INTERRELATIONSHIP OF SIZE EFFECT AND JANUARY EFFECT AT THE NAIROBI STOCK EXCHANGE (NSE): AN EMPIRICAL INVESTIGATION

BY

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DECLARATION

This research project is my original work and has not been presented for a degree in any other university.

Signed........................................... Date........................

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This research project has been submitted for examination with my approval as university supervisor.

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DEDICATION
This study is dedicated to my immediate family and all the staff at KASNEB for their practical support and encouragement. God bless you all.
ACKNOWLEDGEMENT

The successful completion of this project is the culmination of the combined effort, assistance and input of many people who in various ways selflessly gave me their support as I undertook the research and wrote this project.

I wish to express gratitude to my family for their encouragement and constant support shown during my study for the Master of Business Administration (MBA) programme at the University of Nairobi.

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ABBREVIATIONS

ANOVA- Analysis of Variance
BSE- Brussels Stock Exchange
CAPM- Capita Assets Pricing Model
CRPS- Centre for Research and Security Prices
EMH- Efficient Market Hypothesis
FTAS- Financial Times Actuaries All Shares
FTO- Financial Times Ordinary
JSE- Johannesburg Stock Exchange
LSE- London Stock Exchange
ME- Market Equity
MSE- Madrid Stock Exchange
NSE- Nairobi Stock Exchange
NYSE- New York Stock Exchange
OLS- Ordinary Least Squares
P/E- Price Earning
PSE- Paris Stock Exchange
S&P- Standard and Poors
U.S.A- United States of America
UK- United Kingdom
ABSTRACT

Seasonality in stock returns has been of great importance to financial scholars and practitioners. The size effects indicate that the stocks returns are a decreasing function of firm size whereas the January effect is situation where stock returns in January are higher than the average return in any other month.

The objective of the study was to establish whether there is any interrelationship between size and January effect at the NSE. To facilitate the attainment of the objective of this study, data was collected from the NSE in form of monthly stock prices for the period 1 January 1999 to 31 December 2006. The Chi-squared and Mann-Whitney U testes were used to find out whether there was any significant difference between the two effects.

From the study it was found that there was no significant relationship between the size effect and January effect at the NSE. This is inconsistent with the findings from other stock markets. This could mean that the NSE is an efficient market at least in the weak form. The implication of the findings is that no investor is better off or worse off on average by choosing to invest in either small or large sized companies in January or in any other month of the year.
CHAPTER ONE

INTRODUCTION

1.0

1.1 BACKGROUND

Seasonality in stock returns has been of great importance to financial scholars and practitioners. Investors attach a lot of importance to stock prices hence knowledge in this area enables them make informed decisions. Certain empirical regularities in the stock market are well known among investment professionals. Because these regularities cannot be explained by any of the currently known asset pricing models, they are referred to as anomalies (Sharpe, Alexander and Bailey, 2005). These anomalies have been regarded as strong evidence against Efficient Market Hypothesis (EMH) in financial economics (Fama, 1970). The EMH requires that risk and its proxies be the only factors determining stock returns. However, evidence has shown that other factors have significant effect on stock returns. Basu (1977) found a positive relationship between P/E ratios and stock returns. Fama and French (1992) document two factors, market equity (ME) and the ratio of book equity to market equity (BE/ME) capture much of the cross-section of average equity returns.

1.1.1 Size Effect

The size effect indicates that stock returns are a decreasing function of firm size such that larger firm stocks have lower returns than smaller firm stocks. Thus, the size of a firm and the return on its common stock are inversely related (Annaert and Combez, 2002). Naturally, the distribution of earnings should be considered when attempting to explain the size effect.
Small companies are more concerned with building equity and gaining market share than large companies are. As a result, their earnings are distributed differently. A small company is more likely to reinvest its earnings back to the company causing the retained earnings to grow faster and increasing the value of common stock. However, a large company is more likely to use its earnings in ways that generally do not increase the value of its common stock. Paying dividends to preferred stockholders is one example. Since large companies are retaining a smaller percentage of their earnings than the small firms, the common stock is returning less to its owners (Moore, 2005).

1.1.2 January Effect
The January effect or turn-of-the-year effect is a situation where stock returns in January are higher than the average return in any other month (Riepe, 2001). The most popular explanation for high January returns is the tax-loss selling hypothesis. Investors experiencing losses sell stock in December to qualify for the tax-loss and then buy in January. Thus, stocks experiencing capital losses should have their prices driven down in December and driven up in January; Dyl (1977), Givoly and Oradia (1983), Brown et al (1983), Jacobs and Levi (1988), Ogden (1990), Griffiths and White (1993), Grinblatt and Moskowitz (1999). In Kenya, it is probable that the need for cash increase at the end of the year due to school fees and other commitments that are heaviest in January the following year. This may induce investors to dispose of their stocks in December and January thus lowering the prices in these months.

Various studies have suggested that January effect may arise from the prevalence of end of year “window dressing” by professional investors seeking to eliminate embarrassing losers from their portfolios prior to the end of important reporting periods.
This asserts that some professional money managers wish to sell those stocks that have performed poorly during the past year in order to avoid their appearance on end-year reports (Rathinasamy and Matripragada, 1996).

