITIES  
EXCHANGE**

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## DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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This project has been submitted for examination with my approval as the University supervisor.

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# TABLE OF CONTENTS

<b>ACKNOWLEDGEMENT</b> .....	<b>iii</b>
<b>DEDICATION</b> .....	<b>iv</b>
<b>TABLE OF CONTENTS</b> .....	<b>v</b>
<b>ABSTRACT</b> .....	<b>ix</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>1</b>
Background to the Study .....	1
1.1.1 Stock Splits .....	3
1.1.2 Share Price .....	4
1.1.3 Stock Splits and Share Price .....	4
1.2 Research Problem.....	8
1.3 Research Objective.....	10
1.4 Value of the Study.....	10
<b>CHAPTER TWO</b> .....	<b>12</b>
<b>LITERATURE REVIEW</b> .....	<b>12</b>
2.1 Introduction .....	12
2.2 Theoretical review .....	12
2.2.1 Signaling Theory.....	13
2.2.2 Market Efficiency Theory.....	14
2.3 Event Studies.....	16
2.4 Determinants of Share Prices .....	18
2.5 Empirical Studies .....	20
2.6 Summary of Literature Review .....	28
<b>CHAPTER THREE</b> .....	<b>29</b>
<b>RESEARCH METHODOLOGY</b> .....	<b>29</b>
3.1 Introduction .....	29
3.2 Research Design.....	29
3.3 Population and sample of the Study .....	30
3.4 Data Collection.....	30
3.5 Data Analysis .....	31

3.5.1 Analytical Model .....	31
<b>CHAPTER FOUR.....</b>	<b>33</b>
<b>DATA ANALYSIS, RESULTS AND DISCUSSION.....</b>	<b>33</b>
4.1 Introduction .....	33
4.2 Response Rate .....	33
4.3 Descriptive Statistics .....	34
4.4 Reaction of Share Price to Stock Split .....	35
4.5. Abnormality of Returns and Share Price following stock split.....	39
4.4 Security Returns Variability .....	39
4.5 The Cumulative Average Abnormal Returns between 2009 and 2011 .....	41
Cumulative Average Abnormal Returns 2011 .....	43
<b>CHAPTER FIVE .....</b>	<b>47</b>
<b>SUMMARY, CONCLUSION AND RECOMMENDATIONS.....</b>	<b>47</b>
5.1 Introduction .....	47
5.2 Summary of Findings .....	47
5.3 Conclusion.....	49
5.4 Recommendations .....	50
5.5 Limitation of the Study .....	51
5.6 Suggestions for Further Research .....	52
<b>APPENDICES .....</b>	<b>58</b>
Appendix I: Stock Splits at the NSE 2009 - 2013.....	58
Source: NSE, 2013 .....	58
<b>Appendix II: Share Price Index between t-90 and t+90, average Abnormal Returns and Abnormal Returns.....</b>	<b>58</b>
<b>Appendix III: Average Security Returns Variability .....</b>	<b>64</b>
Appendix VI: Cumulative Average Abnormal Returns.....	70

## List of Tables

Table 4. 1: Descriptive Statistics of the Stock Splits on the Announcement Day .....	34
Table 4.2: Average Value of ASRV for Stock Split Announcement .....	40

## **List of Figures**

Figure 4.1: East Africa Breweries limited.....	36
Figure 4.2: Cumulative Average Abnormal Returns 2011 .....	43
Figure 4.3: Cumulative Average Abnormal Returns 2012 .....	44
Figure 4.4: Cumulative Average Abnormal Returns 2013 .....	44
Figure 4.5: Cumulative Average Abnormal Returns 2010 .....	45
Figure 4.6: Overall Cumulative Average Abnormal Returns .....	46

## **ABBREVIATIONS**

AIMS	-	Alternative Investment Market Segment
ATS	-	Automated Trading System
CMA	-	Capital Market Authority
IPO	-	Initial Public Offer
NASDAQ	-	National Association of Securities Dealers Automated Quotations
NASI	-	Nairobi All-Share Index
NSE	-	Nairobi Stock Exchange
NYSE	-	New York Stock Exchange



## **ABSTRACT**

Stock split encompasses the technique of psychological pricing where new prices are more attractive to the incoming retail investors as well as fulfilling to the existing shareholder. Knowledge of share prices and its movement enables investors to choose the companies in which to invest in wisely. The objective of this study is to investigate the effect of stock split on stock prices for firms listed at the Nairobi Securities Exchange. This study employed an event study methodology where the effect of stock split on share price was investigated for a period of 181 days in pre and post stock split date. The study covered the period between 2009 and 2013 with a sample size of 7 companies. Secondary data collected from NSE on the daily stock prices of the 7 companies and the NSE 20-Share price index for 90 day pre and 90 day post-split announcement date was used. This study established that the events of stock splits announcements affect stock prices almost immediately and that on average; it takes 3 day for prices to react to stock splits. In conclusion, this study established that stock split positively impacts on the share prices and hence recommends that CMA reviews the policy on this event to encourage firms to adopt stock splitting, educate the public on the operations at the NSE to reduce abnormal reaction of prices caused by speculative retail trading. This will be in a bid to encourage more long-term investments than short-term ones as well as impart knowledge on the public regarding stock market activity. The study also recommends that NSE should maintain a record of the dates of various events and make the information available to encourage scholars to undertake research on these events. That way, they will gain from the research and researchers would have easy access to information regarding stock split. Lastly, CMA should ensure compliance with insider trading laws, guidelines, rules and regulations by effectively monitoring the market. This will eliminate incidence of: collusion between brokers and traders, inside trading and leaking of information hence, boost investor's confidence.

# CHAPTER ONE

## INTRODUCTION

### **Background to the Study**

Corporate managers have over the years discovered that stock split is a powerful marketing tool in which companies spend minimally compared to other marketing strategies and tools. Moreover, stock split encompasses the technique of psychological pricing where new prices are more attractive to the incoming retail investors as well as fulfilling to the existing shareholder; creating in them a sense of greater wealth by the increment in number of shares held, (Groover, 2001).

Conceptually, a related strand of literature, reviewed by Verrenchia (2001) has dealt with the theoretical modeling of how the disclosure of information affects investors as reflected in stock prices and trading volume. (Grossman, 1980) stated that prices can only fully reflect costless information, since there must be a return to acquiring information at a cost, otherwise there will be no information acquisition. This insight led to a revised definition of efficiency in where two versions of the hypothesis that security prices fully reflect all available information are given.

The strong version stipulates that information and trading costs are always zero, while the weaker version states that prices should reflect information to the point where the marginal benefits of acting on information do not exceed the cost. As noted in Ball

(1987) this in essence involves a reclassification from the three earlier and more statistically-based information subsets to subsets based on the cost of information. Empirical work has to a large extent supported the efficiency hypothesis, although several anomalies have been uncovered, Kothari (2001) for example, the post announcement drift, which concerns the tendency for stock prices to continue to drift after information disclosures. Fama, Fisher, Jensen and Roll (2000) support the various research outcomes on reasons for the stock splits. Nairobi Stock Exchange have reported cases of prices overreacting to new information and remaining unstable for many days, which raise doubts about a market's ability to instantaneously and accurately reflect the correct significance of information.

Several studies such as: Conroy, Harris and Benet (1999), Gray, Smith and Whaley (1999) show that the percentage bid/offer spread increases following a split. Other arguments are: a desire by firms to control the relative tick size at which their shares trade, a desire by managers to increase ownership by individual investors, and a desire by the brokerage firms to preserve commission income. Research further indicates that stock splits bring share price to a preferred price range. Managers often justify stock splits on the basis that they improve liquidity and marketability and that a stock split is merely an arithmetic exercise. They state that a stock split results in a reduction of the par value and a consequent increase in the number of shares proportionate to the split while all other capital accounts remain unchanged.

### **1.1.1 Stock Splits**

A stock split refers to the division of Stock. It may either be split forward or in reverse. A forward stock split occurs when a company issues additional shares of stock while a reverse split occurs when stocks are reduced in number and their prices increase. Fama, Fisher, Jensen and Roll (2000) defined a stock split as an exchange of shares in which at least five shares were distributed for every four formerly outstanding. This meant that stockholders got additional shares for every share previously held. The forward stock split is commonly called the stock split and refers to the division of each outstanding shares of a company. This results into lower prices per share but market capitalization or the company's equity is not affected. Stock splits are either in percentages or ratios with the latter being the most commonly used.

Dhar and Chhaochharia (2008) realized that stock splits took place at any ratio and that the most commonly used ratios are 2:1, 3:2, 4:3, 5:4 etc. Wooldridge and Chambers (1983) noted that when a stock split occurred, the balance sheet items remained the same; except that the total number of outstanding shares of the company increased proportionately to the ratio of split. They also noted that a stock split was usually done by companies that had seen their share price increase to levels that were either too high, or beyond the price levels of similar companies in their sector.

### **1.1.2 Share Price**

Share price is the cost of purchasing a security on an exchange. Share price which is also referred to as stock price, change every day at times several changes occur in a day as a result of market forces of demand and supply. Supply of stock is based on the number of shares a company has issued while the demand is created by people who want to buy those shares from those who already own them, (Byun and Rozeff, 2003).

Price movement of stock indicates how investors feel about a company's worth. Share prices are driven by Indexes, a company's financial health, industry information, economic trends and world national news. The higher the cash flows in terms of revenues and collection of accounts receivables, the higher the stock price. This is because investors care about the cash flows and what those flows mean to them in the present. Cash flows are crucial in determining the value of a stock since the ability to pay dividends depends on it as much as it does on the bottom line of the company, (Byun and Rozeff, 2003).

### **1.1.3 Stock Splits and Share Price**

Stock splits are associated with positive abnormal returns either in the short-run (around the announcement dates and ex-dates) or in the long term (the evidence here is, however, somewhat more mixed). For instance, Marloney and Mulherin (2009) present evidence of a wealth increase effect around the announcement and execution dates, for their sample

of NASDAQ stock splits that occurred between the beginning of 1985 and the end of 1989. Around the announcement date, they find an important price run-up in the ten days leading to this date. These authors also find price increases around the execution date, though of smaller magnitude than those recorded for the announcement date.

The price increase is also significant for the three days starting on the execution date. Marloney and Mulherin (2009) argue that this positive reaction on the ex-date cannot be connected to informational content, since the split date is known well in advance. They try to find support for this price reaction in microstructure components of the stock market. The authors believe that these results are consistent with the hypothesis that favorable information related to the split was completely embedded into prices within one year after the announcement. They argue that the evidence supported what they term as the “self-selection hypothesis. The Efficient Market Hypothesis (EMH) asserts that for a market to be efficient, prices must at all times reflect all available relevant information. Munyi (2010) explain that a response to stock split in terms of a price adjustment must be both almost instantaneous and of a direction and size that fully reflects the significance of the information. Fama, Fisher, Jensen and Roll (2000) avers that strong form of market efficiently exists when prices reflect all information both public and private.

Guo, Muscarella, Vetsuypens and Wulf (2005) discuss about the trading range hypothesis which suggests that stock splits bring share price to a preferred price range. Managers often justify stock splits on the basis that they improve liquidity and marketability. Guo,

Muscarella, Vetsuypens and Wulf (2005) quote Ikenberry (2003) who conducted empirical research and had inconclusive results based on splits leading to improved liquidity and marketability. The optimal trading range may arise for other reasons such as a desire by firms to control the relative tick size at which their shares trade, a desire by managers to increase ownership by individual investors, and a desire by the brokerage firms to preserve commission income.

The most common rationale behind stock splits according to the stock split hypothesis is that there is an optimal price range for securities. The stocks that trade in this range are presumed to be more liquid since they have a lower brokerage fees as a percent of value traded. This optimal range is considered to be a compromise between the desires of wealthy investors and institutions that will minimize brokerage costs if securities are highly-priced and the desires of small investors who will minimize odd lot brokerage costs if securities are low priced. The optimal trading range hypothesis is in contrast to the decrease in trading activity after a stock split that was observed by Copeland (2007) and Conroy, Harris and Benet (1999), Muscarella and Vetsuypens (1996) showed that stock prices after a stock split increase which is accompanied by wealth gains for the investor's. Their findings support the model of Amihud and Mendelson (1986) that predicts a positive relationship between equity value and liquidity. According to this model, rational investors discount illiquid securities heavier than the liquid ones due to the higher transaction cost and the greater trading frictions they face.

### **1.1.4 Firms Listed at the Nairobi Securities Exchange**

Companies in the Nairobi securities exchange do split their stock, and this make their stock more attractive for the individual investors. Nairobi securities exchange which is a market started in 1954 and is licensed by the capital market authority with its main obligation to regulate the security market and ensure trading of securities by bringing together borrowers and investors at low cost, the lower post-split price, do observe a lower proportion of institutional ownership, and a higher proportion of individual ownership, after the split than before the split.

To test if stock splitting companies perform better than the rest of the market, Lakonishok and Lev (1987) compared their earnings and dividend growth to those of a control group. A stock split generally occurs in the face of new highs for the stock. Thus, it is an event dripping with positive connotations and associations. It makes bulls snort and roar to suddenly have twice as many shares as they started with, for example. Stock splits at NSE always draw attention back to the so called neglected firms. Neglected firms are usually the smaller firms that analysts tend to ignore. Information available on these smaller companies tends to be limited to those items that are required by law. Mwangi (2007) proposed the hypothesis that if there is little known about a firm, Its shares will trade at a discount and the firm will use the split to draw attention to ensure that information about it is widely recognized than before. Aduda and Chemarum (2010) post that the percentage bid/offer spread increases following a split. By mid of 2013, 13 companies had conducted stock splits. Years 2007 and 2010 had the highest split factor



of 10 followed by 2004 which had an average split size of 7.5 while 2009 had the lowest at 0.1. However, 2006 had the highest number of splits given that 4 companies conducted stock splits, (NSE, 2013).

## **1.2 Research Problem**

Knowledge of share prices enables investors to choose the companies in which to invest in wisely. Share price in itself means nothing but in relation to earning and net assets, an investor will be able to determine if a stock is over or undervalued and therefore invest accordingly. However not all investors are well informed and thus make decisions based on superficial view of the share price movement. Capital market, being a vital institution, facilitates economic development. It is true that so many parties are interested in knowing the efficiency of the capital market. Investors care about market efficiency because stock price movement affects their wealth. The small and medium investors can be motivated to save and invest in the capital market only if their securities in the market are appropriately priced. Thus, stock market inefficiency may thus affect consumption and investment spending which in turn influences the overall performance of the economy

Globally, previous research has documented positive price performance subsequent to splits. Simbovo (2006); Lamoureux and Poon (1987) support the signaling hypothesis that firms use stock splits to signal future positive earnings. The alternative liquidity and trading range hypothesis comes from management claims that the motivation for split

activities is to bring stock prices down to a preferred trading range and improve liquidity. Previous studies at the Nairobi Stock Exchange have reported cases of prices overreacting to new information and remaining unstable for many days, which raise doubts about a market's ability to instantaneously and accurately reflect the correct significance of information. For example, Crown Berger's share price fell from Kshs.38.00 to Ksh.8.00 in August 2008 and later settled at Ksh26.00 after it released its half-year results, (Nyamosi, 2011).

Several studies on stock splits have been undertaken in Kenya: Aduda and Chemarum (2010) found that there was an average increase in trading volume and a positive abnormal return after the split announcement and event. Omenda (2011) carried out a study on effects of stock splits on liquidity of companies listed in NSE and found that share prices is likely to start low and after sometime appreciate tremendously for a short time. Simbovo (2006) carried out a research on the NSE to determine the effect of stock splits and large stock splits and large stock dividends. He found out that in the case of splits, most managers in Kenya opt for stock splits to maintain an optimal trading range. Yet existing empirical research, finds that the impact of split on liquidity is mixed. Copeland (2007) and Desai, Nimalendran and Venkataraman (1998) find that bid-ask spreads, increase, and indicating worsened liquidity.

Researchers in Kenya have tended to concentrate on the general market reactions to stock split and effect of stock split on dividend; they have also concentrated on the various theories like the signaling effect of. The closest study that has been done on this was by

Ndirangu (2012), who researched on abnormal returns resulting from stock split. There is however no research on the relationship between stock split and share price. This study therefore sought to fill the knowledge gap that exists on the effect of stock split on stock prices of firms listed at the Nairobi Securities Exchange by providing answers to the question; what is the effect of stock split on stock prices of listed companies at the Nairobi stock exchange?

### **1.3 Research Objective**

The objective of this study was to investigate the effect of stock split on stock prices for firms listed at the Nairobi Securities Exchange.

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

This study will benefit the theory and practice of Finance in the following ways: In theory, this study will provide additional knowledge which can guide training and further research on stock splits and stock prices on financial sector thus filling a gap in knowledge that will give students, faculty and the general academic fraternity added knowledge as to how prices are affected by stock split since this area has not been widely researched on in Kenya.

In practice, this study will benefit investors who are concerned with the value of their investment; thus both current and potential investors will be comfortable investing where

they assume good returns. The management of listed companies will be able to understand the effect of stock splits on stock prices in order for them to make appropriate decisions. This study will shed light to companies listed at the NSE on the impact of stock split on stock prices and determine the value added to their investments.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents literature review on impact of stock split on stock prices. This is presented in the following subsections: The study outlines two theories of signaling theory of stocks splits on stock prices and market efficiency theory. The study review on effects of stocks splits on share prices. The study captures empirical evidence on stocks splits, the firm liquidity, and market investors and finally summarizes the literature review.

#### **2.2 Theoretical review**

In theory, stock split is merely an accounting change, which leaves investors no better or worse off than they were before the split. Yet stock splits are relatively common occurrences. This implies that there must be some benefit, either real or perceived, that results from a firm splitting its stock. Survey evidence indicates that managers split their stock to get the stock's price into some optimal trading range, (Baker and Gallagher, 1980).