A related statistical explanation for the January effect is commonly referred to as the “data-snooping hypothesis”. This asserts that much if not all of the January effect may be a statistical artifact tied to investment period selection. Historically brief advantages for investing during January may simply represent the type of unexplainable pattern in stock market returns that can be uncovered by diligent data snooping (Lo and Mac Kinlay, 1990).

1.1.3 Interrelationship of Size and January Effects

Having observed that small firms have higher returns than large firms and that returns are higher in January than in any other months of the year, one might wonder whether these two effects are related. Size effect was first shown to be related to the January effect by Banz (1981), Reinganum (1983), Keim (1983) and subsequently by Rathinasamy and Matripragada (1996). Keim (1983) documented a strong relation between January returns and firm size concluding that the size effect is concentrated in the first five trading days of January. He referred the anomaly to as turn-of-the-year effect. In New York Stock Exchange (NYSE) and Belgium Stock Exchange; the returns are high in January. This can be attributed to the fiscal year ending in December, while in London Stock Exchange (LSE), the return is significantly high in April because the fiscal year ends in March (Jegadeesh, 1990).

A possible explanation of the existence of interrelationship between size and January effects is that small stocks may be relatively riskier in January than during the rest of the year. If they are, they should have a relatively higher return in January.
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A study finding that betas of small stocks tend to increase at the beginning of the year lends support to this explanation (Rogalski and Tinic, 1986).

In a study carried out by Rathinasamy and Matripragada (1996) to investigate the interrelationship of size and January effects, the findings revealed that both risk and return are higher for small firms in January but the return is much higher than what is warranted by the extra risk involved.

More recently, Jacobsen, Mamun and Visaltanachoti (2005) carried out a study to investigate the interaction between the January effect on portfolios formed on the basis of size. In their findings, the January effect plays an important role in explaining the small firm effect.

This research aims to study the interrelationship between size and January effects which has been documented in many stock exchange markets in the developed economies but has not been studied at the Nairobi Stock Exchange (NSE).

1.2 STATEMENT OF THE RESEARCH PROBLEM

Investors are not guaranteed “good” returns simply because the firm’s earning power has grown. Rather, the month in question can also influence the investors’ returns (Chen, 2001). Knowledge of the market seasonalties is of great importance to investors since such knowledge would signal the right time to buy or sell stocks. It is important for the investors to understand the stock market seasonalties to be able to take advantage of them. In the real world, stock markets are not perfect, which
provide a fertile ground for stock return seasonality caused by market imperfections (Sharpe, Alexander and Bailey, 2005).

Related studies investigating stock market anomalies in Kenya have been focused on stock market seasonality (Kingori, 1995), turn of the month and January effects (Kamau, 2003), and the size effect at the NSE (Oluoch, 2003). However, no study has yet been undertaken at the NSE to investigate whether there is any interrelationship between size and January effects.

Kamau (2003) in his study examined the January effect at the NSE and in his findings; the January effect was not a prevalent phenomenon in the period covered (1995-2003). In his analysis, he did not classify the firms studied in terms of size. This research thus aims to investigate as to whether the results will be any different when the sizes of the firms are taken into account and using a more recent period.

Oluoch (2003) in his study aimed to determine whether size effect is experienced at the NSE. The study failed to predict any existence or prevalence of the anomaly in the market. Oluoch (2003) in his study did not analyse the returns of small and large firms on a monthly basis. This research will thus provide evidence as to whether the results will be different if the January effect is put into consideration.

Keim (1983) in his study, analysed the interrelationship of size and January effects at the NYSE. The result of the study was that the size effect was more pronounced in January in the market. Rathinasamy and Matripragada (1996) re-examined the January effect, small firm effect and the small firm January effect using data from the Centre for Research in Security Prices. The results showed that there was a January effect even after adjusting for risk and small firms do generate abnormal returns.
More recently, Jacobsen, Mamun and Visaltanachoti (2005) carried out a study to investigate the interaction between the January effect on portfolios formed on the basis of size. In their findings, the January effect plays an important role in explaining the small firm effect.

This research will be of importance since it will indicate when it advantageous to place a buy or sell order of a company’s stock depending on the size of the company. Firstly, the various studies done to investigate the interrelationship of size and January effects were performed in developed stock markets, it is imperative to try and analyse whether the same interrelationship exists at the NSE.

Secondly, although these regularities have been found to exist in the past and in some instances for long periods of time and in several foreign markets, there is no guarantee that they will continue to exist in the future. Thus, this study aims to investigate as to whether the interrelationship is also prevalent at the NSE and for a more recent period relative to the related past studies. It thus aims at answering the question; are the size effect and the January effect related at the NSE?

1:3 OBJECTIVE OF THE STUDY

To establish whether the size effect and the January effect are related at the NSE.

1.4 HYPOTHESES

In order to study this problem, the study will test the following hypotheses:

Ho: There is no significant relationship between size effect and January effect.

Ha: There is significant relationship between size effect and January effect.
1.5 JUSTIFICATION OF THE STUDY

The findings of the study will be of benefit to the following groups of people among others:

1. Investors- A rational investor generally considers various parameters before making any investment decision. An investor will thus be interested in performance of company returns in relation to its size and month of the year. This study will assist investors to know the best month to sell or buy stocks of small or large firms. If the interrelationship of size and January effects holds at the NSE as stated by Keim (1983), then stocks of small firms are to be purchased in late December or somewhat earlier and stocks of large firms are to be purchased in early February or somehow later.

2. Stock brokers and dealers - knowledge of such crucial information on stock prices may assist the stock brokers and dealers to plan well on when to trade and get abnormal returns and when to hold in order to maximise their returns. This study will thus provide information as to when it will be profitable for stockbrokers and dealers to buy or sell stocks of small or large firms.

3. Management- Is responsible for the day to day running the company. The actions of the management may be affected either positively or negatively by the seasonality of the company stock. This study will provide management of firms with information as to when it will be most profitable to issue out new stock depending on the size of the firm.

4. The Government- As a regulator would be able to monitor the performance of the stock market which will provide a signal of economic stability of the country.

5. Scholars- The study can be used as a basis for further research on the subject. The study will also add to the body of knowledge in the finance discipline.
CHAPTER TWO

LITERATURE REVIEW

2.1 EFFICIENT MARKET HYPOTHESIS

The simplest explanation of efficient market hypothesis (EMH) is that securities prices reflect all information. Fama (1970) made a distinction between three forms of EMH; the weak form, the semi-strong form and the strong form. The strong form suggests that securities prices reflect all available information, even private information. The semi strong form of EMH asserts that the security prices reflect all publicly available information. There are no undervalued or over valued securities and thus trading rules are incapable of providing superior returns. When new information is released, it is fully incorporated in the price rather speedily. The weak form of the hypothesis suggests that past prices on returns reflect future prices of securities. However, the strong form has formed the basis for most empirical research.

The EMH became controversial especially after the detection of certain anomalies in the capital markets. There continues to be disagreement on the degree of market efficiency. The maintained hypothesis of the EMH also stimulated a number of studies that looked among other things, at the reaction of the stock market to the announcement of various events such as earnings (Ball & Brown, 1968), capital expenditure (Mc Connell and Muscarella, 1985), and takeovers (Jensen and Ruback, 1983). In general, the typical results from the event studies showed that security prices seemed to adjust to new information within a day of the event announcement, and inference that is consistent with EMH.
seemed to adjust to new information within a day of the event announcement, and inference that is consistent with EMH.

In efficient markets, prices are random, so no investment pattern can be discerned (Fama, 1991). A planned approach to investment therefore cannot be successful.

Even though there is considerable evidence regarding the existence of efficient markets (Grossman and Stiglitz, 1980), one has to bear in mind that there are no universally accepted definitions of crucial terms such as abnormal returns, economic value and even the null hypothesis of market efficiency. Critics of EMH (La Porta, Lakonishok, Shliefer and Vishny, 1997) argue that the predictability of stock returns reflects the psychological factors, social movements, noise trading and fashions or "fads" of irrational investors in a speculative market. Various anomalies and inconsistent results call for refinement of the existing paradigm.

Studies in behavioral finance which look into the effects of investor psychology on stock prices also reveal that there are some predictable patterns in the stock market (Hirshleifer and Shumway, 2001). Investors tend to buy undervalued stock and sell overvalued stock and in a market of many participants, the result can be anything but efficient (Fama, 1970).

2.2 MARKET ANOMALIES

The EMH became controversial especially after the detection of certain anomalies in the capital markets. Some of the main anomalies that have been identified are as follows:

2.2.1 Time of the day (hourly) effect

This anomaly asserts that stock returns are dependent on the time of the day. Several studies have been undertaken to test the hourly effect. Wood et al (1985) did a study on the stock return behavior using minute by
minute return series on the New York Stock Exchange (NYSE). The research examined two periods as follows:

i. Six months from September 1971 to February 1972 and
ii. Calendar year 1982

The index comprised of 946 and 1138 common stocks respectively for the two periods. In computing the minute returns, prices were adjusted for dividends and changes in capitalisation. The study found that the mean market return is higher during the first few minutes of trading for 1971 - 1972 period. In both samples periods, all positive returns were earned during the first 30 minutes of trading and at the close of the market. Hence, the minute-by-minute trading had a U-shape.

In another study, Lockwood and Linn (1990) examined the variance of the hourly market return in U.S.A and reported similar findings. The researchers computed returns from opening, closing and in trading hourly values of the Dow Jones industrial average from January 1964 to February 1989. Days immediately following were excluded in the analysis. Also days when the NYSE closes early or trading was halted were excluded from the analysis. The results showed that the hourly variances followed a U - Shape falling from the opening hour until the afternoon and rising thereafter.

2.2.2 Day-of-the-week (Daily) effect

This asserts that stock returns depend on the particular day of the week. One of the well known studies in this area is the study by Gibbons and Hess (1981). They used data on the standard and Poor’s 500 (hereafter referred to as S & P 500) and Centre for Research and Security prices (CRSP) daily indices in U.S.A. They used a regression model to test the day-of-the-week effect (the coefficients of the equation being the mean returns for Monday to Friday). A dummy variable was used to identify the day on which the observation fell.
The researchers found that the two indices exhibited a day-of-the-week effect with strong and persistent negative mean returns on Monday. It has been suggested that small issues tend to trade more frequently on Friday than any other day of the week. This leads to a high mean return on Friday and a low mean return on Monday. This explanation was tested by Gibbons and Hess (1981) on 30 individual securities of Dow Jones firms. The researchers found that the negative Monday effects were not limited to a few stocks. All 30 actively traded securities exhibited a negative mean on Monday.