### **2.2.1 Signaling Theory**

A signaling explanation of splits based on information asymmetries between managers and investors has received considerable attention in the academic literature, Leland and Pyle (1977). Its basic notion is that manager's use splits to signal good information to investors. According to this view, the key role of splits is to convey information, not to seek out some optimal price level. Value increases on split announcements are often attributed to this signaling effect.

Theories combining informational issues and transactions costs yield further insights into splits. To be a credible signal that will not be copied by firms without good news, splits must carry with them some increase in cost. Such costs may take the form of increased transaction costs in trading lower-priced shares, Brennan and Copeland (1988) Recent empirical findings: McNichols and Dravid (1990); Ikenberry (2003) have been interpreted by the authors as especially supportive of the relationship between information and transaction costs portrayed by Brennan and Copeland (1988). According to this view lower prices and smaller firms lead to higher trading costs for investors. Specifically, the studies find market reactions to split announcements are negatively related to firm size and post-split price and positively related to the size of the split factor. The signaling explanation is that managers split to achieve lower prices only if they have especially good information about the prospects for the firm.

In contrast, Muscarella and Vetsuypens (1996) provide empirical support for the liquidity benefits of splits even when signaling is not likely a contributing factor. Using the unique circumstance of American Depository Rights (ADRs), Muscarella and Vetsuypens (1996) find that the prices of both the ADR and the underlying stock increases on the announcement of an ADR split even when there is no accompanying stock split in the firms home market. They also find increases in trading activity after the split, which they cite as additional evidence of liquidity benefits. Hans (1995) finding of liquidity benefits in reverse splits is further evidence for the role of transaction costs in explaining splits.

Whatever the financial market consequences, the evidence that company executives' base splits on the notion of a preferred price range is overwhelming and long-standing. Based on surveys of companies with splits in the first third of the century, Dolley (1933) reports that over 90% of the managers responding said that the primary reason for splits was a wider distribution of shares which was accomplished by reducing the market value per share and thus facilitating trading. Baker and Powell (1993) reports that managers' major stated purpose of splits is to lower the stock price and thus, bring them to a preferred trading range.

## **2.2.2 Market Efficiency Theory**

Market efficiency theory suggests that market is rational and provides correct pricing. That is, the current prices of securities are close to their fundamental values because of either the rational investors or the arbitragers buy and sell action of underpriced or

overstocked priced stocks. On the other hand, observed market anomalies have a challenge for this argument.

Fama, Fisher, Jensen and Roll (2000) presented a landmark paper on the efficient market which focused on comprehensive review of the theory and beyond the theory to empirical work. He defines market efficiency very clearly as a market in which prices always fully reflect all available information. Fama distinguished three nested information sets: past prices, publicly-available information and all the information including private information. Efficient market hypothesis is divided into three stages as the weak form, semi-strong form, and the strong form with respect to the availability of the above mentioned three information sets.

Weak form of efficiency claims that the current stocks prices already reflect all historical market data such as the past prices and trading volumes, Bodie, Kane and Marcus (2007). The assertion of weak form of efficiency is very much consistent with the findings of researches on random walk hypothesis; that is, the price changes from one time to another are independent, (Dixon, 1992).

Semi strong form of efficiency states that, in addition to the past prices, all publicly available information including fundamental data on the firms' product line, earnings forecast, dividend, stock splits announcements, quality of management, balance sheet composition, patent held, accounting practices etc should be fully reflected in security



prices. Thus, one cannot make superior profit by using the fundamental analysis in the market which is efficient in the semi-strong form. Strong form of efficiency states that market prices reflect all information including the past prices and all publicly available information plus all private information. In such a market, prices would always be fair and any investor, even consider traders cannot beat the market.

### **2.3 Event Studies**

Event studies have been used in a wide range of settings, including accounting and finance, (Mackinlay,1997). As an example, in finance, researchers have used event studies to examine the market effect of mergers and acquisitions. Additional examples in accounting include whether accounting disclosures contain information, based on whether the stock market reacts to the disclosure of information events. In general, virtually any discipline, the basic methodology remains the same; there is an event and a test to determine whether the stock market reacts to the event. Event studies have widely been used in virtually all businesses and economics disciplines. One of the event studies was published by Dolley (1933), who investigated the effect of stock splits on stock prices. The modern methodology of event studies was initiated by Ball (1987) and Fama, Fisher, Jensen and Roll (2000) but the methodology continues overtime.

While the efficiency hypothesis avoids the issue of how individuals process information and implicitly assumes homogeneous information, the disclosure literature has provided additional insight by more explicitly modeling this process and allowing for

heterogeneous information. Indeed, Verrenchia (2001) show that empirical observations regarding the behavior of trading volume and price around announcements can only be supported by a theoretical model that allows for both heterogeneous private information about the value of the firm (pre-announcement information) and diverse investor interpretation of the disclosure due to heterogeneous event-period information. Their results show that the change in stock price depends on the average pre-announcement and event-period information. Underscoring this result, Liang (2003) finds a significant positive relationship between the post-earnings announcement drift and heterogeneous information. Finally, the theoretical paper by Verrenchia (2001) suggests that the stock market's reaction should be inversely related to the level of pre-disclosure information, which is referred to as the pre-disclosure information hypothesis. These theoretical and empirical studies therefore indicate that the information environment plays a central role in the stock market's reaction to information disclosures.

Studies of the semi-strong form of the efficient markets hypothesis can be categorized as tests of the speed of adjustment of prices to new information. The principal research tool in this area is the event study as it examines the effect of an announcement on share price as a test of the semi-strong form of the EMH. Event studies indicate that security prices respond efficiently to new information. It remains possible that assets may be persistently over or under-valued over long periods of time. It is more difficult to test whether prices conform to fundamental values, than it is to test whether prices respond appropriately to information.

Nonetheless, despite the difficulty of testing whether the level of security prices is correct, the literature has also evolved in this direction. Shiller (1981) examines the variation in stock market prices, and finds that price fluctuations are too large to be justified by the subsequent variation in dividend payments. Shiller finds that “measures of stock price volatility over the past century appear to be far too high - five to thirteen times too high - to be attributed to new information about future real dividends. The failure of the efficient markets model is thus so dramatic that it would seem impossible to attribute the failure to such things as data errors, price index problems, or changes in tax laws.

Share prices may also be determined by: Indexes, a company’s financial health, industry information, economic trends and world national news. The higher the cash flows in terms of revenues and collection of accounts receivables, the higher the stock price. This is because investors care about the cash flows and what those flows mean to them in the present. Cash flows are crucial in determining the value of a stock since the ability to pay dividends depends on it as much as it does on the bottom line of the company.

## **2.4 Determinants of Share Prices**

As put forth by Kehinde (2006), the higher the demand for particular shares the greater the price would increase and vice versa. These forces do not however always remain the

same; a stock do not always have the same amount of demand on any given day, (Kehinde, 2012).

### **2.4.1 Demand Supply Forces**

The demand for shares may change with the reputation of the company, political climate and several other internal and external factors. Rise in oil prices, risk of the economy collapsing and even threat of war could cause severe fluctuation in market share prices that are often quite unpredictable. Yet, market trends alone are not enough to be able to make predictions (Copper, 2011). Agrawal (2011), making a case of microeconomic factors, stated that the most important factor that determines the price of a stock is its earnings. This more so, owes to the fact that companies that are traded on the stock market report their earnings four times a year.

### **2.4.2 Analyst Reports or Market Information**

Agrawal adds that analysts' reports also influence stock prices. Schmidt (2011) noted that with information age, the slightest rumor that casts a company in good or bad light can lead to speedy and unpredictable price movements. Any relationship established between share price change and the basic fundamentals (firm's earnings, dividend payment among others) have less or reduced value, such relationship may be necessary but not sufficient to predicting the behavior of share price in the capital market (Russell, 2011).

## 2.5 Empirical Studies

Past empirical evidence demonstrates that splits have effects in financial markets. Some of the effects are apparently beneficial; splits are associated with significant value increases, appear to spur trading volume, and may increase the number of investors in the company. Other effects seem less desirable; both shareholder risks and some transactions costs appear higher after splits. One source of cost increase is higher percentage bid-ask spreads on lower –priced shares.

Schwerk (1981) examined the relationship between stock returns and inflation. He examined the daily returns to the Standard and Poor's Composite portfolio around the Consumer Price Index (CPI) announcement dates from 1953 -1978. Schwerk used the residual method in his analysis. His conclusions were that the stock market seems to react negatively to the announcement of unexpected inflation in the CPI, however the magnitude of the reaction was small. Interestingly the stock market seemed to react at the time of announcement (about one month after price data were collected), thus the CPI data had information content according to this study.

Studies that have examined the behavior of security prices at the time of dividend release include, Asquith and Mullins (1983), Brickley (1983), Dielman and Oppenheimer (1984). Asquith and Mullins examined a sample of firms that either paid their first dividend in their corporate history or initiated dividend after omitting them for at least ten years. The time period of the study was 1954 - 1980. Brickley on the other hand

examined a sample of specially designed dividend SDD's labelled by management as "extra special or year-end".

The sample was 165 SDD's made by NYSE/ASE firms in the period 1969-1979. Dielman and Oppenheimer (1984) also examined a sample of 202 NYSE firms that made large dividend changes in the period 1969-1977. In all the above studies the conclusion was that "... firms that increase dividends, announce extra or special dividends, or initiate dividend payments for the first time experience positive abnormal returns. Firms that decreased dividends or omit payments altogether experience negative abnormal returns". These results are consistent with the hypothesis that capital markets use dividend release as a signal about the future earnings prospects of the firm and hence they have information content.

Patell and Wolfson (1988) used a sample of 96 firms listed on the NYSE/ASE to examine the intraday behavior of security returns in the period surrounding the earnings announcement. They examined the number of extreme security price changes in a 26 hour trading period surrounding each announcement. An extreme price was defined as one that falls in one of the 5 percent tails of the distribution for the appropriate one hour or overnight trading period. The researchers concluded that " ... there is a very strong reaction at the announcement, the major portion of which decays within two hours but with detectable traces that linger in the following day". Thus earnings have information content.

Richardson (1984) examined a sample of 153 NYSE/ASE firms in the period 1976-1978. Using the security return variability measure, he computed the residual during the announcement of annual earnings reports. Richardson reported that there was a 40 per cent increase in the variability of security returns during the announcement of annual earnings reports. On partitioning the sample into firm size decile and re-examining the mean security return variability, Richardson found other variables that explain the magnitude of the variability of the security returns as: the extent of information available to market participants and the extent of information available from macro sources. Richardson's study seem to suggest that the effect of annual reports on security prices depends on the quantity of information available within the stock market and from sources other than the market.

Maingut (1984) sampled 100 firms listed in the London Stock Exchange (LSE) in the period 1976 - 1978. Included in the sample were firms that had only one dividend announcement in the week of annual earnings announcements (UK earnings and dividends are announced at the same time therefore one can only examine the impact of both earnings and dividends). The mean return variability in the announcement week was compared to the mean for 8 weeks relative to the announcement week. The conclusion by the researcher was that the annual earnings number released by UK companies do possess information content". While the maximum response did take place at the announcement

week, there did appear to be some anticipatory reaction in the week preceding the announcement.

Waymire (1984) examined a sample of 479 point projections of annual 'BPS by management reported in the WSJ. A consensus forecast was then calculated as the average of the analyst's forecast of annual EPS which was then used to proxy expected earnings. Forecast deviations were then computed. Waymire then examined the security returns in the three day trading period surrounding the date of reporting of the management forecast. The conclusion was that a significant positive association exists between magnitude of forecast deviation and the magnitude of abnormal returns in the period immediately around the forecast disclosure date.

Emanuel (1984) examined a sample of 1196 earnings announcement by New Zealand companies in the period 1967 - 1979. He computed the magnitude of the unexpected earnings change and formed six portfolios based on ranks of observations from the most positive to the most negative unexpected earnings release. The cumulative abnormal returns in the 50 weeks up to and including the earnings release were computed for all the six portfolios. Since New Zealand firms typically release dividend information with earnings information, Emanuel observed that combinations of earnings changes and dividend changes in the same period. Emanuel concluded that security returns were positively correlated with the sign and magnitude of both the unexpected earnings and unexpected dividend information.



In Kenya, Parkinson (1987) studied 50 companies continuously quoted in the NSE in the period 1974 – 1978. Out of these companies 22 made 28 bonus issues. Parkinson found out that using a particular trading strategy, there was an abnormal gain of 6.2 per cent per month (about 74.4 per cent per annum) associated with these issues. Parkinson concluded that this was an example of technical inefficiency. Parkinson however noted that this trading strategy could not be applicable due to market thinness and the astuteness of investors.

McNichols and Dravid (1990) using a sample of 34 firms compared the average relative variance measure for annual announcement before and after firms began reporting quarterly earnings (ASE firms were required to report earnings quarterly from 1962 but before then many ASE firms only reported earnings annually). McNichols and Manegold defined the relative variance measure similar to the abnormal return variance used by Beaver (1968). They calculated the mean and variance of daily rates of return for the non-announcement period for each firm and then calculated the return variance of the announcement period as the square of the difference between mean non-announcement return and the daily return. The researchers found that the relative variance measure was significantly lower after the commencement of quarterly reporting. This evidence is fairly consistent with the relative reduction of information content of annual earnings reports following the introduction of quarterly reporting. The evidence from this study indicates then that both interim and annual earnings have information content, however some information content of annual report is already incorporated in interim report.

Arbel and Swanson (1993) in the context of stock splits predominantly propose the neglected –firm hypothesis. It states that if there is little information about a firm, its shares trade at a discount. Thus, the firm’s managers use the split to draw attention to ensure that information about the company is wider recognized than before certainly, most companies prefer that to keep their share prices at a much more affordable level. The goal is to make their stock accessible to as many investors as possible.

Ondigo (1995) examined the information content annual reports of 18 "blue chip" companies quoted in NSE in the period 1990 - 1994. He used market model to measure the information content by analyzing, residual returns, whose parameters were estimated by means of Ordinary Least Square (OLS) regression using realized values of the individual stock returns and the returns of the market during the non report period. The mean residuals were then tested for significance at 5 per cent level. The researcher found out that the annual reports and accounts of the sample firms for the period under study do not have information content which is statistically significant. Thus, the study did not provide any evidence for semi strong efficiency of NSE.

It is important to note that stock splits in themselves have zero impact on a firm’s actual value, Angel (1997). However, stock splits are useful for companies. The aim was to keep its share price in an optimal range to make it affordable for as many investors as possible. The larger a firms potential investor base, the greater value it is likely to attain in the market. In addition, although a stock split in itself doesn’t add value, it often serves

as a positive signal from company management i.e. firms only tend to split their shares when they believe their fundamental corporate prospects are strong. As a result studies have shown that stocks tend to outperform the market immediately after a split.

Groover (2001) evaluated the effectiveness of information technology investments. In this study, the researcher examined the changes in the market value of the firm as reflected in the stock price in response to IT investment announcements. Reactions of price and volume were negatively related to firm size and became more positive over time. Jijo and Rao (2002) in their study, “Market Reaction to Stock Splits – An Empirical Study”, have examined the reaction of stock prices around the date of announcement of stock splits and ex-split date. It was found out that on the date of announcement, there was an abnormal return of 5.27 percent and on day +1, 2.42 percent. The result of abnormal returns around the ex-split day shows that much of the abnormal returns take place on day 0 (3.68%) and day +1 (2.04%). A study by Partrick (2003) investigated the stock splits and liquidity in the case of the Nastaq -100 Index Tracking Stock and found that the average daily turnover before the split was 23.95 percent and after the split was 22.81 percent.

A “t” test for difference in mean failed to reject the hypothesis that the turnover before the split (the t-statistic is 0.8) comparing the number of traders before and after the split. It is apparent that there was a little less than twice as many traders after the split than before. A study entitled “Market Reaction to Stock Market Splits: Evidence from India”

by Gupta and Gupta (2007) maintains that stock splits are associated with positive abnormal returns around the announcement. By and large splits are found to improve the trading volume of shares and there was increase in the daily number of traders. But they do not increase the daily turnover and consequently the liquidity of stocks in India. At the end, the author concluded that the majority of shares which underwent split were trading at low market prices. It appears that reasons for a stock split by low priced companies could be explained by neglected firm hypothesis, which appears to be valid for the Indian stock market. Ikenberry (2003) updated his study on stock splits. This time he looked at companies from 1990 to 1997. Using a similar methodology that included 2-for-1, 3-for-1 and 4-for-1 stock splits, he found the results were essentially the same. Shares of split stocks on average outperformed the market by 8% the following year and 12% over the next three years.

Omondi (2010) analyzed the market reaction to stock splits in an effort of determining factors promoting stock splits practices in Kenya. The study analyzed market reaction to stock splits during pre-announcement period, announcement period and after the books closure. Omondi found that stock prices of companies that conducted the splits had their prices increase or decrease immediately during the split announcement period.

A weakness also cited of capital market research is that it is a joint test of both information content and market efficiency. The absence of price response is usually

interpreted to mean the information tested has no information content. This interpretation is only correct if the market is efficient. But if the market is inefficient there is no way of determining what the absence of the price response means.

## **2.6 Summary of Literature Review**

The above empirical studies and researches remain inconclusive as most have just concentrated on the various specific aspects of stock split without clearly bringing out the relationship between the split and share price. In light of the developments in the Kenyan stock market, the researcher seek to fill a knowledge gap by providing answers to various questions which have been raised about the recent wave of stock splits at NSE. The effects of stock splits are puzzling. In theory a stock split is merely an accounting change, which leaves investors no better or worse off than they were before the split. Yet stock splits are relatively common occurrences. This implies that there must be some benefit, either real or perceived, that results from a firm splitting its stock.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

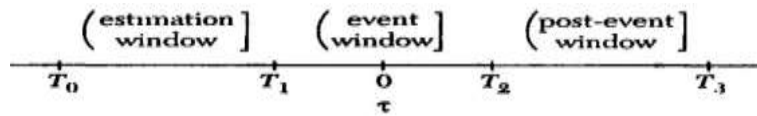
This chapter provides a discussion of the outline of the research methodology that was used in this study. It focuses on the research design, population, sample size, sampling techniques, data collection methods and data analysis methods that was used in this study.