In another study, Lakonishok and Levi (1982) did a research on the weekend effects on U.S. A stock returns. The study used the daily stock market returns from opening to closing prices on the CRSP tape from the period July 1962 to December 1979. They used two market indices; the CRSP equally weighted and the CRSP value weighted indices. The results of the study were that the unadjusted returns on Mondays were negative while returns on Fridays were positive. However, when the daily returns were also adjusted for the interest rates and holiday effect, the extra return of Fridays was small and the abnormal low return on Monday was reduced but the adjusted returns still showed the daily effects. In addition, the research found that Wednesday returns were positive and abnormally high for the entire period of the study. The researchers attributed this return behavior to the settlement pattern. Transactions initiated on a Friday will normally take longer to be completed due to the weekend days. The seller seeks compensation for the two days delay by way of a higher price on Friday deals than on other trading days. This would explain the above average returns of Fridays.

More evidence on daily seasonality on stock returns was provided by Keim and Stambaugh, (1984).
The study used C&P Composite Index and 30 individual stocks in the Dow Jones Industrial Index and it covered a 55-year period from 1928 to 1982. The study found consistently negative Monday returns. Wednesday reported the highest returns followed by Friday. In addition, for the period 1928 to 1952 when NYSE also traded on Saturday, the results also showed large average returns for Saturday. The results for the entire period suggested a tendency for higher returns on the last trading day of the week whether the last day was a Friday or a Saturday and consistently negative returns on Monday, the first trading day of the week.

Theobald and Price (1984) looked at the seasonality of daily (index) returns in United Kingdom. The levels of financial Times Ordinary (FTO) and Financial Times Actuaries All Share (FTAS) indices were collected on a daily basis form June 1975 to May 1981. The Kruskal – Wallis test was used to test the differential impact of seasonality in the indices. The Mann Whitney U-test was also used for the pair wise comparisons (that is Monday with Tuesday, Monday with Wednesday e.t.c). The results were that there was presence of seasonality in the United Kingdom daily index returns data. Further, the results revealed evidence of a significant difference in Monday's mean returns with other days mean returns. For both indices, Monday mean returns were negative and the highest mean returns were recorded on Tuesday, Wednesday and Friday.

Further evidence by Rogalski (1984) confirmed the findings of Keim and Stambaugh. The data used was the New York Stock Exchange Composite Index Value obtained as of 10:15 am and 4:00 pm every trading day form October 1974 to 9th December 1983 and the opening and closing S & P 500 index values for 29 December 1978 to 9 December 1983. F tests were used to test equality of close to close mean returns across days of the week.
The researcher reported that the Monday returns for the NYSE and S&P 500 indices were on average negative. In addition, the study concluded that the Monday effect was actually a weekend effect.

More recently, Lee et al (1990) have provided international evidence in support of the daily seasonal on Asian stock markets plus the U.S.A market. The Asian markets studied were Korea, Taiwan, Singapore, Hong King and Japan. The data collected was daily closing prices over nine years from January 1980 to December 1988 and tests using dummy variable regression were done. The results of the study indicated there was a strong and persistent day-of-the-week effect in most Asian markets. Specifically, Monday returns were negative in all markets except Korea and were less positive (lower) than in all other days that recorded positive returns. Wednesday and Friday returns ranked first and second in size in all stock markets except in Korea and Taiwan. In these two markets, the Monday returns were less positive (lower) than in all other days that recorded positive returns. Wednesday and Friday returns ranked first and second in size in all stock markets except in Taiwan.

A comparative study on seasonal patterns between stocks and bond returns was done by Jordan and Jordan in 1991. Using two equity indices; the S&P 500 and an equally weighed index based on companies in the Dow Jones Composite Bond average, the researchers found that the two stocks indices exhibited their lowest returns on Monday and highest return on Wednesday and Friday. Furthermore, the Monday return was negative in both cases.

Mokua (2003) in his study carried out at the NSE aimed to establish whether the NSE exhibits the week-end effect on the securities traded there. A sample of 43 equity stocks traded at the NSE were tested for equality (or differences) between the sample mean returns.
Monday and Friday mean returns were computed and then tested for variations using the independent samples tests and regression method. The results of the study showed that the NSE mean stock returns are equal over the days of the week.

2.2.3 Weekly seasonal effect
Muragu (1990) examined the weekly price movements at the NSE. His focus was on the level of market efficiency in the stock market. The study found that the random walk holds for NSE, which implies that there is no systematic pattern in weekly price movements and prices in one week are independent of prices in the proceeding week. Similar findings on NSE were provided by Kiweu (1991). Using price data collected from NSE, Kiweu calculated weekly returns and performed serial correlation (auto correlation) and the runs test on the return series. The empirical evidence showed that there were no reported patterns in share price movements.

Elsewhere, studies have revealed slightly different results. Jordan and Jordan (1991) reported that Ariel (1987) found that stock returns are higher in the first two weeks of the month than in the third and fourth weeks of the month. In their own study also on U.S.A market, Jordan and Jordan (1991) found a week-of-the-month effect which was not significant.