The study was on event study methodology where the effect of stock split on stock prices were assessed for a period of 181 days before and after the effective date of the stock split. The study covered a period of five years from 2009-2013.

#### **3.2 Research Design**

The research design employed in this study was event study research design method that aimed at exploring the effects of stock splits on share prices of companies listed in the NSE. This method was preferred because it allowed for prudent comparison of the stock market reaction to an event by looking at such performance on either side of the event; that is, before and after the event. It involved defining the event (stock split), estimating the event period (the period of time over which the stock price of the firm experiences the event), estimating whether the stock price changes beyond the “normal,” or expected changes, in response to the event announcement, and examining to determine the extent

to which the event changes the market participants' evaluation of the stocks as shown below, (Nagm and Kautz, 2007).



Since the study sought to investigate the stock market reaction to stock splits announcements, a time-series design was deemed the best design to fulfill the objective of the study.

### **3.3 Population and sample of the Study**

According to Mugenda and Mugenda (1999), a population is defined as a set of people, services, elements and events, group of things or households that are being investigated. The population consisted of 13 companies that have carried out a stock split at the NSE. My sample size was made up of 7 companies that have done a stock split within a five year period beginning 2009-2013.

### **3.4 Data Collection**

Secondary data was used in this study. It was obtained from the NSE library on share price for 7 companies. The specific data that was collected was data on the stock split for the respective companies for a period of five years 2009-2013.

### **3.5 Data Analysis**

The data collected from the secondary sources was systematically organized in a manner to facilitate analysis. Data analysis involved preparation of the collected data, coding, editing and cleaning of data so as to facilitate processing using SPSS package. The research covered a period of 90 days before the stock split and 90 days after the stock split so as to examine the changes in stock prices over this period of 181 days consisting of 90 days before and 90 days after the event date. The period of 181 days was adequately lengthy for the estimation of the normal return of the model with better accuracy, and it was considered long enough to cover the effects of the splits.

Time for the event study was determined as  $t=-90$  to  $t=+90$  relative to the event date  $t=0$ . The estimation window was taken as  $t_0=-90$  to  $t_1=-1$ , while the post event window was taken as  $t_2=+1$  to  $t_3=+90$  relative to the event day  $t=0$ .

#### **3.5.1 Analytical Model**

In order to examine the relationship between stock split and share price return the study analyzed the abnormality in returns of the share prices as consistent with the market model (Munyi, 2010) and (Ndirangu, 2012).

The study used the pre-event period to establish the expected or the normal return of the share. Abnormal returns was obtained as the difference between actual returns of



company at event day and the expected return. Cumulative Abnormal return was analyzed annually.

$$AR_{jt} = R_{jt} - ER_{jt}$$

The aim of the study was to find out whether the event had any impact on the share prices, and how fast the information was absorbed in share prices. Event timeline was used.

## **CHAPTER FOUR**

### **DATA ANALYSIS, RESULTS AND DISCUSSION**

#### **4.1 Introduction**

This chapter presents the data findings on the effect of stock split on stock prices for firms listed at the Nairobi Securities Exchange by analyzing the share prices and the performance of stock after the split. These data were collected from the NSE offices and analyzed using Excel and SPSS (version 17). Analysis involved establishing the relationship between stock split and the share prices and evaluation of abnormal return. Within the 5 year period of the study, nine companies had done stock split.

#### **4.2 Response Rate**

The study targeted a sample size of 7 of the 13 companies that have carried out a stock split at the NSE making a response rate of 53.84%. This response rate was satisfactory to make conclusions for the study. Weisberg, Krosnick and Bowen (1996) recommended a response rate of 70%. According to Mugenda and Mugenda (2003), a response rate of 50 percent is adequate for analysis and reporting; a rate of 60 percent is good and a response rate of 70 percent and over is excellent. Based on the assertion, the response rate was considered to adequate

### 4.3 Descriptive Statistics

Table 4. 1: Descriptive Statistics of the Stock Splits on the Announcement Day

	Number of Stock Splits	Split Size					Average Split Size
		9:2	2:10	7:3	1:5	4:1	
2009	1	1					8.9
2010	1		1	2			7.5
2011	1	2			1		3.8
2012	2	1					6.4
2013	4			1		1	9.5
<b>Total</b>	<b>9</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>28.6</b>

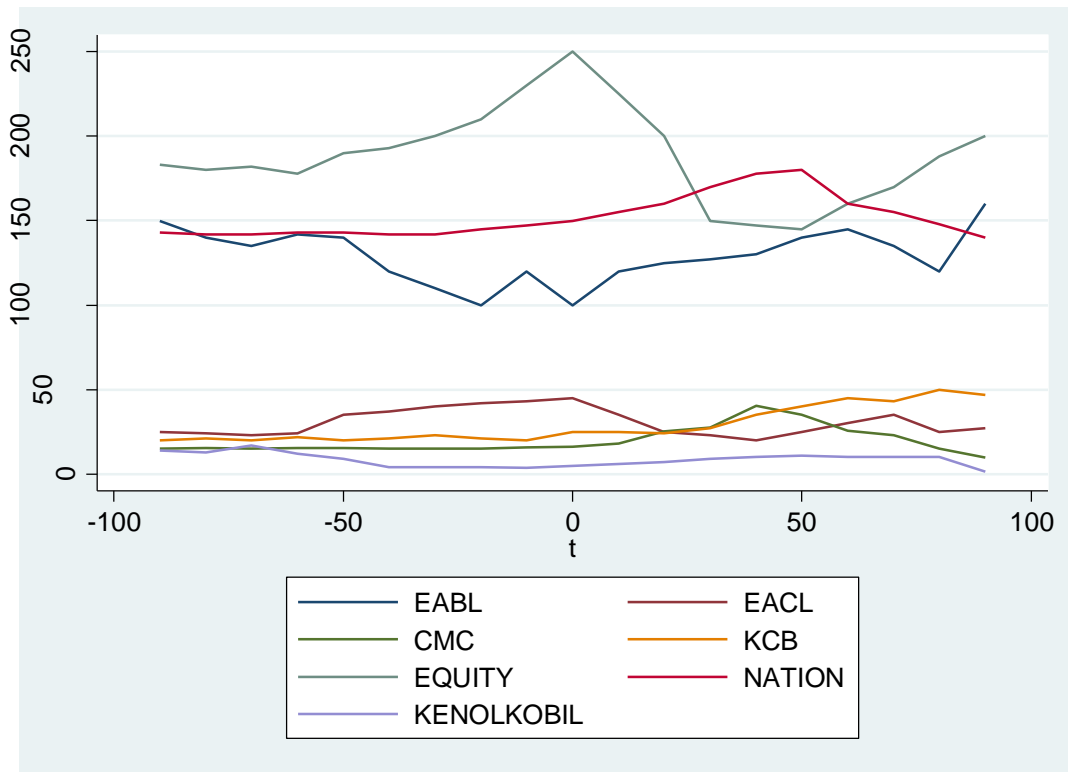
From table 4.1, 2013 had the highest split factor of 9.5 followed by 2009 which had an average split size of 8.9 while 2011 had the lowest at 3.8. However, 2013 had the highest number of splits given that 4 companies conducted stock splits. The study considered the event window of 90 days consisting of t-90 to t+90 relative to event day t0 and only 7 of the 9 companies. Event date is date of announcement of the stock split. This conforms to Carlos and Bacon (2009) who adopted the same approach in establishing the impact of stock split announcements on stock price.

#### **4.4 Reaction of Share Price to Stock Split**

The objective of the study was to find out the effect of the share split on share prices. Therefore, the study analyzed the reaction of share price of seven companies following stock split at period  $t_0$  being the day of stock split and pre-stock split is  $-90$  while post-split is  $+90$ . The detailed price index for these companies for the analyzed period is presented in annex II. Figure 4.1 below illustrates the reaction of share price to stock during and after the stock split window period.

As indicated in the graph below, the stock price for East Africa breweries limited decreases before the day of stock split and the prices of shares increase gradually after the split. The average market showed both zero and non-zero pre-event returns. However, the zero returns were for less than one day and the remaining days sustained non-zero returns. On average, it took the first 3 days for the effect on price to be observed within the 90-day pre-event period. In 2009, figure 4.1 shows that the stock price rose steadily between  $t-90$  and  $t_0$ . However, after the stock split, the average abnormal return increased steadily between  $t_0$  and  $t+90$ .

Figure 4.1: Reaction of share price to stock split



Stock split was conducted on 10<sup>th</sup> of August 2011 for East Africa cables limited. As indicated in the figure 4.1, share price reacted sharply before and after the stock split for East Africa cables limited. A sharp increase in share price was reported 20 days before the stock split and a further decrease in stock price after the stock split.

Shares prices regained its value 20 days after the stock split. This finding is consistent with Agrawal (2011) who adds that analysts' reports also influence stock prices. Schmidt (2011) noted that with information age, the slightest rumor that casts a company in good or bad light could lead to speedy and unpredictable price movements. According to

Russell (2011), any relationship established between share price change and the basic fundamentals (firm's earnings, dividend payment among others) have less or reduced value, such relationship may be necessary but not sufficient to predicting the behavior of share price in the capital market. The sharp increase in share price before the split is as a result of inside trader information.

The result indicates zero-increase in share price during pre-stocksplit CMC holdings. However, a sharp increase in share price was reported after the stock split. According to Angel (1997), stock splits in themselves have zero impact on a firm's actual value. However, stock splits are useful for companies. The aim is to keep its share price in an optimal range to make it affordable for as many investors as possible. The larger a firm's potential investor base, the greater value it is likely to attain in the market. Firms only tend to split their shares when they believe their fundamental corporate prospects are strong. This explains the increase in share price for CMC holdings, which is attributed to the affordability of the stock after split thereby increasing the demand for CMC Holdings share price.

Kenya Commercial bank recorded non-zero price increase for its share in both pre-stock split and post stock split as shown by the graph above. This result indicates the stock split has no impact on the share price for KCB. This implies that Share prices may also be determined by: Indexes, a company's financial health, industry information, economic trends and world national news. The higher the cash flows in terms of revenues and

collection of accounts receivables, the higher the stock price. Leland & Pyle (2007) contends that Cash flows are crucial in determining the value of a stock since the ability to pay dividends depends on it as much as it does on the bottom line of the company. The findings further indicate that there was a steady increase in the stock price at pre-stock increase for equity bank. However, there was price decline for the shares after at  $t_0$  which was sustained up to  $t+40$ . The finding indicates that the share price for equity did not react immediately after the stock split.

Share price for Nation media group rose steadily during pre-split and post-split period and showed a decline after  $t+45$ . The absence of price response implies that the information tested has no information content. This interpretation is only correct if the market is efficient. But if the market is inefficient there is no way of determining what the absence of the price response means. Therefore, zero reaction to stock split is influenced by asymmetric information in the financial market.

The share price for KenolKobil is significantly sensitive to both post and pre-stock split event. Sharp decrease in share price is witnessed before  $t_0$  and sudden price increase after the stock split. This is attributed to negative information about the company which causes panic among the investors and traders. Increase in demand for share prices for KenolKobil after stock split is attributed the affordability and perceived benefit of the stock traded.

#### **4.5. Abnormality of Returns and Share Price following stock split**

The study analysed the the difference between actual returns of company at event day and the expected returns to establish the abnormality of returns following stock splits. The analysed data on abnormality is presented in appendix III, IV and VI. Appendix IV which presents the abnormal returns for the entire market following the stocks split announcements shows that t-2 to t1 had a positive abnormal returns of values greater than 1; 1.0894, 2.3329, 4.5166 and 3.2317 respectively. The period between t2 to t10 had average abnormal return of less than 1 which means that no investor benefited from above normal returns pointing at market adjusting to the stock splits. This implies that the market does not react fast to stock splits which could point to efficiency, but not perfectly efficient. However, period between between t-45 to t1 had above normal returns meaning that the investors enjoyed above normal returns. This could point at insider trading just before the stock splits announcement or management using stock splits to adjust stock price to a more marketable range.

#### **4.4 Security Returns Variability**

The study sought to establish the variability of the stock return following the stock split announcements thus determine the market reaction to stock splits. This information is presented in appendix V and shows that the variability in stock prices do increase erratically with time though there is more variability in the days preceding and after stock splits. In 2011, the security return variability rose to 11.1829, in 2009 the SRV rose to 6.0276 while in 2012 the SRV was 0. However, the t-significance shows 15 of the



statistics were significant; 10 of which were in the post-announcement period. 6 out of the 10 were between  $t_0$  and  $t_{90}$ . The announcement day had an average ASRV of 3.9164 at 95% confidence level. Results support the efficient market hypothesis since stock prices adjust so fast to public information that no investor can earn an above normal return by trading on the announcement day and period thereafter.

Table 4.2: Average Value of ASRV for Stock Split Announcement

<b>Estimation Period</b>	<b>Security Return Variability</b>
From day 0 day -90	1.59914
From day -90 to day -1	1.590992
From day +1 to day +3	2.86806
From day +3 to day +90	1.84746

To analyze the speed at which the stock market absorbs the stock split announcement in its prices, the study presented the average security return variability across the announcement periods as shown in table 4.2 above. As indicated by the table, stock variability was more in post announcement period than pre-announcement period; while  $t_0$  to  $t_{90}$  had ASRV of 1.59914,  $t_{-90}$  to  $t_{-1}$  had ASRV of 1.590992. Between  $t_{+1}$  and  $t_{+3}$  the ASRV was 2.86806,  $t_{+3}$  to  $t_{+90}$  had a variability of 1.84746. Therefore, the stock market positively absorbed stock split information positively.

## **4.5 The Cumulative Average Abnormal Returns between 2009 and 2011**

There are three models of calculating abnormal returns under the semi-strong form of EMH: the market model, the mean adjusted returns model-the Capital Asset Pricing Model (CAPM) and the market adjusted returns model. Of the three, the market model has been considered the best since it controls both the systematic risks and the unsystematic risks of the stock. The strong form of EMH contends that stock prices fully reflect all available information, both public and insider, and therefore no group of investors has a monopolistic access to information relevant to pricing. As such, no investor is able to consistently derive above average profits. The strong form thus encompasses the weak and the semi-strong forms. Strong form of EMH requires not only the assumption of efficient markets but also that of perfect market. In an efficient market, no impact should be observable prior to the announcement, nor during the days following the announcement. The price of stock should react immediately to relevant new information.

Pandey (2004) states that for the capital market to be efficient in the semi-strong form, the value of cumulative abnormal returns (CAR) should be equal to zero before the event, rise to a positive number just after the event and then stay put. In an inefficient market, the value of CAR will continue rising for several weeks after the event. This sub-hypothesis contends that share prices reflect all publicly and privately held information. It encompasses the weak and the semi-strong forms and represents the highest level of market efficiency. The market price fully reflects the true or intrinsic value of the share based on the underlying future cash flows Arnold

(2005). The implication is that no investor, over a reasonable period of time, can earn abnormal rates of return by using publicly held information in superior manner.

EMH operates under a set of assumptions among which is the existence of a large number of profit maximizing participants concerned with the analysis and valuation of securities. These participants operate independently of each other. Moreover, it assumes that new information regarding securities comes to the market in a random manner, and the announcements over time are generally independent from one another. Third, investors adjust security prices rapidly to reflect the effect of new information.

Finally, the security prices that prevail at any one point in time should be an unbiased reflection of all currently available information. Information in the EMH is defined as anything that may affect prices that is unknowable in the present and thus appears randomly in the future, Dixon and Holmes (1996). Jones (1998) states that information is key in determining stock prices, and is therefore the central issue of the efficient market concept. Vernimmen (2007) argues that the financial market will not fairly price a company's securities unless that company provides relevant financial information. The market uses this information to assess the real capacity of the firm to create value. Financial communication reduces the information asymmetries between market participants. Information can be classified as historical, current or forecast, but only current and historical information is certain in its effect on price, (Pike Neale, 2003).

The EMH asserts that market prices adjust as new information is disseminated. In other words for security markets to be efficient, security prices must adjust rapidly, (Mayo, 2006). If prices incorporate all known information and they change rapidly, day to day price changes follow a random walk over time.

Figure 4.2 below shows cumulative average abnormal returns for the year 2011.

### Cumulative Average Abnormal Returns 2011

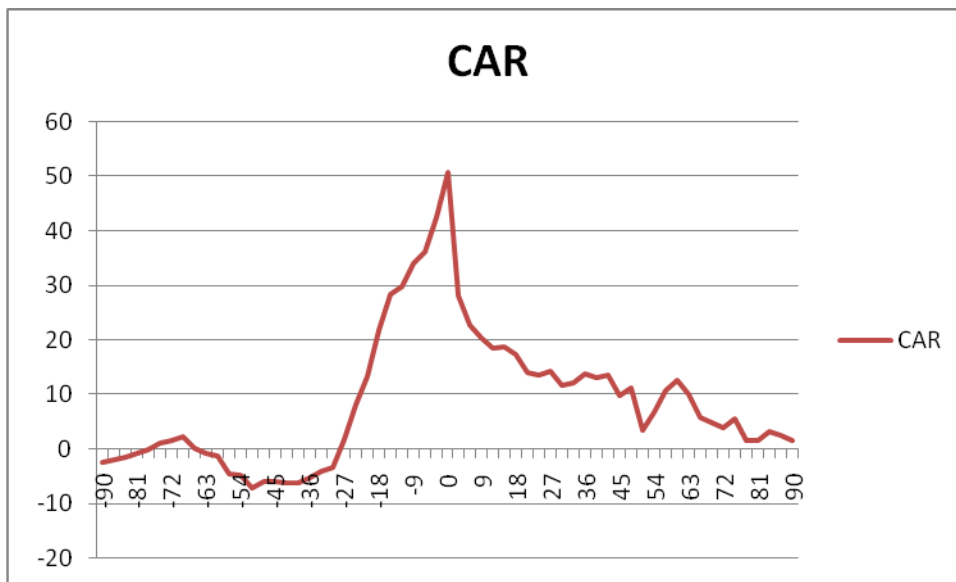
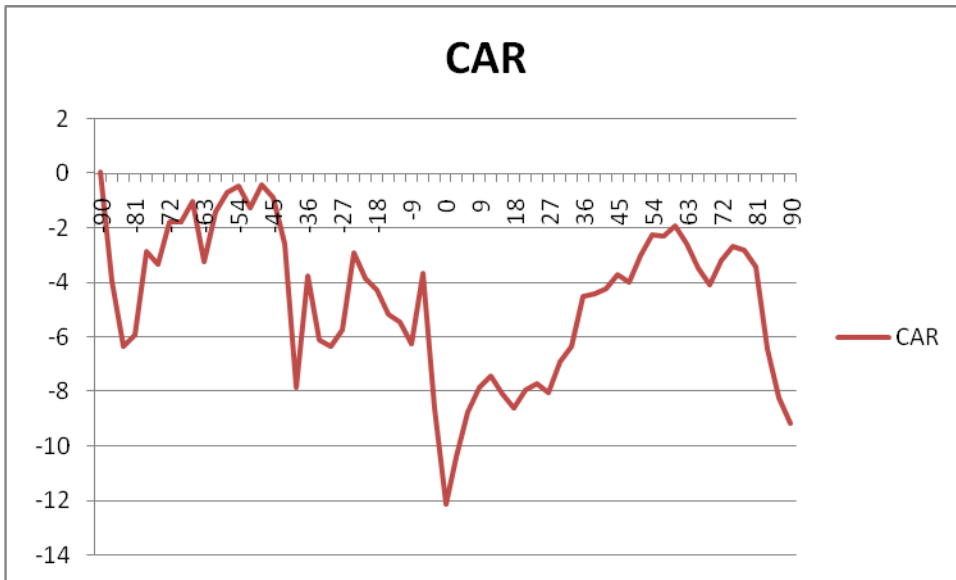


Figure 4.2: Cumulative Abnormal Returns 2011

Figure 4.2 above present the price reaction to stock splits conducted in 2011. Initially between t-45 and t0 there was an increase in abnormal return which steadily declined following the stock split announcement. After the stock split, there was erratic increase average abnormal return at t0 and a steady decline of stock price between t0 to t+90.

Figure 4.3: Cumulative Average Abnormal Returns 2012



In 2012, there was a negative abnormal return pre-stock split announcement which rose steadily between  $t-45$  and  $t_0$ . Following the stock split announcement, the abnormal returns fell drastically between  $t_0$  and  $t45$  shown by figure 4.3.

Figure 4.4: Cumulative Average Abnormal Returns 2013

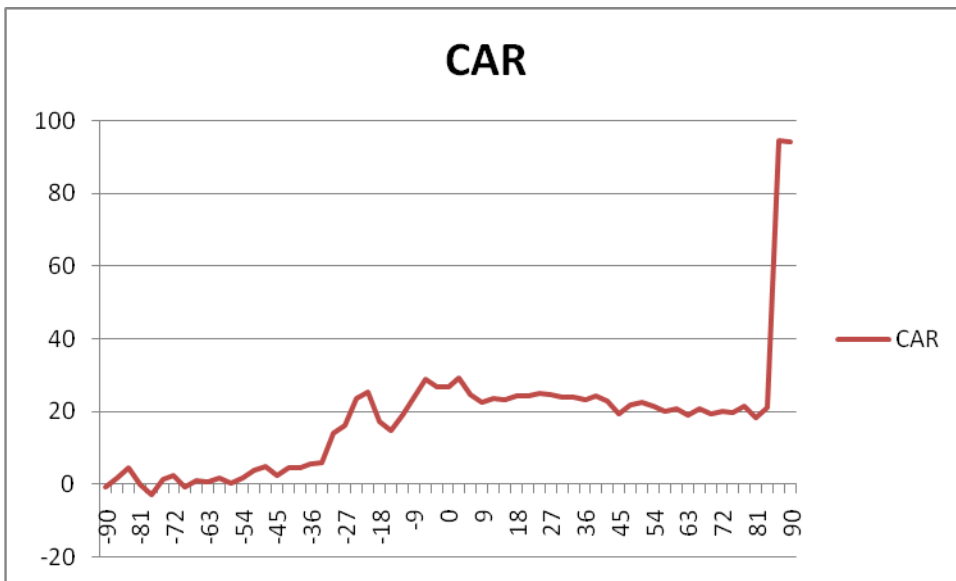


Figure 4.4 shows that there was a steady increase in abnormal return in pre-split between  $t-36$  to  $t_0$ . However, there was no reaction on stock price after the split as shown in figure 4.4 but a sharp and erratic abnormal return was witnessed between  $t_{81}$  to  $t_{90}$ .

Figure 4.5: Cumulative Average Abnormal Returns 2010

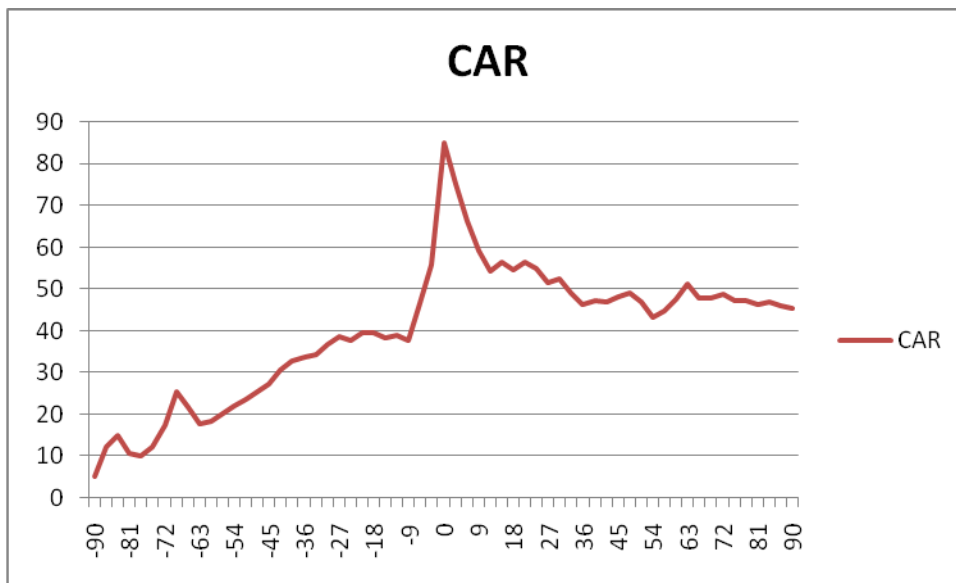
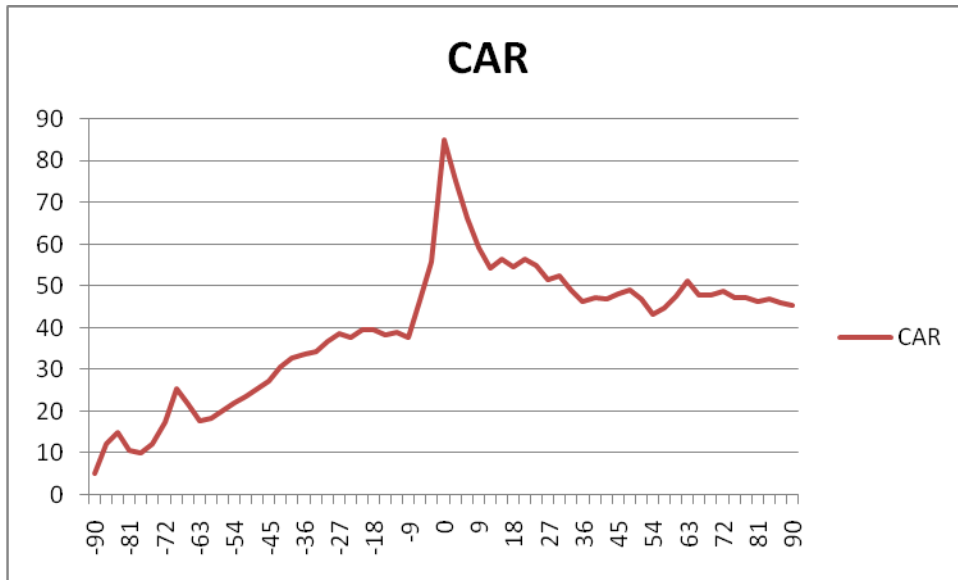


Figure 4.5 shows that there was infinitesimal changes to abnormality in returns following stock splits which was followed by a sharp increase in abnormality of stock returns. There was steady increase in abnormal return between  $t-90$  to  $t_0$  with a further decline of abnormal return after the split reported between  $t_0$  to  $t_{63}$ .

Figure 4.6: Overall Cumulative Average Abnormal Returns



The study also sought to average the cumulative abnormal return for the entire period and presented the data in figure 4.6. From the figure, between  $t-90$  to  $t_0$  period there is positive abnormal returns which is reduced drastically following split announcement (between  $t_0$  to  $t_9$ ). The abnormal returns changes positively but stabilizes between  $t_{27}$  to  $t_{90}$ . It, thus, appears that companies experiencing bull run are resorting to stock splits.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter discusses the summary of the finding in chapter four. Conclusion and recommendations drawn from these findings are discussed in relation to the objectives of the study which was to establish the effect of stock split on stock prices for 7 companies listed at the Nairobi Securities Exchange.

#### **5.2 Summary of Findings**

The study employed an event study methodology where the effect of stock split on share price was investigated for a period of 181 days in pre and post stock split date. The study covered a period between 2009 and 2013. Analysis of some companies share prices reaction to stock splits give mixed results.

For East Africa Breweries Limited the stock price decreased before the day of stock split and the prices of shares increased gradually after the split. However, the zero returns were for less than one day and the remaining days sustained non-zero returns. On average, it took the first 3 days for the effect on price to be observed within the 90-day pre-event period. The effect on share price was sustained over the next 45 days. Nil average returns were exceptionally sustained from day 3 to day 45 and pre-event returns as well as post-event returns gave a positive outlook.



Share price reacted sharply before and after the stock split for East Africa Cables Limited. A sharp increase in share price was reported 20 days after the stock split and a further decrease increase in stock price after the stock split. Shares prices regained its value 20 days after the stock split. CMC Holding indicated zero-increase in share price during pre stock split and a sharp increase was reported after the stock split. However, KCB showed no reaction on the split of its stock split.

The findings further showed that the variability in stock prices do increase erratically with time through the variability in the days preceeding and after stock splits. In 2009 the stock price rose steadily between  $t-90$  and  $t_0$ . However, after the stock split, the average abnormal return increased steadily between  $t_0$  and  $t+90$ . In 2010 there was infinite changes to abnormality in returns following stock splits which was followed by a sharp increase in abnormality of stock returns. There was steady increase in abnormal return between  $t-90$  to  $t_0$  with a further decline of abnormal return after the split was reported between  $t_0$  to  $t_{63}$ . In 2011, between  $t-45$  and  $t_0$  there was an increase in abnormal return which steadily declined following the stock split announcement.

After the stock split, there was erratic increase in average abnormal return at  $t_0$  and a steady decline of stock price between  $t_0$  to  $t+90$ . In 2012, there was a negative abnormal return pre-stock split announcement which rose steadily between  $t-45$  and  $t_0$ . Following the stock split announcement, the abnormal returns fell drastically between  $t_0$  and  $t_{45}$  shown by figure 4.3. Figure 4.4 shows that there was a steady increase in abnormal return

in pre-split between  $t-36$  to  $t_0$ . However, there was no reaction on stock price after the split as shown in figure 4.4 but a sharp and erratic abnormal return was witnessed between  $t_{81}$  to  $t_{90}$ . The findings is consistent with Muscarella and Vetsuypens (1996) who found out that the prices of both the ADR and the underlying stock increases on the announcement of an ADR split even when there was no accompanying stock split in the firms home market. They also found increases in trading activity after the split, which they cited as additional evidence of liquidity benefits. The result of abnormal returns around the ex-split day shows that much of the abnormal returns take place on day  $t_0$  and day  $t+3$ .

### **5.3 Conclusion**

Stock splits announcements are informational events that cause increases in stock prices. I conclude that these events of stock split announcements cause a general increase in stock prices. Given roughly a 90-day period, the effect of stock splits announcements on stock prices persists for an average period of one month. Stock split announcements affect stock prices almost immediately. On average, it takes 3 day for prices to react to stock splits.

This study established that the companies share returns exhibits erratic positive returns before and after the split. This change drastically with stock split announcement from day 3. Hence, the information made by the companies is useful for valuing the securities. The study also found that some investors who have made abnormal returns at some point during post-announcement period always use information of split announcement.

Therefore, the study concludes that the security prices react to stock splits. The results support the semi- strong form efficient market hypothesis since stock prices adjust to public information though not fast enough that no investor can earn an above normal return by trading during post split period especially between day t1 and t3. However, some period after the split have above normal returns.

#### **5.4 Recommendations**

From the study findings, it was established that stock split positively impacts on the share prices therefore the policy on this event may need to be reviewed by CMA to encourage firms to adopt stock splitting.

Secondly, to reduce abnormal reaction of prices caused by speculative trading by retail investors, the public should be educated on the operations of NSE in a bid to encourage more long-term investments than short-term ones as well as impart knowledge on the public regarding stock market activity.

NSE should maintain a record of the dates of various events and make the information available to encourage scholars to undertake research on these events. That way, they will gain from the research and researchers would have easy access to information regarding stock split

CMA should ensure compliance with insider trading laws, guidelines, rules and regulations by effectively monitoring the market. This will eliminate incidences of collision between brokers and traders, inside trading and leaking information and hence boosting investor's confidence.

### **5.5 Limitation of the Study**

The study encountered the following major limitations: The study heavily relied on secondary data and research conducted in the developed countries for literature review since few studies have been carried out at the Nairobi Securities exchange. There are also few number of splits that have taken place at the Nairobi Securities exchange. In addition to this, voluntary stock split is not the only factor that influences share prices of companies. Other important factors such as voluntary disclosure of the company information should be considered while assessing the level of companies share prices. Therefore this factors which were not considered might have influenced the findings. Investors can only gain if there is an assurance that other factors in the economy will remain unchanged

Voluntary stock split is not the only factor that influences share prices of companies. Other important factors such as voluntary disclosure of the company information should be considered while assessing the level of companies share prices. Therefore this factors

which were not considered might have influenced the findings. Investors can only gain if there is an assurance that other factors in the economy will remain unchanged

The study used a sample of seven companies listed in Nairobi stock exchange in Kenya. However, the sample size used is not representative of the population of the study considering that there are over one thousand companies in Kenya. Inference from the finding would therefore be misleading for policy makers. The study was conducted spanning from the year 2009 to 2013 making a sample size of the time of five years. However, in statistical analysis involving regression requires that the time period should be at least 30 years. This implies that some variables which are significant might not have been significant if a large sample size was used.

## **5.6 Suggestions for Further Research**

The study recommends that a similar study can be done on other corporate events like bonus issue, merger and acquisitions, cross listing, rights issues so as to determine how the stock market reacts to these events. This will help stakeholders be in a position to conclude whether Kenyan stock market is efficient in the semi-strong form as different events conveys different information.

A similar study should be carried out with a large sample size to seek validity. In addition, this will enable organizations to benefit from knowing whether reaction to stock split differ even in similar contexts, thus, adding another perspective to the effect of stock

split on share prices of companies listed at the Nairobi securities exchange literature on comparing the retention management practices.

The study further suggests that research should be conducted to examine if reaction to stock split has either short or long term effect on the financial performance of companies listed at the Nairobi securities exchange. Policy makers would utilize the information to in their long term strategies in improving the financial performance of the companies listed at NSE.

## REFERENCES

- Aduda, J. & Chemarum, C. (2010). Market reaction to stock splits. *African Journal of Business Management Vol 1* .
- Agrawal, G. K. (2011). using event study methodology in strategic management research. *Technovation*, 8 , 25 - 42.
- Amihud, Y. & Mendelson, H. (1986). Liquidity and Asset pricing, the Bid - Ask , Spread. *Journal of Fianancial Economics* , 219 - 223.
- Angel, J. (1997). tick size, share prices and stocks splits. *Journal of Finance* , 45 - 67.
- Arbel, G. S. & Swanson, P. L. (1993). what do stock split really signal? *Journal of Financial and Quantitative Analysis*, 31 , 357 - 375.
- Asquith, P. & Mullins, D. W. (1983). Impact of initiating Dividend payment on shareholders wealth. *Journal of Business* , 77 - 96.
- Baker, K. & Powell, G. (1993). Further evidence on managerial motives for stock splits. *Quarterly Journal of Business and Economics* .
- Ball, R. G. (1987). bonus issues, share split and Ex- day share price behaviour; Australian evidence. *Australian Journal of Management* , 277 - 291.
- Bodie, Z., Kane, A., & Marcus, J. (2007). the option pricing model and the risk factor of stock. *Journal of Financial Management* .
- Brennan, M. J. & Copeland, T. E. (1988). Stock Splits, Stock prices and transaction costs. *Journal of Financial Economics* .
- Brickley, J. (1983). Shareholder Wealth , Information Signalling and Specifically Designated Dividend: An Emperical Study. *Journal of Financial Economics 2(2)* , 187 - 209.
- Byun, J. & Rozeff, M. (2003). long- run performance after stock splits; 1927 to 1996. *Journal of Finance 58* , 1063 - 1085.
- Conroy, R., Harris, R., & Benet, B. (1999). Stock splits and information : the role of share price. *Finance management* , 1285 - 1295.
- Copeland, T. R. (2007). liquidity changes following stock splits. *Journal of Finance 34* , 115 - 142.
- Copper, R. H. (2011). the stock market effects of CEO succession in bankrupt firms. *Journal of Management*, 19 , 517 - 533.