2.2.4 The January effect
Rozeff and Kinney (1976) were the first to document evidence of higher mean returns in January as compared to other months. Using NYSE stocks for the period 1940-1974, they found the average returns for the month of January was 3.48 per cent as compared to only 0.42 per cent for the other months. Keim (1983) found that the excess returns to small firms in January were temporarily concentrated.
He concluded that 50 percent of the returns seen in the small companies occurred during the first five trading sessions of the month.

Dyl (1977) examined the influence of capital gains on investors' market behavior. The study used a random sample of 100 common stocks selected from CRSP tape and monthly volume data was collected from January 1959 to February 1970. The results of his study indicted that there was significant trading volume in December in common stocks that depreciated during the year and abnormally low volume trading for those stocks that appreciate during the year.

Giroly and Ovadia (1983) studied the U.S.A stock market for monthly seasonal using NYSE securities recorded on CRSP tape for the period January 1945 to December 1979. The researchers used the market model to derive abnormal returns. The results showed that January had the highest average rate of return for all the 35 years covered in the study.


Corhay et al (1987) examined a sample of 1591 common stocks traded on the NYSE, London Stock Exchange (LSE), Paris Stock Exchange (PSE) and Brussels Stock Exchange (BSE) from January 1970 to December 1983. The research used dummy variable regression tests and found there is a January effect in stock market returns for all the four countries. The January mean returns were different from the returns in the other months of the year.
In addition, in the United Kingdom and France, there was also an April and July seasonal respectively. BSE returns exhibited the greatest number of monthly seasonal in January, February, June and July.

Kamau (2003) examined the January effects at the NSE during the period July 1995 through June 2003. He made use of the NSE daily closing prices. Average daily returns were computed by applying the holding period return method. In his findings, the January effect was not a prevalent phenomenon in the period covered.

2.2.5 Holiday effect
Ariel (1990) found statistically significant high returns accruing to the Centre of Research for Security Prices (CRSP) equally and value weighed indexes on trading days prior to holidays. The study employed data from the CRSP for 20 years and used 8 national days in the U.S.A. The means and variances of the two stocks indexes for these two sets of days were calculated along with a t-statistic for the difference of means. It was found that the means of the pre-holidays returns exceed the means of the non-pre holiday returns by factor of 9 and 14 for the equally and value weighted indices respectively. The study also found high stock returns predominate only the single trading day preceding holidays and not on the other days around the holiday period.

Bhana (2002) evaluated the impact of the public holiday effect on the share returns of the companies listed on the Johannesburg Stock Exchange (JSE) during the period 1975-1990. He used the analysis of variance (ANOVA) technique and 9 pre-holiday periods to determine whether or not the holiday effect has an influence on share returns of companies listed on the JSE. His study finds high mean returns accruing to the JSE Overall Actuaries Index on the trading day prior to holidays which is statistically significant.
Rasugu (2006) in his study evaluated the impact of the holiday effect on the common share returns of companies listed on the NSE during the period 1st Jan 1998 to 1st December 2002. Daily mean returns of the days preceding holidays and other non-pre holiday days were compared.

Results showed that on a trading day prior to public holidays, mean returns were 1.6 times returns of other days. However, the results were not significant. The results thus did not support the existence of the holiday effect in the NSE.

2.2.6 Small firm effect
Banz (1981) published one of the earliest articles on the small firm effect which is also known as the “size-effect”. He studied the stocks quoted on NYSE from 1926 to 1980 period using market capitalization of the stocks. He grouped them into five equal groups and used regression analysis to estimate returns of the groups. He found that risk adjusted stocks returns are a decreasing function of firm size such that larger firms stocks have lower returns than smaller firms stocks. Thus the returns for the small firms were higher. He suggests that size may be a proxy for other factors that were not tested in his model. He pointed out the neglected firm effect as one of these.

Oluoch (2003) in his study “The small size effect in the Kenyan stock market” aimed to determine whether the small size effect is experienced in the NSE. The study utilized the firms quoted at the equity section of the NSE. The analysis used OLS regression. The study failed to detect any existence or prevalence of the anomaly at the market.

2.2.7 Price earning (P/E) ratio effect
Basu (1997) showed that stocks of companies with low P/E ratios earned a premium for investors during the period 1957-1971.
An investor who held the low P/E ratio portfolio earned higher returns than an investor who held the entire sample of stocks. These results also contradict the EMH.

Dechow, et al (2001) documented that short-sellers position themselves in stocks of firms with low earnings to price ratios since they are known to have lower future returns.

2.2.8 Over/under reaction of stock prices to earnings announcements

There is substantial documented evidence on both over and under reaction to earnings announcements. De Bondt and Thaler (1985, 1987) presented evidence that is consistent with stock prices overreacting to current changes in earnings.

They reported positive (negative) estimated abnormal stock returns for portfolios that previously generated inferior (superior) stock price and earning performance. This could be construed as the prior period stock price behavior overreacting to earnings developments (Benard, 1993).

2.2.9 Weather effect

Few would argue that sunshine puts people in a good mood. People in good moods make more optimistic choices and judgments. Hirshleifer and Shumway (2001) analysed data for 26 countries from 1982-1997 and found that stock market returns are positively correlated with sunshine in almost all of the countries studied. They however found that snow and rain have no predictive power.