- Desai, A. S., Nimalendran, M., & Venkataraman, S. (1998). changes in trading activity following stock split and their effect on volatility and the adverse information component of the bid - ask spread. *Journal of Financial Research* 11 , 159 - 183.
- Dhar, S. & Chhaochharia, S. (2008). market reactions around stock splits and bonus issues. *Indian Evidence* , 235 - 250.
- Dixon, R. (1992). Financial markets: an introduction. *International Thomson business Press, UK* .
- Dolley, S. M. (1933). A market based evaluation of of discretionary accrual models. *Journal of Accounting Research Supplement* 34 , 107 - 115.
- Fama, E. F., Fisher, L., Jensen, M. & Roll, R. (2000). The adjustment of stock prices to new information. *International Economic Review* 10 , 1- 21.
- Gray, S., Smith, T. & Whaley, R. E. (1999). the market reaction to stock split; evidence from Germany. *Schmalenbach Business Review* voll , 270 - 297.
- Groover, P. (2001). Stock splits, tick size and sponsorship. *Journal of Finance* , 429 - 450.
- Grossman, S. J. (1980). size related anomalies and stock return seasonality; further empirical evidence . *Journal of Financial Economics* , 395.
- Guo, M., Muscarella, C. J., Vetsuypens, M. & Wulf, C. M. (2005). Excess stock return and analyst forecast error anomalies revisited. *Journal of Accounting Research* 33, 175 - 191.
- Gupta, A. & Gupta, K. (2007). A re-examination of factors affecting returns in the Indian Stock market. *Indian Press* , 22-28.
- Hans, K. C. (1995). the effect of reverse splits on liquidity of the stock. *Journal of Financial and Quantitative Analysis* , 159 - 169.
- Ikenberry, D. (2003). what do stock split really signal? *Journal of Financial and Quantitative Analysis (March)* , 357 - 375.
- Kehinde, P. L. (2006). Joint Venture Formation and stock market reactions: An assesment in the information technology sector. *Academy of management Journal* 34 , 869 - 892.
- Kothari, P. (2001). capital markets research in Accounting. *pacific - Basin Finance Journal* , 29 - 54.



- Lakonishok, J. & Lev, B. (1987). stock splits and stock dividends: why, who and when. *Journal of Finance (September)* , 913 -932.
- Lamoureux, C. G. & Poon, P. (1987). the market reactions to stock splits. *Journal of finance (September)* , 913 -932.
- Leland, H. & Pyle, D. (1977). Information assymetries, financial structure and financial Intermediation. *Journal of Finance* , 32.
- Mackinlay, C. (1997). Event studies in Economics and Finance. *Journal of Economic Literature* .
- Marloney, M. & Mulherin, J. H. (2009). the effect of splitting on the Ex: A micro structure reconciliation. *Financial Management* , 44 - 59.
- McNichols, L. & Dravid, O. (1990). assymetric information, corporate finance Investment. *the University of Chicago press* .
- Mugenda, O. & Mugenda, A. (1999). Research methods; Qualitative and Quantitative Approaches. *Nairobi: Acts Press* .
- Munyi, J. N. (2010). Stock Splits Announcements in Kenya: A test of Stock Market Efficiency. *MBA Project, University of Nairobi* .
- Munyi, J. N. (2010). Stock Splits Announcements in Kenya: A test of stock market efficiency. *MBA project, University of Nairobi* .
- Muscarella, C. J. & Vetsuypens, M. R. (1996). stock splits: Signaling or liquidity? the case of ADR 'solo splits'. *Journal of Financial Economics (May)* , 3 - 26.
- Mwangi, G. D. (2007). the effects of firms' financial disclosure strategies on stock prices. *unpublished MBA project, University of Nairobi* .
- Nagm, F. & Kautz, K. (2007). Event Study: The market Value of IT Investment Announcements. *Journal of Information, Technology Theory and Application* , issue 3, Article 5.
- Ndirangu, J. (2012). Abnormal returns resulting from stock split. *Journal of Finance* , 2143 - 2184.
- Ndirangu, J. K. (2012). Abnormal Returns resulting from stock split. *Journal of Finance*, 54 , 2143 - 2184.
- Nairobi Securities Exchange (NSE), 2013. History of Organization, *Nairobi Stock Exchange Handbook, various editions*, NSE.

- Nyamosi, W. O. (2011). relationship between company dividend and stock split. *unpublished MBA project, Maseno University* .
- Omenda, P. A. (2011). effects of stock splits on liquidity of companies listed in NSE. *Journal of Accounting and Economics 31* , 405 - 440.
- Omondi, G. A. (2010). A survey of Factors Promoting the Practise of Stock Split in the Stock Market in Kenya. *MBA project, Jomo Kenyatta University of Technology* .
- Ondigo, H. O. (1995). share price level and risk: implications for financial management. *Managerial Finance, 14* , 6 - 16.
- Parkinson, R. (1987). A note on the behaviour of stock returns around Ex- Dates of stock distribution. *Journal of Finance, 42* , 163 -168.
- Patell, V. F. & Wolfson, D. (1988). share price level and Risk: Implication for Financial Management. *Mnagerial Finance, 14* , 6 - 16.
- Schmidt, T. (2011). Pricing Corporate securities under noisy asset information. *Journal of Mathematical Finance* , 403 - 421.
- Schwerk, G. (1981). The relationship between stock returns and inflation. *Journal of Finance,50* , 1175 - 1199.
- Shiller, R. J. (1981). do stock prices move too much to be justified by subsequent changes in dividends? *The American Economic Review Vol.71* , 421-436.
- Simbovo, H. (2006). the effect of stock splits and Large Stock Diviends on Liquidity: Evidence from the Nairobi Stock Exchange. *Unpublished MBA project, University of Nairobi* .
- Verrenchia, R. E. (2001). the effect of split announcements on Canadian Stocks. *Global financial Journal* , 181 - 235.
- Wooldridge, J. R. & Chambers, D. (1983). reverse split and shareholder wealth. *financial management 12* , 5 - 15.

## APPENDICES

### Appendix I: Stock Splits at the NSE 2009 - 2013

Company	Split Factor	Announcement	Books Closure
East African Breweries Ltd	7:3	27/August/2009	26/November/2009
EA Cables Ltd	9:2	10/August/2011	4/September/2011
Kenya Oil Company	1:5	8/November/2011	29/November/2011
Sasini Tea Ltd	7:3	18/December/2012	14/February/2012
CMC Holdings Ltd	9:2	11/January/2009	26/February/2009
Kenya Commercial Bank	9:2	5/March/2012	2/April/2012
Nation Media Group	4:1	18/March/2012	25/July/2012
Equity Bank Ltd.	1:10	12-February-2013	25/March/2013
KenolKobil	10:1	20/May/2013	01/June/2013

**Source: NSE, 2013**

### Appendix II: Share Price Index between t-90 and t+90, average Abnormal Returns and Abnormal Returns

Share Price Index between t-90 and t+90	Abnormal Returns	Average Abnormal Returns
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Days	EABL	EACL	KOC	CMCHL	KCB	NMG	EQTY	AR1	AR2	AR3	AR4	AR5	AR6	AAR	t	Sig.
-90	152	27.75	15.7	15	23.5	141	151	1.42	-3.11	9.691	-3.1	-0.37	2.029	17.2	0.7	0.506
-89	143	27.85	16.5	18.8	21.3	141	170	0.7	-0.33	4.818	-0.42	0.176	0.232	0.22	-0	0.79
-88	138	27.85	14.7	19.4	28.57	140	161	0.58	1.859	1.215	0.497	0.946	0.881	0.59	1.3	0.237
-87	140	27.85	10.4	19.2	26.17	139	160	0.22	0.609	1.535	0.257	1.066	0.379	0.71	-1	0.363
-86	144	27.85	9.86	20	27.18	137	155	5.7	1.578	3.08	1.533	0.677	8.014	1.05	-0	0.8
-85	144	27.85	6.89	19.4	27.56	139	153	0.01	0.341	7.992	-4.14	1.106	4.367	0.38	1	0.385
-84	146	27.75	13.1	19.7	25.52	139	141	0.61	0.431	8.749	1.739	0.515	0.953	0.26	1.4	0.218
-83	14.6	27.65	8.9	20.2	25.16	140	142	0.67	1.047	17.12	-0.89	0.703	-3.18	0.48	0.9	0.426
-82	141	27.68	10.5	19.8	25.41	136	147	-	1.653	-9.67	2.139	-2.09	1.667	0.37	-1	0.554

								0.67								
-81	145	27.75	12.4	20.4	24.07	131	140	0.31	0.585	-6.93	-1.16	-0.96	-0.25	0.38	-1	0.273
-80	140	27.55	10.2	28.6	26.81	130	132	2.04	1.707	-1.07	2.604	-0.57	0.941	0.62	0.4	0.733
-79	142	27.55	8.37	26.2	26.46	134	124	2.31	0.766	0.651	2.647	-3.28	-1.31	0.42	-1	0.623
-78	146	27.85	9.98	27.2	26.55	139	136	-0.5	2.234	1.051	2.649	-0.15	1.499	0.36	2.2	0.08
-77	140	27.8	9.49	27.6	30.52	141	128	2.45	-0.05	0.966	2.516	-2.35	2.058	0.43	1.2	0.28
-76	141	27.82	17.9	25.5	24.07	141	125	0.83	-0.84	6.38	-3.11	1.204	1.187	0.21	0.7	0.495
-75	146	27.82	22.4	25.2	24.87	141	115	0.57	-0.69	1.594	2.25	0.028	-2.64	0.17	0.3	0.805
-74	145	27.83	11.1	25.4	21.67	141	108	1.42	-3.11	9.691	-3.1	-0.37	2.029	1.02	0.6	0.596
-73	144	27.85	11.9	24.1	21.25	142	96.4	0.7	-0.33	4.818	-0.42	0.176	0.232	1.76	1.1	0.335
-72	142	27.85	12.1	26.8	25.96	141	109	0.58	1.859	1.215	0.497	0.946	0.881	1.28	4.9	0.004
-71	145	27.77	20.6	26.5	26.68	142	111	0.22	0.609	1.535	0.257	1.066	0.379	0.38	2.4	0.063
-70	144	27.65	15.2	26.6	24.16	137	111	5.7	1.578	3.08	1.533	0.677	8.014	2.61	2.9	0.032
-69	142	27.85	19.2	30.5	21.96	137	127	1.85	1.716	4.468	-0.48	5.163	2.411	0.58	3	0.029
-68	142	27.85	11.4	35.2	21.85	137	129	0.42	-0.24	-1.74	-0.48	6.443	7.381	1.43	1.1	0.314
-67	140	27.58	11	68.3	21.76	139	142	2.25	-0.98	2.602	1.324	5.077	1.819	0.53	2.5	0.053
-66	143	26.95	11	61.2	21.63	142	172	0.24	0.485	0	-0.21	8.534	-8.28	1.27	0.1	0.955
-65	141	26.95	13.3	54.9	23.1	143	189	0.16	0.398	-2.96	0.677	6.67	-2.42	0.35	0.3	0.804
-64	144	26.25	13.7	66.3	24.08	142	170	0.25	0.671	-0.5	1.675	1.28	4.037	0.27	1.9	0.112
-63	142	26.75	16.2	60.2	22.09	142	161	2.72	0.336	-1.99	-0.71	4.177	5.041	0.83	1.4	0.223
-62	140	26.71	19.6	34.8	21.53	136	127	0.01	0.635	9.654	8.338	2.287	5.115	1.09	2.6	0.047
-61	142	26.73	17.7	36.2	21.61	136	89	2.1	-0.58	9.345	9.291	6.337	-2.28	2.33	2	0.106
-60	142	27.15	16.7	35.5	21.44	139	116	0.22	4.499	41.67	16.59	8.19	-0.01	4.52	1.8	0.126
-59	142	27.15	16	25.9	21.42	142	123	0.12	-2.44	-10.7	-8.67	-22.7	2.685	3.23	-2	0.125
-58	141	27.15	14.4	22.7	21.02	150	97.8	0.17	-0.1	-10.3	-7.91	-5.22	-4.78	0.86	-3	0.04
-57	139	27.25	11.2	21.7	20.35	148	101	0.83	-0.32	-11.5	-2.46	-2.36	-1.97	0.29	-2	0.158
-56	141	27.35	12.9	24.8	20.03	148	102	0.75	0.248	-2.84	-7.34	-2.03	0.838	0.23	-1	0.236
-55	142	27.25	13.2	15.7	26.97	147	140	0.47	0.002	-1.4	6.231	0.175	-0.13	0.14	0.7	0.541
-54	141	27.25	15	16.5	26.74	142	210	0.22	-0.1	-1.89	-2.11	-1.42	1.109	0.06	-1	0.245
-53	141	27.75	12.9	14.7	26.04	139	143	0.68	0.692	2.758	0.641	-3.09	0.012	0.13	0.4	0.73
-52	144	27.66	10.9	10.4	25.97	140	182	0	-0.63	-1.38	-1.31	-0.55	0.698	0.04	-2	0.163
-51	140	27.65	9.38	9.86	26.12	143	257	0.1	0.129	-2.86	-4.18	0.722	-0.52	0.07	-1	0.226
-50	140	27.56	7.91	6.89	26.43	151	115	0.02	0.15	-2.82	4.962	-2.53	-0.68	0.19	-0	0.901
-49	138	27.55	6.7	13.1	26.63	149	123	1198	0.342	-2.12	-4.92	0.267	-0.17	43	1	0.366

-48	131	27.55	6.34	8.9	26.48	141	115	4.94	0.855	-0.85	-4.73	1.83	-0.69	1.52	0.2	0.871
-47	129	27.25	7.5	10.5	26.23	148	183	0.73	0.743	-1.33	3.403	-0.81	1.256	0.12	1	0.375
-46	126	27.23	7.42	12.4	25.38	153	173	2.04	-0.2	-2.25	1.877	0.549	-1.38	0.25	-1	0.424
-45	125	27.55	9.28	10.2	24.53	149	123	4.19	0.174	0	2.256	-3.81	-3.76	1.14	-1	0.219
-44	121	27.55	8.85	8.37	22.67	146	166	6.78	0.26	1.854	-0.05	1.314	2.53	2.33	-0	0.921
-43	120	27.55	13.5	9.98	21.14	141	170	2.75	-0.09	-8.32	3.943	-7.56	0.632	0.79	-1	0.285
-42	119	26.15	15.2	9.49	20.6	135	146	0.05	0	0.815	-8.13	3.229	-1.02	0.28	-1	0.614
-41	120	27.05	9.84	17.9	20.83	125	185	1.58	0.257	-0.26	3.273	3.893	-1.28	0.24	0.8	0.483
-40	119	27.05	16.6	22.4	21.34	149	184	2.44	-0.34	3.743	1.564	1.858	0.859	0.35	1	0.355
-39	118	27.65	13	11.1	21.88	153	105	0.98	-0.08	8.197	-0.6	-2.44	-1.91	0.2	0.4	0.68
-38	117	27.52	10.8	11.9	22.94	161	136	3.45	0.362	-4.41	-2.1	-4.2	1.843	0.79	-2	0.116
-37	116	27.52	9.42	12.1	24.54	172	180	0.84	0.122	-1.67	1.564	-0.99	-1.66	0.11	-1	0.304
-36	116	27.15	7.56	20.6	24.37	171	141	3.18	2.329	1.435	0.032	-1.05	0.826	0.88	0.1	0.939
-35	115	27.56	6.39	15.2	24.8	174	144	0.64	0.379	-1.8	-1.28	1.748	-0.22	0.07	-0	0.874
-34	115	26.85	7.95	19.2	25.23	177	178	1.17	3.515	0.601	-0.6	-4.06	1.556	0.91	-0	0.981
-33	116	26.85	6.73	11.4	25.19	176	178	1.62	1.368	-3.58	2.342	-0.07	-3.02	0.41	-0	0.837
-32	110	26.75	6.7	11	24.93	175	167	3.39	-0.55	-1.09	2.028	1.801	2.61	1.27	1.9	0.121
-31	105	26.75	9.89	11	24.65	173	148	2.06	-16.7	-0.64	-1.14	-0.79	73.7	17.2	0.7	0.506
-30	100	26.55	8.47	13.3	23.56	165	143	1.45	-0.52	2.495	-3.68	-0.94	-0.27	0.22	-0	0.79
-29	106	27.55	8.26	13.7	24.41	171	176	1.63	-0.06	0.336	10.02	-2.44	-0.69	0.44	0.8	0.451
-28	106	28.75	10.2	16.2	24.81	174	127	0.01	1.059	5.294	8.761	0.483	2.526	1.39	2.2	0.081
-27	107	28.95	9.79	19.6	24.79	174	158	-0.2	-0.82	0.209	5.683	0.497	2.633	0.59	1.3	0.237
-26	108	29.15	11.8	17.7	25.32	177	188	1.92	-0.13	0.849	-9.5	0.612	-4.47	0.71	-1	0.363
-25	111	29.15	12	16.7	25.85	181	169	0.32	-0.34	8.906	-10.1	0.733	-2.89	1.05	-0	0.8
-24	116	30.27	9.3	16	25.47	178	147	0.01	0.341	7.992	-4.14	1.106	4.367	0.38	1	0.385
-23	114	31.65	8.53	14.4	25.48	178	142	0.61	0.431	8.749	1.739	0.515	0.953	0.26	1.4	0.218
-22	116	35.65	10.9	11.2	26.07	182	142	0.67	1.047	17.12	-0.89	0.703	-3.18	0.48	0.9	0.426
-21	118	36.65	10.7	12.9	26.42	185	139	0.67	1.653	-9.67	2.139	-2.09	1.667	0.37	-1	0.554
-20	118	37.25	10.8	13.2	26.29	184	138	0.31	0.585	-6.93	-1.16	-0.96	-0.25	0.38	-1	0.273

-19	117	37.75	12	15	26.24	184	143	-	2.04	1.707	-1.07	2.604	-0.57	0.941	0.62	0.4	0.733
-18	119	38.58	10.7	12.9	26.2	183	158	-	2.31	0.766	0.651	2.647	-3.28	-1.31	0.42	-1	0.623
-17	120	38.8	10.5	14.8	26.08	183	163	-0.5	2.234	1.051	2.649	-0.15	1.499	0.36	2.2	0.08	
-16	120	39.75	10.1	17.6	25.92	181	181	2.45	-0.05	0.966	2.516	-2.35	2.058	0.43	1.2	0.28	
-15	120	39.75	10.4	26.9	25.83	181	199	0.83	-0.84	6.38	-3.11	1.204	1.187	0.21	0.7	0.495	
-14	118	40.25	10.3	23.1	26.18	183	216	0.57	-0.69	1.594	2.25	0.028	-2.64	0.17	0.3	0.805	
-13	116	41.28	9.79	25.4	26.21	183	210	1.42	-3.11	9.691	-3.1	-0.37	2.029	1.02	0.6	0.596	
-12	117	42.56	10.1	18.7	26.34	184	212	0.7	-0.33	4.818	-0.42	0.176	0.232	1.76	1.1	0.335	
-11	116	43.51	9.64	21.2	26.3	184	196	0.58	1.859	1.215	0.497	0.946	0.881	1.28	4.9	0.004	
-10	114	44.52	8.54	28.9	26.32	184	196	-	0.22	0.609	1.535	0.257	1.066	0.379	0.38	2.4	0.063
-9	114	44.75	8.19	24.2	26.32	184	196	5.7	1.578	3.08	1.533	0.677	8.014	2.61	2.9	0.032	
-8	106	44.75	7.63	25.8	26.32	184	193	1.85	1.716	4.468	-0.48	5.163	2.411	0.58	3	0.029	
-7	103	44.75	8.25	25.1	26.23	184	187	-	0.42	-0.24	-1.74	-0.48	6.443	7.381	1.43	1.1	0.314
-6	103	45.65	7.29	21.7	26.2	183	182	2.25	-0.98	2.602	1.324	5.077	1.819	0.53	2.5	0.053	
-5	103	45.65	8.3	17.3	26.08	183	194	0.24	0.485	0	-0.21	8.534	-8.28	1.27	0.1	0.955	
-4	103	45.52	8.12	23.6	26.02	182	181	-	0.16	0.398	-2.96	0.677	6.67	-2.42	0.35	0.3	0.804
-3	104	45.25	8.69	19	26.09	183	171	0.25	0.671	-0.5	1.675	1.28	4.037	0.27	1.9	0.112	
-2	103	45.25	9.04	16.4	26.11	183	144	2.72	0.336	-1.99	-0.71	4.177	5.041	0.83	1.4	0.223	
-1	102	45.15	7.06	10.9	26.22	184	135	-	0.01	0.635	9.654	8.338	2.287	5.115	1.09	2.6	0.047
0	100	45	6.22	9.38	26.27	184	251	2.1	-0.58	9.345	9.291	6.337	-2.28	2.33	2	0.106	
1	102	45.25	5.88	36.2	26.19	183	150	0.22	4.499	41.67	16.59	8.19	-0.01	4.52	1.8	0.126	
2	106	45.25	6	36.6	26.27	184	144	0.12	-2.44	-10.7	-8.67	-22.7	2.685	3.23	-2	0.125	
3	106	45.25	6.2	43.1	26.44	185	144	0.17	-0.1	-10.3	-7.91	-5.22	-4.78	0.86	-3	0.04	
4	106	45.75	8.2	51.9	26.52	186	146	0.83	-0.32	-11.5	-2.46	-2.36	-1.97	0.29	-2	0.158	
5	107	45.75	4.9	62.2	26.51	186	150	0.75	0.248	-2.84	-7.34	-2.03	0.838	0.23	-1	0.236	
6	107	45.75	7.1	64.2	25.91	181	149	-	0.47	0.002	-1.4	6.231	0.175	-0.13	0.14	0.7	0.541
7	107	45.75	8.3	65.3	25.61	179	136	0.22	-0.1	-1.89	-2.11	-1.42	1.109	0.06	-1	0.245	
8	108	44.15	6.3	65.4	25.53	179	133	0.68	0.692	2.758	0.641	-3.09	0.012	0.13	0.4	0.73	
9	108	44.25	6.4	65.8	25.22	177	128	0	-0.63	-1.38	-1.31	-0.55	0.698	0.04	-2	0.163	
10	109	44.15	1.1	68	23.87	167	135	0.1	0.129	-2.86	-4.18	0.722	-0.52	0.07	-1	0.226	
11	109	43.25	2.2	69	24.57	172	140	0.02	0.15	-2.82	4.962	-2.53	-0.68	0.19	-0	0.901	
12	110	43.25	2.6	68.4	24.92	174	138	1198	0.342	-2.12	-4.92	0.267	-0.17	43	1	0.366	
13	110	43.12	0.2	67.9	25.32	177	133	4.94	0.855	-0.85	-4.73	1.83	-0.69	1.52	0.2	0.871	
14	110	42.25	6.2	67.4	25.97	182	129	0.73	0.743	-1.33	3.403	-0.81	1.256	0.12	1	0.375	

15	111	42.15	1.9	66.1	25.92	181	124	-	2.04	-0.2	-2.25	1.877	0.549	-1.38	0.25	-1	0.424
16	111	40.25	1.9	62.8	25.58	179	122	-	4.19	0.174	0	2.256	-3.81	-3.76	1.14	-1	0.219
17	111	40.25	1.2	58.1	25.34	177	122	-	6.78	0.26	1.854	-0.05	1.314	2.53	2.33	-0	0.921
18	111	35.65	1.4	56.2	25.43	178	119	-	2.75	-0.09	-8.32	3.943	-7.56	0.632	0.79	-1	0.285
19	111	35.25	6.1	56	25.46	178	128	-	0.05	0	0.815	-8.13	3.229	-1.02	0.28	-1	0.614
20	111	34.25	7.2	55.5	25.75	180	146	-	1.58	0.257	-0.26	3.273	3.893	-1.28	0.24	0.8	0.483
21	111	30.25	8.3	51.7	25.97	182	164	-	2.44	-0.34	3.743	1.564	1.858	0.859	0.35	1	0.355
22	111	30.25	4.8	42.4	26.41	185	174	-	0.98	-0.08	8.197	-0.6	-2.44	-1.91	0.2	0.4	0.68
23	111	30.25	3.5	43.5	26.42	185	176	-	3.45	0.362	-4.41	-2.1	-4.2	1.843	0.79	-2	0.116
24	111	30.05	4	45.2	26.66	187	187	-	0.84	0.122	-1.67	1.564	-0.99	-1.66	0.11	-1	0.304
25	120	30.25	5.1	10.2	26.94	189	178	-	3.18	2.329	1.435	0.032	-1.05	0.826	0.88	0.1	0.939
26	122	31.25	3.9	9.79	26.91	188	188	-	0.64	0.379	-1.8	-1.28	1.748	-0.22	0.07	-0	0.874
27	123	27.5	4.6	11.8	27.07	81.2	183	-	1.17	3.515	0.601	-0.6	-4.06	1.556	0.91	-0	0.981
28	126	27.52	5.1	12	27.07	81.2	193	-	1.62	1.368	-3.58	2.342	-0.07	-3.02	0.41	-0	0.837
29	126	27.55	3.4	9.3	26.59	79.8	190	-	3.39	-0.55	-1.09	2.028	1.801	2.61	1.27	1.9	0.121
30	128	27.56	7.8	8.53	25.98	77.9	185	-	2.06	-16.7	-0.64	-1.14	-0.79	73.7	17.2	0.7	0.506
31	128	28.75	8.18	10.9	25.65	76.9	177	-	1.45	-0.52	2.495	-3.68	-0.94	-0.27	0.22	-0	0.79
32	130	28.75	8.46	10.7	24.93	74.8	181	-	1.63	-0.06	0.336	10.02	-2.44	-0.69	0.44	0.8	0.451
33	130	28.85	9.04	10.8	25.38	76.2	176	-	0.01	1.059	5.294	8.761	0.483	2.526	1.39	2.2	0.081
34	130	30.25	9.56	12	25.47	76.4	166	-	-0.2	-0.82	0.209	5.683	0.497	2.633	0.59	1.3	0.237
35	130	30.25	10.2	10.7	25.56	76.7	164	-	1.92	-0.13	0.849	-9.5	0.612	-4.47	0.71	-1	0.363
36	130	30.25	9.55	10.5	25.41	76.2	157	-	0.32	-0.34	8.906	-10.1	0.733	-2.89	1.05	-0	0.8
37	130	30.75	9.94	10.1	25.27	75.8	164	-	0.01	0.341	7.992	-4.14	1.106	4.367	0.38	1	0.385
38	130	31.75	10.9	10.4	24.7	74.1	167	-	0.61	0.431	8.749	1.739	0.515	0.953	0.26	1.4	0.218
39	132	31.75	11.4	10.3	24.57	73.7	168	-	0.67	1.047	17.12	-0.89	0.703	-3.18	0.48	0.9	0.426
40	141	32.75	11	11.2	24.91	74.7	165	-	0.67	1.653	-9.67	2.139	-2.09	1.667	0.37	-1	0.554
41	143	32.75	11.3	12.9	24.37	73.1	163	-	0.31	0.585	-6.93	-1.16	-0.96	-0.25	0.38	-1	0.273
42	146	33.27	12	14.8	24.07	72.2	164	-	2.04	1.707	-1.07	2.604	-0.57	0.941	0.62	0.4	0.733

43	146	34.75	12.5	15.3	23.93	71.8	191	2.31	0.766	0.651	2.647	-3.28	-1.31	0.42	-1	0.623
44	145	34.75	11.8	15	24.09	72.3	192	-0.5	2.234	1.051	2.649	-0.15	1.499	0.36	2.2	0.08
45	145	34.77	12.2	12.9	23.77	71.3	193	2.45	-0.05	0.966	2.516	-2.35	2.058	0.43	1.2	0.28
46	146	35.45	15.7	10.5	23.92	71.8	192	0.83	-0.84	6.38	-3.11	1.204	1.187	0.21	0.7	0.495
47	147	36.58	16.5	12.1	24.47	73.4	193	0.57	-0.69	1.594	2.25	0.028	-2.64	0.17	0.3	0.805
48	147	40.51	14.7	12.9	24.55	73.7	188	1.42	-3.11	9.691	-3.1	-0.37	2.029	1.02	0.6	0.596
49	147	40.25	10.4	12.8	24.29	72.9	186	0.7	-0.33	4.818	-0.42	0.176	0.232	1.76	1.1	0.335
50	147	42.65	9.86	12.4	51.89	156	184	0.58	1.859	1.215	0.497	0.946	0.881	1.28	4.9	0.004
51	146	42.45	6.89	11.6	53.62	161	183	0.22	0.609	1.535	0.257	1.066	0.379	0.38	2.4	0.063
52	145	43.65	13.1	11.5	56.59	170	176	5.7	1.578	3.08	1.533	0.677	8.014	2.61	2.9	0.032
53	144	35.55	8.9	11	55.7	167	179	1.85	1.716	4.468	-0.48	5.163	2.411	0.58	3	0.029
54	141	36.54	10.5	10.9	55.43	166	177	0.42	-0.24	-1.74	-0.48	6.443	7.381	1.43	1.1	0.314
55	138	38.51	12.4	10.6	55.52	167	169	2.25	-0.98	2.602	1.324	5.077	1.819	0.53	2.5	0.053
56	137	35.51	10.2	10.1	55.54	167	158	0.24	0.485	0	-0.21	8.534	-8.28	1.27	0.1	0.955
57	139	35.51	8.37	10	55.8	167	149	0.16	0.398	-2.96	0.677	6.67	-2.42	0.35	0.3	0.804
58	138	35.45	9.98	9.04	56.71	170	150	0.25	0.671	-0.5	1.675	1.28	4.037	0.27	1.9	0.112
59	136	35.56	9.49	7.34	58.29	175	148	2.72	0.336	-1.99	-0.71	4.177	5.041	0.83	1.4	0.223
60	130	34.26	8.32	8.63	58.41	175	147	0.01	0.635	9.654	8.338	2.287	5.115	1.09	2.6	0.047
61	129	34.52	8.17	8.34	58.37	175	143	2.1	-0.58	9.345	9.291	6.337	-2.28	2.33	2	0.106
62	128	34.64	8.42	7.6	58.24	175	148	0.22	4.499	41.67	16.59	8.19	-0.01	4.52	1.8	0.126
63	127	36.52	8.61	8.07	57.99	174	156	0.12	-2.44	-10.7	-8.67	-22.7	2.685	3.23	-2	0.125
64	125	35.51	8.09	8.3	57.31	172	156	0.17	-0.1	-10.3	-7.91	-5.22	-4.78	0.86	-3	0.04
65	126	36.5	8.47	8.38	56.99	171	155	0.83	-0.32	-11.5	-2.46	-2.36	-1.97	0.29	-2	0.158
66	126	36.58	9.14	8.38	56.43	169	147	0.75	0.248	-2.84	-7.34	-2.03	0.838	0.23	-1	0.236
67	126	35.56	9.71	7.77	55.86	168	139	0.47	0.002	-1.4	6.231	0.175	-0.13	0.14	0.7	0.541
68	126	35.65	10.1	10.1	55.62	167	184	0.22	-0.1	-1.89	-2.11	-1.42	1.109	0.06	-1	0.245
69	126	36.45	11	9.85	55.15	165	166	0.68	0.692	2.758	0.641	-3.09	0.012	0.13	0.4	0.73
70	126	35.45	11.6	9.61	54.74	164	159	0	-0.63	-1.38	-1.31	-0.55	0.698	0.04	-2	0.163
71	125	35.25	11.6	9.37	54.93	165	154	0.1	0.129	-2.86	-4.18	0.722	-0.52	0.07	-1	0.226
72	125	34.25	12	10.3	54.89	165	166	0.02	0.15	-2.82	4.962	-2.53	-0.68	0.19	-0	0.901
73	125	34.75	12	10.2	54.38	163	171	1198	0.342	-2.12	-4.92	0.267	-0.17	43	1	0.366
74	125	40.25	12.9	11	53.75	161	166	4.94	0.855	-0.85	-4.73	1.83	-0.69	1.52	0.2	0.871
75	125	40.25	13.3	12.3	56.17	169	164	0.73	0.743	-1.33	3.403	-0.81	1.256	0.12	1	0.375
76	124	40.54	10.5	14.5	55.97	168	162	2.04	-0.2	-2.25	1.877	0.549	-1.38	0.25	-1	0.424



77	124	40.75	10.3	14.9	55.53	167	164	4.19	0.174	0	2.256	-3.81	-3.76	1.14	-1	0.219
78	123	40.85	10.2	14.8	51.66	155	170	6.78	0.26	1.854	-0.05	1.314	2.53	2.33	-0	0.921
79	121	40.25	10.2	11.8	42.38	127	172	2.75	-0.09	-8.32	3.943	-7.56	0.632	0.79	-1	0.285
80	120	40.15	9.79	11.1	43.5	131	173	0.05	0	0.815	-8.13	3.229	-1.02	0.28	-1	0.614
81	123	39.56	11.8	11.9	45.18	136	168	1.58	0.257	-0.26	3.273	3.893	-1.28	0.24	0.8	0.483
82	124	38.25	12	12.4	44.48	133	177	2.44	-0.34	3.743	1.564	1.858	0.859	0.35	1	0.355
83	131	27.55	9.3	12.4	44.47	133	181	0.98	-0.08	8.197	-0.6	-2.44	-1.91	0.2	0.4	0.68
84	131	28.55	8.53	11.5	44.14	132	176	3.45	0.362	-4.41	-2.1	-4.2	1.843	0.79	-2	0.116
85	136	27.52	10.9	11.2	43.99	132	177	0.84	0.122	-1.67	1.564	-0.99	-1.66	0.11	-1	0.304
86	126	26.51	10.7	11.2	51.89	156	178	3.18	2.329	1.435	0.032	-1.05	0.826	0.88	0.1	0.939
87	152	28.52	10.8	11.1	53.62	161	175	0.64	0.379	-1.8	-1.28	1.748	-0.22	0.07	-0	0.874
88	155	29.51	12	10.8	56.59	170	170	1.17	3.515	0.601	-0.6	-4.06	1.556	0.91	-0	0.981
89	156	30.55	10.7	10.5	55.7	167	166	1.62	1.368	-3.58	2.342	-0.07	-3.02	0.41	-0	0.837
90	161	36.4	10.5	10.2	55.43	166	158	3.39	-0.55	-1.09	2.028	1.801	2.61	1.27	1.9	0.121

### Appendix III: Average Security Returns Variability

Days	2009	2010	2011	2012	2013	Mean (ASRV)	STDEV	T-stat	Sig
-90	84.3086	0.0194	0.0137	1.0001	0.8521	17.2388	33.5374	1.259	0.264
-89	0.5859	0.2114	0.0197	0.2769	0.0049	0.2198	0.2115	2.546	0.052
-88	0.2113	0.4419	0.0055	1.8121	0.4668	0.5875	0.6349	2.267	0.073
-87	0.8964	1.2381	0.0083	0.064	1.3443	0.7102	0.5702	3.051	0.028
-86	0.0594	1.7334	0.0119	2.8981	0.5617	1.0529	1.1117	2.32	0.068
-85	0.0346	0.5069	0.0272	0.0663	1.2843	0.3839	0.485	1.939	0.11
-84	0.1453	0.3684	0.0059	0.7253	0.0612	0.2612	0.2629	2.434	0.059
-83	0.4345	1.2624	0.011	0	0.6792	0.4774	0.4699	2.488	0.055
-82	0.9193	0.462	0.0967	0.1838	0.1871	0.3698	0.301	3.009	0.03
-81	0.125	0.2239	0.0206	1.5485	0.0043	0.3845	0.5874	1.603	0.17
-80	1.8711	0.0976	0.0073	1.0621	0.0597	0.6196	0.738	2.057	0.095