2.3 EMPIRICAL STUDIES ON THE INTERRELATIONSHIP OF SIZE AND JANUARY EFFECTS

Financial market anomalies have been extensively studied and publicised yet, there still exist many seemingly predictable patterns in the markets. The January effect refers to the phenomenon that small stocks tend to yield unusually high returns in the first few days of January.
Researchers have long noticed the January effect on stock returns. Given the presence of regularities, researchers have attempted to see whether there are any interrelationships among them. For instance, is the January effect more pronounced for small firms than for large ones? The studies by Banz (1981) and Fama and French (1992) show that the previous findings on the size effect are not robust across sub-periods. The findings are that the size effect is largely driven by the January effect on all markets and the size effect on the various stock exchanges.

Keim (1983) in his study examined all NYSE listed stocks over the 17-year period of 1963-1979. At the end of each year, each firm was ranked by market capitalization (that is, the year-end market price per share times the number of common shares outstanding). Ten portfolios were then formed on the basis of size, with portfolio 1 containing the smallest 10 percent of the firms, portfolio 2 the next smallest 10 percent, and so on. Abnormal returns were calculated for each portfolio on a monthly basis over the 17-year period and averaged for each month. The findings of the study were that the size effect was more pronounced in January. Also of interest is the observation that large firms had a negative abnormal return in January. Thus, the January effect had been due primarily to the behavior of small firms and the size effect had been concentrated mainly in the month of January. Further examination revealed that the interrelationship is concentrated in the first five trading days of January.

Rathinasamy and Mantripragada (1996) in their study re-examined the well documented January effect, small firm effect and the small firm January effect.
They used data from the Centre for Research in Security Prices for 1963-1982 and computed portfolio returns, betas and variances for 20 different portfolios ranked by size for each month, average variances of daily percentage return for each month and betas of firm size portfolios by month. The results showed that there was a January effect even after adjusting for risk and small firms in January do generate abnormal returns. Both risk and return are higher for small firms in January but the return is much higher than what is warranted by the extra risk involved.

More recently, Jacobsen, Mamun and Visaltanachoti (2005) in their study investigated the interaction between the January effect on portfolios formed on size. They used data from Fama and French data library over the period 1926 to 2004. Data was collected on decile portfolio returns for all portfolios formed on size. The methodology involved analyzing all time series of (log) portfolio returns starting with the random walk model and then including a January dummy to study the interaction between these effects and the different portfolio returns. In their findings, the January effect plays an important role in explaining the small firm effect.

Attempts have been made to explain this interrelationship one of them being “tax-selling”. This explanation argues that stocks that have declined during the year have downward pressure on their prices near year-end as investors sell them to realise capital losses in order to minimise tax payments. After the end of the year, this pressure is removed and the prices jump back to their “fair” values. This explanation has been used in U.S.A (Dyl, 1977 and Chan, 1986) and Canada where the tax year ends on 31 December and in UK where the tax year ends on 21 March. A related argument asserts that some professional money managers wish to sell those stocks that have performed poorly during the past year in order to avoid their appearance on year-end reports. Such activity is often referred to as “window dressing”.

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Another possible explanation is that small stocks may be relatively riskier in January than during the rest of the year. If they are, then they should have a relatively higher average return in January.

2.4 THE SMALL FIRM EFFECT PHENOMENON

This is where small firms have higher returns on average than larger firms. Such an anomaly would affect the pricing of capital assets. Researchers have given different explanations to answer such anomaly.

a) Seasonality in stock returns

Kiem (1983) has shown that half of the small firms' effect occurs in January. The reasoning given by Kiem (1983) is that investors sell securities at the end of the year to establish short-term tax losses for tax purposes. Roll (1987) and Reinganum (1983) tested this hypothesis and found that the January effect cannot be fully explained by tax-loss selling.

b) Information content of the stock traded

Banz (1981) argued that the lack of information about small firms could cause certain investors to exclude them from their portfolios. This would lead to higher risk adjusted returns for the undesirable small firms.

c) Firm characteristic

After identifying the importance of size as a factor for pricing an asset in Fama and French (1995), they extended their work to find the relationship between size and firm earnings. They found that small firm effect is prevalent and small firms have stronger earnings than large firms.
2.5 CONCLUSION

The foregoing literature review reveals that most studies on stock markets seasonality have tended to focus on January, size, holiday, day of the week and turn of the month effects and results have been varying. While most of the empirical results on the interrelationship of size and January effects have been conducted in the stock markets outside Kenya, no such study has been undertaken at the NSE. Most studies at the NSE have been biased towards the calendar anomalies (Kingori 1995 and Mokua 2003) and size (Oluoch 2003). There is therefore need for an alternative study to give insights into the interrelationship of the size and January effects at the NSE. Such a study should be able to add to the knowledge about the NSE and other market fundamentals.

First, since the various studies done to investigate the interrelationship of size and January effects were performed in developed stock markets, it is imperative to try and analyse whether the same interrelationship exists at the NSE. Second, although these regularities have been found to exist in the past and in some instances for long periods of time and in several foreign markets, there is no guarantee that they will continue to exist in the future. Thus, this study aims to investigate as to whether the interrelationship is also prevalent at the NSE and for a more recent period relative to the related past studies.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN
The analytical research design was used in this study. The aim of the study was to provide an analysis of the interrelationship between size effect and January effect at the NSE. This could best be achieved through the use of an analytical research design. This was a cross-sectional study since it was designed to obtain information on variables in different contexts but at the same time.

3.2 POPULATION OF THE STUDY
The population of the study consisted all equity stocks listed and traded on the NSE for the period January 1, 1999 to December 31, 2006 and for whom data is available on NSE files and tapes. There were fifty four (54) companies listed at the NSE as at September 30, 2007. A list of the companies has been attached in appendix 2. The study was limited to companies quoted at the NSE and for the eight year period because of the ready availability of data. Any company which traded exclusively on preferred stock was excluded so as to ensure comparability of the companies.

3.3 SAMPLE
The sample included companies that had been consistently quoted at the Nairobi Stock exchange over the period January 1, 1999 to December 31, 2006 and for which data on stock returns was available. Forty six (46) companies satisfied the sampling criteria. Hence, the coverage of this study was 85% of the population. A list of the sampled companies is attached in appendix 3.
3.4 DATA COLLECTION
The study used quantitative, secondary data obtained from the NSE in form of monthly stock prices. Kiweu (1991) in his pilot study shows that the NSE bid prices are close to the transaction prices. Thus, this study also used daily bid prices between 1 January 1999 and 31 December 2006 as an approximation of daily transaction prices.

3.5 DATA SPECIFICATION
Size was defined as the market value of firm’s ordinary equity calculated as at December 31 of the previous year that is, year t-1. Oluoch (2003) in his pilot study entitled “the size effect in the Kenyan stock market” determined size by market capitalization at the beginning of each year. The outstanding number of shares for each company and their market prices were obtained from the NSE. Therefore, company size was determined by market capitalization at the beginning of each year (that is, market value of quoted shares x number of outstanding shares as at year t-1). The market capitalizations of the companies at the beginning of each year are attached in appendix 4.

3.6 DATA ANALYSIS METHOD
Ten equally weighted portfolios were formed on the basis of company size for each year with portfolio 1 containing the smallest 10 per cent of the firms, portfolio 2 the next smallest 10 percent and so on. Lists of the portfolios for each year are attached in appendix 4. The monthly stock prices were transformed into monthly returns using the following formula:

\[ R_{it} = \left( \frac{P_{it+1} - P_{it}}{P_{it}} \right) \]

Where:

\( R_{it} = \) Return on stock i for month t, where \( t = 1, 2 \ldots \ldots \ldots \ldots 12 \).

\( P_{it} = \) Market price of stock i at the beginning of the month.
\( p_{i+1} \) = Market price of stock \( i \) at the end of the month.

The monthly returns were used because daily returns have been shown to overstate the small firm effect (Blume, 1980). The study did not consider dividends paid in computing the returns from the stocks. Coutts (1997) concluded that it is unlikely that the exclusion of the dividend payment data invalidates the results of the anomalies studies. Further still, Lakonishock and Smidt (1988) and Draper and Pauyal (1997) concluded that any bias which occurs from not using dividend adjusted returns is so small, as to be considered negligible. This therefore justifies the use of the share prices as a measure of return as the dividend data should not impart on the statistical significance of the overall results.

The Chi-squared \( (X^2) \) test was used to find out whether there were any statistically significant differences between the actual (observed) mean returns and hypothesized (expected) mean returns of the portfolios. Jacobsen, Mamun and Visaltanachoti (2005) applied a 95 % level of confidence in their study to investigate the interaction between the January effect on portfolios formed on size. Therefore, a 95 % level of confidence was considered appropriate for this study. The Mann-Whitney U test was also used to measure equality of the January mean returns and the February to December mean returns.
CHAPTER FOUR

4.0 DATA ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION
The study analysed monthly average returns for each portfolio. The average returns were obtained by averaging the returns of the companies in the portfolios in the month t. The hypothesis for equality of average monthly returns were tested using the chi-squared and Mann-Whitney U tests.

4.2 PORTFOLIOS
The sample consisted a total of forty six (46) companies as listed in appendix 3. Ten portfolios were formed based on the sizes of the companies with portfolio 1 consisting of the smallest 10 percent of the companies, portfolio 2 the next 10 percent and so on. Size was determined using market capitalization obtained at the beginning of each year. Portfolios 1, 2, 3, 8, 9 and 10 contained a total of 5 companies each whereas portfolios 4, 5, 6 and 7 contained a total of 4 companies each. A list of the portfolios formed is attached in appendix 4. The results showed that there were no major changes in the portfolio formation over the years studied.