-79	1.4651	0.0977	0.2385	0.1619	0.116	0.4158	0.5269	1.933	0.111
-78	1.5442	0.1007	0.0005	0.014	0.1512	0.3621	0.5936	1.494	0.195
-77	1.4605	0.0906	0.1224	0.1863	0.2852	0.429	0.52	2.021	0.099
-76	0.3775	0.3061	0.0322	0.2179	0.0949	0.2057	0.1282	3.932	0.011
-75	0.2186	0.0801	0	0.0698	0.4682	0.1673	0.1663	2.465	0.057
-74	3.365	0.5328	0.003	0.91	0.2773	1.0176	1.2111	2.058	0.095
-73	0.1503	0.1016	0.0007	8.567	0.0036	1.7646	3.4017	1.271	0.26
-72	1.1081	0.0097	0.0199	5.2345	0.0523	1.2849	2.0187	1.559	0.18
-71	0.1222	0.011	0.0252	1.7412	0.0097	0.3819	0.681	1.374	0.228
-70	8.6351	0.0727	0.0102	0.0206	4.3257	2.6129	3.4394	1.861	0.122
-69	1.7088	0.0885	0.5916	0.1192	0.3914	0.5799	0.5939	2.392	0.062
-68	0.0597	0.0162	0.9214	2.4875	3.6694	1.4308	1.4331	2.446	0.058
-67	1.5091	0.0529	0.5722	0.2748	0.2228	0.5264	0.5191	2.484	0.056
-66	0.0842	0.0006	1.6167	0.0506	4.6194	1.2743	1.7801	1.754	0.14
-65	0.0534	0.0436	0.9875	0.2656	0.3947	0.349	0.3457	2.473	0.056
-64	0.1488	0.0395	0.0364	0.0256	1.0976	0.2696	0.4164	1.586	0.174
-63	1.8347	0.0239	0.3873	0.1905	1.7117	0.8296	0.7799	2.605	0.048
-62	0.1197	1.3491	0.1161	2.1002	1.7619	1.0894	0.8281	3.222	0.023
-61	1.1701	1.5539	0.8913	7.6982	0.3512	2.3329	2.7111	2.108	0.089
-60	6.0276	11.1829	1.4889	3.8835	0	4.5166	3.9164	2.825	0.037
-59	1.7725	1.5187	11.4097	0.9723	0.4855	3.2318	4.1131	1.925	0.112
-58	0.0095	1.3087	0.604	0.8164	1.5409	0.8559	0.5396	3.886	0.012
-57	0.1961	0.6457	0.1237	0.2454	0.2614	0.2945	0.182	3.962	0.011
-56	0.1557	0.7719	0.0919	0.0585	0.0473	0.2251	0.276	1.997	0.102
-55	0.0528	0.5394	0.0007	0.1295	0.0011	0.1447	0.2029	1.747	0.141
-54	0.015	0.0761	0.0446	0.085	0.0829	0.0607	0.0271	5.491	0.003
-53	0.2558	0.0381	0.212	0.1435	0	0.1299	0.0981	3.244	0.023
-52	0.118	0.0317	0.0067	0.0164	0.0328	0.0411	0.0397	2.54	0.052
-51	0.0072	0.2737	0.0116	0.0351	0.0185	0.0692	0.1027	1.651	0.16
-50	0.0068	0.3708	0.1417	0.3916	0.0316	0.1885	0.1639	2.817	0.037
-49	214.6492	0.3502	0.0016	0.109	0.002	43.0224	85.8135	1.228	0.274
-48	6.1295	0.3091	0.0743	1.0443	0.0324	1.5179	2.3342	1.593	0.172
-47	0.2915	0.1659	0.0146	0.0015	0.1063	0.116	0.1066	2.666	0.045
-46	1.0206	0.0698	0.0067	0.0145	0.1276	0.2478	0.3888	1.561	0.179
-45	4.2719	0.0696	0.3222	0.0757	0.9529	1.1385	1.5994	1.744	0.142
-44	11.158	0.0147	0.0383	0.0217	0.4311	2.3328	4.4154	1.294	0.252
-43	1.8423	0.5083	1.2693	0.2973	0.0269	0.7888	0.6696	2.886	0.034
-42	0.0006	0.9078	0.2314	0.186	0.07	0.2792	0.3248	2.105	0.089

-41	0.6219	0.1468	0.3364	0.0009	0.1102	0.2432	0.2181	2.732	0.041
-40	1.4733	0.0933	0.0766	0.039	0.0496	0.3464	0.5638	1.505	0.193
-39	0.235	0.2919	0.132	0.1195	0.2447	0.2046	0.0673	7.444	0.001
-38	2.9286	0.1434	0.3916	0.2655	0.2287	0.7916	1.0715	1.81	0.13
-37	0.1761	0.0454	0.0218	0.1182	0.1846	0.1092	0.0663	4.038	0.01
-36	4.0701	0.0088	0.0245	0.2514	0.0459	0.8801	1.5974	1.35	0.235
-35	0.1415	0.0364	0.0679	0.089	0.0031	0.0676	0.047	3.521	0.017
-34	4.0063	0.0065	0.365	0.0089	0.1631	0.91	1.5537	1.435	0.211
-33	1.1965	0.1299	0.0001	0.1074	0.6134	0.4095	0.4468	2.245	0.075
-32	2.8722	0.0613	0.072	2.8798	0.4587	1.2688	1.3201	2.354	0.065
-31	84.3086	0.0194	0.0137	1.0001	0.8521	17.2388	33.5374	1.259	0.264
-30	0.5859	0.2114	0.0197	0.2769	0.0049	0.2198	0.2115	2.546	0.052
-29	0.6486	1.3738	0.132	0.0006	0.0323	0.4375	0.5234	2.047	0.096
-28	0.3331	1.1696	0.0052	5.0313	0.4296	1.3938	1.8582	1.837	0.126
-27	0.2113	0.4419	0.0055	1.8121	0.4668	0.5875	0.6349	2.267	0.073
-26	0.8964	1.2381	0.0083	0.064	1.3443	0.7102	0.5702	3.051	0.028
-25	0.0594	1.7334	0.0119	2.8981	0.5617	1.0529	1.1117	2.32	0.068
-24	0.0346	0.5069	0.0272	0.0663	1.2843	0.3839	0.485	1.939	0.11
-23	0.1453	0.3684	0.0059	0.7253	0.0612	0.2612	0.2629	2.434	0.059
-22	0.4345	1.2624	0.011	0	0.6792	0.4774	0.4699	2.488	0.055
-21	0.9193	0.462	0.0967	0.1838	0.1871	0.3698	0.301	3.009	0.03
-20	0.125	0.2239	0.0206	1.5485	0.0043	0.3845	0.5874	1.603	0.17
-19	1.8711	0.0976	0.0073	1.0621	0.0597	0.6196	0.738	2.057	0.095
-18	1.4651	0.0977	0.2385	0.1619	0.116	0.4158	0.5269	1.933	0.111
-17	1.5442	0.1007	0.0005	0.014	0.1512	0.3621	0.5936	1.494	0.195
-16	1.4605	0.0906	0.1224	0.1863	0.2852	0.429	0.52	2.021	0.099
-15	0.3775	0.3061	0.0322	0.2179	0.0949	0.2057	0.1282	3.932	0.011
-14	0.2186	0.0801	0	0.0698	0.4682	0.1673	0.1663	2.465	0.057
-13	3.365	0.5328	0.003	0.91	0.2773	1.0176	1.2111	2.058	0.095
-12	0.1503	0.1016	0.0007	8.567	0.0036	1.7646	3.4017	1.271	0.26
-11	1.1081	0.0097	0.0199	5.2345	0.0523	1.2849	2.0187	1.559	0.18
-10	0.1222	0.011	0.0252	1.7412	0.0097	0.3819	0.681	1.374	0.228
-9	8.6351	0.0727	0.0102	0.0206	4.3257	2.6129	3.4394	1.861	0.122
-8	1.7088	0.0885	0.5916	0.1192	0.3914	0.5799	0.5939	2.392	0.062
-7	0.0597	0.0162	0.9214	2.4875	3.6694	1.4308	1.4331	2.446	0.058
-6	1.5091	0.0529	0.5722	0.2748	0.2228	0.5264	0.5191	2.484	0.056
-5	0.0842	0.0006	1.6167	0.0506	4.6194	1.2743	1.7801	1.754	0.14
-4	0.0534	0.0436	0.9875	0.2656	0.3947	0.349	0.3457	2.473	0.056

-3	0.1488	0.0395	0.0364	0.0256	1.0976	0.2696	0.4164	1.586	0.174
-2	1.8347	0.0239	0.3873	0.1905	1.7117	0.8296	0.7799	2.605	0.048
-1	0.1197	1.3491	0.1161	2.1002	1.7619	1.0894	0.8281	3.222	0.023
0	1.1701	1.5539	0.8913	7.6982	0.3512	2.3329	2.7111	2.108	0.089
1	6.0276	11.1829	1.4889	3.8835	0	4.5166	3.9164	2.825	0.037
2	1.7725	1.5187	11.4097	0.9723	0.4855	3.2318	4.1131	1.925	0.112
3	0.0095	1.3087	0.604	0.8164	1.5409	0.8559	0.5396	3.886	0.012
4	0.1961	0.6457	0.1237	0.2454	0.2614	0.2945	0.182	3.962	0.011
5	0.1557	0.7719	0.0919	0.0585	0.0473	0.2251	0.276	1.997	0.102
6	0.0528	0.5394	0.0007	0.1295	0.0011	0.1447	0.2029	1.747	0.141
7	0.015	0.0761	0.0446	0.085	0.0829	0.0607	0.0271	5.491	0.003
8	0.2558	0.0381	0.212	0.1435	0	0.1299	0.0981	3.244	0.023
9	0.118	0.0317	0.0067	0.0164	0.0328	0.0411	0.0397	2.54	0.052
10	0.0072	0.2737	0.0116	0.0351	0.0185	0.0692	0.1027	1.651	0.16
11	0.0068	0.3708	0.1417	0.3916	0.0316	0.1885	0.1639	2.817	0.037
12	214.6492	0.3502	0.0016	0.109	0.002	43.0224	85.8135	1.228	0.274
13	6.1295	0.3091	0.0743	1.0443	0.0324	1.5179	2.3342	1.593	0.172
14	0.2915	0.1659	0.0146	0.0015	0.1063	0.116	0.1066	2.666	0.045
15	1.0206	0.0698	0.0067	0.0145	0.1276	0.2478	0.3888	1.561	0.179
16	4.2719	0.0696	0.3222	0.0757	0.9529	1.1385	1.5994	1.744	0.142
17	11.158	0.0147	0.0383	0.0217	0.4311	2.3328	4.4154	1.294	0.252
18	1.8423	0.5083	1.2693	0.2973	0.0269	0.7888	0.6696	2.886	0.034
19	0.0006	0.9078	0.2314	0.186	0.07	0.2792	0.3248	2.105	0.089
20	0.6219	0.1468	0.3364	0.0009	0.1102	0.2432	0.2181	2.732	0.041
21	1.4733	0.0933	0.0766	0.039	0.0496	0.3464	0.5638	1.505	0.193
22	0.235	0.2919	0.132	0.1195	0.2447	0.2046	0.0673	7.444	0.001
23	2.9286	0.1434	0.3916	0.2655	0.2287	0.7916	1.0715	1.81	0.13
24	0.1761	0.0454	0.0218	0.1182	0.1846	0.1092	0.0663	4.038	0.01
25	4.0701	0.0088	0.0245	0.2514	0.0459	0.8801	1.5974	1.35	0.235
26	0.1415	0.0364	0.0679	0.089	0.0031	0.0676	0.047	3.521	0.017
27	4.0063	0.0065	0.365	0.0089	0.1631	0.91	1.5537	1.435	0.211
28	1.1965	0.1299	0.0001	0.1074	0.6134	0.4095	0.4468	2.245	0.075
29	2.8722	0.0613	0.072	2.8798	0.4587	1.2688	1.3201	2.354	0.065
30	84.3086	0.0194	0.0137	1.0001	0.8521	17.2388	33.5374	1.259	0.264
31	0.5859	0.2114	0.0197	0.2769	0.0049	0.2198	0.2115	2.546	0.052
32	0.6486	1.3738	0.132	0.0006	0.0323	0.4375	0.5234	2.047	0.096
33	0.3331	1.1696	0.0052	5.0313	0.4296	1.3938	1.8582	1.837	0.126
34	0.2113	0.4419	0.0055	1.8121	0.4668	0.5875	0.6349	2.267	0.073

35	0.8964	1.2381	0.0083	0.064	1.3443	0.7102	0.5702	3.051	0.028
36	0.0594	1.7334	0.0119	2.8981	0.5617	1.0529	1.1117	2.32	0.068
37	0.0346	0.5069	0.0272	0.0663	1.2843	0.3839	0.485	1.939	0.11
38	0.1453	0.3684	0.0059	0.7253	0.0612	0.2612	0.2629	2.434	0.059
39	0.4345	1.2624	0.011	0	0.6792	0.4774	0.4699	2.488	0.055
40	0.9193	0.462	0.0967	0.1838	0.1871	0.3698	0.301	3.009	0.03
41	0.125	0.2239	0.0206	1.5485	0.0043	0.3845	0.5874	1.603	0.17
42	1.8711	0.0976	0.0073	1.0621	0.0597	0.6196	0.738	2.057	0.095
43	1.4651	0.0977	0.2385	0.1619	0.116	0.4158	0.5269	1.933	0.111
44	1.5442	0.1007	0.0005	0.014	0.1512	0.3621	0.5936	1.494	0.195
45	1.4605	0.0906	0.1224	0.1863	0.2852	0.429	0.52	2.021	0.099
46	0.3775	0.3061	0.0322	0.2179	0.0949	0.2057	0.1282	3.932	0.011
47	0.2186	0.0801	0	0.0698	0.4682	0.1673	0.1663	2.465	0.057
48	3.365	0.5328	0.003	0.91	0.2773	1.0176	1.2111	2.058	0.095
49	0.1503	0.1016	0.0007	8.567	0.0036	1.7646	3.4017	1.271	0.26
50	1.1081	0.0097	0.0199	5.2345	0.0523	1.2849	2.0187	1.559	0.18
51	0.1222	0.011	0.0252	1.7412	0.0097	0.3819	0.681	1.374	0.228
52	8.6351	0.0727	0.0102	0.0206	4.3257	2.6129	3.4394	1.861	0.122
53	1.7088	0.0885	0.5916	0.1192	0.3914	0.5799	0.5939	2.392	0.062
54	0.0597	0.0162	0.9214	2.4875	3.6694	1.4308	1.4331	2.446	0.058
55	1.5091	0.0529	0.5722	0.2748	0.2228	0.5264	0.5191	2.484	0.056
56	0.0842	0.0006	1.6167	0.0506	4.6194	1.2743	1.7801	1.754	0.14
57	0.0534	0.0436	0.9875	0.2656	0.3947	0.349	0.3457	2.473	0.056
58	0.1488	0.0395	0.0364	0.0256	1.0976	0.2696	0.4164	1.586	0.174
59	1.8347	0.0239	0.3873	0.1905	1.7117	0.8296	0.7799	2.605	0.048
60	0.1197	1.3491	0.1161	2.1002	1.7619	1.0894	0.8281	3.222	0.023
61	1.1701	1.5539	0.8913	7.6982	0.3512	2.3329	2.7111	2.108	0.089
62	6.0276	11.1829	1.4889	3.8835	0	4.5166	3.9164	2.825	0.037
63	1.7725	1.5187	11.4097	0.9723	0.4855	3.2318	4.1131	1.925	0.112
64	0.0095	1.3087	0.604	0.8164	1.5409	0.8559	0.5396	3.886	0.012
65	0.1961	0.6457	0.1237	0.2454	0.2614	0.2945	0.182	3.962	0.011
66	0.1557	0.7719	0.0919	0.0585	0.0473	0.2251	0.276	1.997	0.102
67	0.0528	0.5394	0.0007	0.1295	0.0011	0.1447	0.2029	1.747	0.141
68	0.015	0.0761	0.0446	0.085	0.0829	0.0607	0.0271	5.491	0.003
69	0.2558	0.0381	0.212	0.1435	0	0.1299	0.0981	3.244	0.023
70	0.118	0.0317	0.0067	0.0164	0.0328	0.0411	0.0397	2.54	0.052
71	0.0072	0.2737	0.0116	0.0351	0.0185	0.0692	0.1027	1.651	0.16
72	0.0068	0.3708	0.1417	0.3916	0.0316	0.1885	0.1639	2.817	0.037

73	214.6492	0.3502	0.0016	0.109	0.002	43.0224	85.8135	1.228	0.274
74	6.1295	0.3091	0.0743	1.0443	0.0324	1.5179	2.3342	1.593	0.172
75	0.2915	0.1659	0.0146	0.0015	0.1063	0.116	0.1066	2.666	0.045
76	1.0206	0.0698	0.0067	0.0145	0.1276	0.2478	0.3888	1.561	0.179
77	4.2719	0.0696	0.3222	0.0757	0.9529	1.1385	1.5994	1.744	0.142
78	11.158	0.0147	0.0383	0.0217	0.4311	2.3328	4.4154	1.294	0.252
79	1.8423	0.5083	1.2693	0.2973	0.0269	0.7888	0.6696	2.886	0.034
80	0.0006	0.9078	0.2314	0.186	0.07	0.2792	0.3248	2.105	0.089
81	0.6219	0.1468	0.3364	0.0009	0.1102	0.2432	0.2181	2.732	0.041
82	1.4733	0.0933	0.0766	0.039	0.0496	0.3464	0.5638	1.505	0.193
83	0.235	0.2919	0.132	0.1195	0.2447	0.2046	0.0673	7.444	0.001
84	2.9286	0.1434	0.3916	0.2655	0.2287	0.7916	1.0715	1.81	0.13
85	0.1761	0.0454	0.0218	0.1182	0.1846	0.1092	0.0663	4.038	0.01
86	4.0701	0.0088	0.0245	0.2514	0.0459	0.8801	1.5974	1.35	0.235
87	0.1415	0.0364	0.0679	0.089	0.0031	0.0676	0.047	3.521	0.017
88	4.0063	0.0065	0.365	0.0089	0.1631	0.91	1.5537	1.435	0.211
89	1.1965	0.1299	0.0001	0.1074	0.6134	0.4095	0.4468	2.245	0.075
90	2.8722	0.0613	0.072	2.8798	0.4587	1.2688	1.3201	2.354	0.065

## Appendix VI: Cumulative Average Abnormal Returns

Day	2009		2010		2011		2012	
	AAR	CAR	AAR	CAR	AAR	CAR	AAR	CAR
-90	0.785	0.785	5.178	5.178	-2.439	-2.439	0.045	0.045
-89	0.537	1.322	7.027	12.205	0.483	-1.956	-4.013	-3.969
-88	-0.512	0.809	2.946	15.151	0.497	-1.458	-2.409	-6.377
-87	0.894	1.703	-4.327	10.824	0.612	-0.847	0.453	-5.925
-86	-0.33	1.373	-0.595	10.228	0.733	-0.113	3.046	-2.879
-85	0.164	1.537	1.928	12.156	1.106	0.993	-0.461	-3.339
-84	-0.089	1.448	5.244	17.4	0.515	1.508	1.524	-1.815
-83	0.858	2.306	8.111	25.512	0.703	2.211	0.004	-1.811
-82	0.493	2.799	-3.765	21.747	-2.088	0.123	0.767	-1.044
-81	0.447	3.246	-4.048	17.698	-0.963	-0.839	-2.227	-3.271
-80	-0.164	3.083	0.766	18.465	-0.575	-1.414	1.844	-1.427
-79	-0.77	2.312	1.649	20.114	-3.278	-4.692	0.72	-0.707
-78	0.866	3.178	1.85	21.964	-0.152	-4.844	0.212	-0.495
-77	1.202	4.38	1.741	23.705	-2.348	-7.192	-0.772	-1.267
-76	-0.006	4.375	1.636	25.341	1.204	-5.988	0.835	-0.432
-75	-0.061	4.313	1.922	27.263	0.028	-5.96	-0.473	-0.905
-74	-0.845	3.468	3.295	30.558	-0.37	-6.33	-1.707	-2.612
-73	0.182	3.65	2.201	32.759	0.176	-6.154	-5.237	-7.849
-72	1.218	4.868	0.856	33.615	0.946	-5.208	4.094	-3.755
-71	0.193	5.061	0.896	34.51	1.066	-4.142	-2.361	-6.116
-70	3.642	8.703	2.307	36.817	0.677	-3.466	-0.257	-6.373
-69	1.785	10.488	1.994	38.81	5.163	1.697	0.618	-5.755
-68	-0.33	10.158	-1.113	37.698	6.443	8.14	2.822	-2.933
-67	0.634	10.792	1.963	39.661	5.077	13.217	-0.938	-3.871
-66	0.364	11.156	-0.106	39.554	8.534	21.752	-0.402	-4.274
-65	0.118	11.274	-1.14	38.414	6.67	28.421	-0.922	-5.196
-64	0.46	11.733	0.588	39.003	1.28	29.702	-0.286	-5.482
-63	1.53	13.264	-1.351	37.652	4.177	33.879	-0.781	-6.263
-62	0.314	13.577	8.996	46.647	2.287	36.166	2.593	-3.67
-61	0.757	14.334	9.318	55.965	6.337	42.503	-4.965	-8.634
-60	2.36	16.694	29.129	85.094	8.19	50.693	-3.526	-12.16
-59	-1.161	15.533	-9.695	75.4	-22.672	28.02	1.764	-10.396
-58	0.034	15.567	-9.101	66.299	-5.216	22.804	1.617	-8.779
-57	0.254	15.821	-6.969	59.329	-2.361	20.444	0.886	-7.893

-56	0.5	16.321	-5.09	54.239	-2.035	18.409	0.433	-7.46
-55	-0.232	16.089	2.418	56.657	0.175	18.584	-0.644	-8.104
-54	0.061	16.15	-2	54.657	-1.418	17.166	-0.522	-8.626
-53	0.688	16.838	1.7	56.357	-3.09	14.076	0.678	-7.948
-52	-0.315	16.523	-1.346	55.012	-0.548	13.528	0.229	-7.719
-51	0.113	16.636	-3.52	51.491	0.722	14.249	-0.335	-8.054
-50	0.085	16.72	1.07	52.562	-2.527	11.723	1.12	-6.934
-49	15.043	31.764	-3.52	49.042	0.267	11.99	0.591	-6.344
-48	2.896	34.66	-2.789	46.253	1.83	13.82	1.829	-4.515
-47	0.734	35.394	1.039	47.292	-0.811	13.009	0.07	-4.445
-46	-1.118	34.276	-0.186	47.106	0.549	13.559	0.215	-4.23
-45	-2.009	32.267	1.128	48.234	-3.81	9.749	0.492	-3.738
-44	-3.258	29.009	0.904	49.138	1.314	11.062	-0.263	-4.001
-43	-1.422	27.587	-2.187	46.951	-7.562	3.5	0.976	-3.026
-42	0.026	27.613	-3.659	43.291	3.229	6.729	0.772	-2.254
-41	-0.659	26.953	1.507	44.798	3.893	10.622	-0.053	-2.307
-40	-1.386	25.567	2.653	47.451	1.858	12.48	0.353	-1.954
-39	0.451	26.018	3.801	51.253	-2.439	10.041	-0.619	-2.572
-38	-1.545	24.473	-3.255	47.998	-4.2	5.841	-0.922	-3.494
-37	-0.36	24.113	-0.054	47.944	-0.991	4.85	-0.615	-4.109
-36	-0.427	23.686	0.734	48.678	-1.051	3.799	0.897	-3.212
-35	50.189	73.876	-1.542	47.136	1.748	5.548	0.534	-2.678
-34	3.515	77.391	0	47.136	-4.055	1.492	-0.168	-2.847
-33	1.368	78.759	-0.621	46.515	-0.068	1.424	-0.586	-3.433
-32	-0.548	78.211	0.467	46.982	1.801	3.225	-3.036	-6.469
-31	-16.738	61.472	-0.886	46.096	-0.786	2.439	-1.789	-8.259
-30	-0.517	60.956	-0.59	45.505	-0.942	1.497	-0.942	-9.2
-29	0.785	0.785	5.178	5.178	-2.439	-2.439	0.045	0.045
-28	0.537	1.322	7.027	12.205	0.483	-1.956	-4.013	-3.969
-27	-0.512	0.809	2.946	15.151	0.497	-1.458	-2.409	-6.377
-26	0.894	1.703	-4.327	10.824	0.612	-0.847	0.453	-5.925
-25	-0.33	1.373	-0.595	10.228	0.733	-0.113	3.046	-2.879
-24	0.164	1.537	1.928	12.156	1.106	0.993	-0.461	-3.339
-23	-0.089	1.448	5.244	17.4	0.515	1.508	1.524	-1.815
-22	0.858	2.306	8.111	25.512	0.703	2.211	0.004	-1.811
-21	0.493	2.799	-3.765	21.747	-2.088	0.123	0.767	-1.044
-20	0.447	3.246	-4.048	17.698	-0.963	-0.839	-2.227	-3.271
-19	-0.164	3.083	0.766	18.465	-0.575	-1.414	1.844	-1.427



-18	-0.77	2.312	1.649	20.114	-3.278	-4.692	0.72	-0.707
-17	0.866	3.178	1.85	21.964	-0.152	-4.844	0.212	-0.495
-16	1.202	4.38	1.741	23.705	-2.348	-7.192	-0.772	-1.267
-15	-0.006	4.375	1.636	25.341	1.204	-5.988	0.835	-0.432
-14	-0.061	4.313	1.922	27.263	0.028	-5.96	-0.473	-0.905
-13	-0.845	3.468	3.295	30.558	-0.37	-6.33	-1.707	-2.612
-12	0.182	3.65	2.201	32.759	0.176	-6.154	-5.237	-7.849
-11	1.218	4.868	0.856	33.615	0.946	-5.208	4.094	-3.755
-10	0.193	5.061	0.896	34.51	1.066	-4.142	-2.361	-6.116
-9	3.642	8.703	2.307	36.817	0.677	-3.466	-0.257	-6.373
-8	1.785	10.488	1.994	38.81	5.163	1.697	0.618	-5.755
-7	-0.33	10.158	-1.113	37.698	6.443	8.14	2.822	-2.933
-6	0.634	10.792	1.963	39.661	5.077	13.217	-0.938	-3.871
-5	0.364	11.156	-0.106	39.554	8.534	21.752	-0.402	-4.274
-4	0.118	11.274	-1.14	38.414	6.67	28.421	-0.922	-5.196
-3	0.46	11.733	0.588	39.003	1.28	29.702	-0.286	-5.482
-2	1.53	13.264	-1.351	37.652	4.177	33.879	-0.781	-6.263
-1	0.314	13.577	8.996	46.647	2.287	36.166	2.593	-3.67
0	0.757	14.334	9.318	55.965	6.337	42.503	-4.965	-8.634
1	2.36	16.694	29.129	85.094	8.19	50.693	-3.526	-12.16
2	-1.161	15.533	-9.695	75.4	-22.672	28.02	1.764	-10.396
3	0.034	15.567	-9.101	66.299	-5.216	22.804	1.617	-8.779
4	0.254	15.821	-6.969	59.329	-2.361	20.444	0.886	-7.893
5	0.5	16.321	-5.09	54.239	-2.035	18.409	0.433	-7.46
6	-0.232	16.089	2.418	56.657	0.175	18.584	-0.644	-8.104
7	0.061	16.15	-2	54.657	-1.418	17.166	-0.522	-8.626
8	0.688	16.838	1.7	56.357	-3.09	14.076	0.678	-7.948
9	-0.315	16.523	-1.346	55.012	-0.548	13.528	0.229	-7.719
10	0.113	16.636	-3.52	51.491	0.722	14.249	-0.335	-8.054
11	0.085	16.72	1.07	52.562	-2.527	11.723	1.12	-6.934
12	15.043	31.764	-3.52	49.042	0.267	11.99	0.591	-6.344
13	2.896	34.66	-2.789	46.253	1.83	13.82	1.829	-4.515
14	0.734	35.394	1.039	47.292	-0.811	13.009	0.07	-4.445
15	-1.118	34.276	-0.186	47.106	0.549	13.559	0.215	-4.23
16	-2.009	32.267	1.128	48.234	-3.81	9.749	0.492	-3.738
17	-3.258	29.009	0.904	49.138	1.314	11.062	-0.263	-4.001
18	-1.422	27.587	-2.187	46.951	-7.562	3.5	0.976	-3.026
19	0.026	27.613	-3.659	43.291	3.229	6.729	0.772	-2.254

20	-0.659	26.953	1.507	44.798	3.893	10.622	-0.053	-2.307
21	-1.386	25.567	2.653	47.451	1.858	12.48	0.353	-1.954
22	0.451	26.018	3.801	51.253	-2.439	10.041	-0.619	-2.572
23	-1.545	24.473	-3.255	47.998	-4.2	5.841	-0.922	-3.494
24	-0.36	24.113	-0.054	47.944	-0.991	4.85	-0.615	-4.109
25	-0.427	23.686	0.734	48.678	-1.051	3.799	0.897	-3.212
26	50.189	73.876	-1.542	47.136	1.748	5.548	0.534	-2.678
27	3.515	77.391	0	47.136	-4.055	1.492	-0.168	-2.847
28	1.368	78.759	-0.621	46.515	-0.068	1.424	-0.586	-3.433
29	-0.548	78.211	0.467	46.982	1.801	3.225	-3.036	-6.469
30	-16.738	61.472	-0.886	46.096	-0.786	2.439	-1.789	-8.259
31	-0.517	60.956	-0.59	45.505	-0.942	1.497	-0.942	-9.2
32	0.785	0.785	5.178	5.178	-2.439	-2.439	0.045	0.045
33	0.537	1.322	7.027	12.205	0.483	-1.956	-4.013	-3.969
34	-0.512	0.809	2.946	15.151	0.497	-1.458	-2.409	-6.377
35	0.894	1.703	-4.327	10.824	0.612	-0.847	0.453	-5.925
36	-0.33	1.373	-0.595	10.228	0.733	-0.113	3.046	-2.879
37	0.164	1.537	1.928	12.156	1.106	0.993	-0.461	-3.339
38	-0.089	1.448	5.244	17.4	0.515	1.508	1.524	-1.815
39	0.858	2.306	8.111	25.512	0.703	2.211	0.004	-1.811
40	0.493	2.799	-3.765	21.747	-2.088	0.123	0.767	-1.044
41	0.447	3.246	-4.048	17.698	-0.963	-0.839	-2.227	-3.271
42	-0.164	3.083	0.766	18.465	-0.575	-1.414	1.844	-1.427
43	-0.77	2.312	1.649	20.114	-3.278	-4.692	0.72	-0.707
44	0.866	3.178	1.85	21.964	-0.152	-4.844	0.212	-0.495
45	1.202	4.38	1.741	23.705	-2.348	-7.192	-0.772	-1.267
46	-0.006	4.375	1.636	25.341	1.204	-5.988	0.835	-0.432
47	-0.061	4.313	1.922	27.263	0.028	-5.96	-0.473	-0.905
48	-0.845	3.468	3.295	30.558	-0.37	-6.33	-1.707	-2.612
49	0.182	3.65	2.201	32.759	0.176	-6.154	-5.237	-7.849
50	1.218	4.868	0.856	33.615	0.946	-5.208	4.094	-3.755
51	0.193	5.061	0.896	34.51	1.066	-4.142	-2.361	-6.116
52	3.642	8.703	2.307	36.817	0.677	-3.466	-0.257	-6.373
53	1.785	10.488	1.994	38.81	5.163	1.697	0.618	-5.755
54	-0.33	10.158	-1.113	37.698	6.443	8.14	2.822	-2.933
55	0.634	10.792	1.963	39.661	5.077	13.217	-0.938	-3.871
56	0.364	11.156	-0.106	39.554	8.534	21.752	-0.402	-4.274
57	0.118	11.274	-1.14	38.414	6.67	28.421	-0.922	-5.196

58	0.46	11.733	0.588	39.003	1.28	29.702	-0.286	-5.482
59	1.53	13.264	-1.351	37.652	4.177	33.879	-0.781	-6.263
60	0.314	13.577	8.996	46.647	2.287	36.166	2.593	-3.67
61	0.757	14.334	9.318	55.965	6.337	42.503	-4.965	-8.634
62	2.36	16.694	29.129	85.094	8.19	50.693	-3.526	-12.16
63	-1.161	15.533	-9.695	75.4	-22.672	28.02	1.764	-10.396
64	0.034	15.567	-9.101	66.299	-5.216	22.804	1.617	-8.779
65	0.254	15.821	-6.969	59.329	-2.361	20.444	0.886	-7.893
66	0.5	16.321	-5.09	54.239	-2.035	18.409	0.433	-7.46
67	-0.232	16.089	2.418	56.657	0.175	18.584	-0.644	-8.104
68	0.061	16.15	-2	54.657	-1.418	17.166	-0.522	-8.626
69	0.688	16.838	1.7	56.357	-3.09	14.076	0.678	-7.948
70	-0.315	16.523	-1.346	55.012	-0.548	13.528	0.229	-7.719
71	0.113	16.636	-3.52	51.491	0.722	14.249	-0.335	-8.054
72	0.085	16.72	1.07	52.562	-2.527	11.723	1.12	-6.934
73	15.043	31.764	-3.52	49.042	0.267	11.99	0.591	-6.344
74	2.896	34.66	-2.789	46.253	1.83	13.82	1.829	-4.515
75	0.734	35.394	1.039	47.292	-0.811	13.009	0.07	-4.445
76	-1.118	34.276	-0.186	47.106	0.549	13.559	0.215	-4.23
77	-2.009	32.267	1.128	48.234	-3.81	9.749	0.492	-3.738
78	-3.258	29.009	0.904	49.138	1.314	11.062	-0.263	-4.001
79	-1.422	27.587	-2.187	46.951	-7.562	3.5	0.976	-3.026
80	0.026	27.613	-3.659	43.291	3.229	6.729	0.772	-2.254
81	-0.659	26.953	1.507	44.798	3.893	10.622	-0.053	-2.307
82	-1.386	25.567	2.653	47.451	1.858	12.48	0.353	-1.954
83	0.451	26.018	3.801	51.253	-2.439	10.041	-0.619	-2.572
84	-1.545	24.473	-3.255	47.998	-4.2	5.841	-0.922	-3.494
85	-0.36	24.113	-0.054	47.944	-0.991	4.85	-0.615	-4.109
86	-0.427	23.686	0.734	48.678	-1.051	3.799	0.897	-3.212
87	50.189	73.876	-1.542	47.136	1.748	5.548	0.534	-2.678
88	3.515	77.391	0	47.136	-4.055	1.492	-0.168	-2.847
89	1.368	78.759	-0.621	46.515	-0.068	1.424	-0.586	-3.433
90	-0.548	78.211	0.467	46.982	1.801	3.225	-3.036	-6.469