4.3 MONTHLY AVERAGE RETURNS
The monthly stock returns were calculated for each company and average returns for the portfolios obtained for each month from 1 January 1999 to 31 December 2006. Thereafter, averages of the average monthly returns from February to December of each year were obtained.
The summary of the average returns for the portfolios is as indicated in the table below:

**Table 4.3: Average returns for the portfolios for the month of January**

<table>
<thead>
<tr>
<th>Year</th>
<th>Portfolio Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
<td>0</td>
<td>0.0039</td>
<td>0.0085</td>
<td>0.0776</td>
<td>-0.004</td>
<td>0.0053</td>
<td>0</td>
<td>0.0177</td>
<td>0.0059</td>
<td>0.1184</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>-0.059</td>
<td>-0.155</td>
<td>-0.403</td>
<td>-0.223</td>
<td>-0.161</td>
<td>-0.289</td>
<td>-0.342</td>
<td>-0.082</td>
<td>-0.198</td>
<td>-0.048</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>-0.061</td>
<td>0.0334</td>
<td>-0.011</td>
<td>0.0879</td>
<td>0.0667</td>
<td>-0.04</td>
<td>-0.065</td>
<td>0.0256</td>
<td>-0.044</td>
<td>0.0123</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td>-0.001</td>
<td>-0.013</td>
<td>0.0058</td>
<td>-0.002</td>
<td>-0.041</td>
<td>0.0084</td>
<td>0.0443</td>
<td>-0.033</td>
<td>-0.001</td>
<td>0.7376</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td>0.0164</td>
<td>0.2948</td>
<td>0.2131</td>
<td>0.2503</td>
<td>0.2013</td>
<td>0.3454</td>
<td>0.1964</td>
<td>0.3214</td>
<td>0.1189</td>
<td>0.0826</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>0.0025</td>
<td>0.0966</td>
<td>0.0608</td>
<td>0.1555</td>
<td>0.4179</td>
<td>0.6534</td>
<td>0.1926</td>
<td>0.2787</td>
<td>0.4197</td>
<td>0.068</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>0</td>
<td>0.0378</td>
<td>0.0167</td>
<td>0.1596</td>
<td>0.0007</td>
<td>-0.022</td>
<td>0.027</td>
<td>0.0499</td>
<td>0.0309</td>
<td>0.0062</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>0</td>
<td>0.0014</td>
<td>0.037</td>
<td>-0.008</td>
<td>0.0146</td>
<td>-0.003</td>
<td>-0.01</td>
<td>-0.003</td>
<td>0.0056</td>
<td>-0.003</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>-0.015</td>
<td>0.0375</td>
<td>-0.009</td>
<td>0.0623</td>
<td>0.0619</td>
<td>0.0823</td>
<td>0.0054</td>
<td>0.0719</td>
<td>0.0423</td>
<td>0.1218</td>
</tr>
</tbody>
</table>

*Source: Research Data*

From the above table, it is evident that small companies actually obtained lower stock returns compared to larger companies. Portfolios 1 and 3 have negative averages for the period covered. The highest average return for the years was from portfolio 6 which is a medium sized company. This thus negates the findings of Keim (1983) that smaller sized firms tend to have higher stock returns in January as compared to other months of the year.
Figure 4.3a: Distribution of average returns for the portfolios for the month of January

From the above figure, it is evident that the small sized portfolios do not necessarily have higher returns in January as compared to the large sized companies. There is no clear pattern of stock returns depicted in the above figure.

Table 4.3b: Average returns for the portfolios for the months of February to December

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>0.0112</td>
<td>-0.018</td>
<td>0.0016</td>
<td>0.0067</td>
<td>-0.0072</td>
<td>-0.003</td>
<td>-0.0096</td>
<td>-0.017</td>
<td>-0.0073</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>0.0065</td>
<td>0.0141</td>
<td>0.0096</td>
<td>0.014</td>
<td>0.0081</td>
<td>0.0167</td>
<td>0.0356</td>
<td>0.0125</td>
<td>0.0123</td>
<td>0.002</td>
</tr>
<tr>
<td>2001</td>
<td>-0.0006</td>
<td>-0.011</td>
<td>-0.012</td>
<td>-0.004</td>
<td>-0.0122</td>
<td>-0.013</td>
<td>0.0321</td>
<td>-0.026</td>
<td>-0.0395</td>
<td>-0.016</td>
</tr>
<tr>
<td>2002</td>
<td>-0.007</td>
<td>0.0161</td>
<td>0.0118</td>
<td>0.0003</td>
<td>0.0052</td>
<td>-0.013</td>
<td>0.0105</td>
<td>0.0399</td>
<td>0.0048</td>
<td>0.0469</td>
</tr>
<tr>
<td>2003</td>
<td>0.0226</td>
<td>0.0573</td>
<td>0.0414</td>
<td>0.1</td>
<td>0.0446</td>
<td>0.01067</td>
<td>0.1266</td>
<td>0.0489</td>
<td>0.0529</td>
<td>0.1154</td>
</tr>
<tr>
<td>2004</td>
<td>0.0105</td>
<td>0.0668</td>
<td>0.0281</td>
<td>-0.002</td>
<td>-0.0461</td>
<td>-0.036</td>
<td>-0.0053</td>
<td>-0.004</td>
<td>-0.0198</td>
<td>-0.041</td>
</tr>
<tr>
<td>2005</td>
<td>0.0146</td>
<td>0.0487</td>
<td>0.0388</td>
<td>0.0609</td>
<td>0.0435</td>
<td>0.0415</td>
<td>0.0256</td>
<td>0.0339</td>
<td>0.0591</td>
<td>0.0016</td>
</tr>
<tr>
<td>2006</td>
<td>0.0029</td>
<td>0.0124</td>
<td>-0.002</td>
<td>0.0043</td>
<td>0.0076</td>
<td>0.0085</td>
<td>0.0095</td>
<td>0.0028</td>
<td>-0.0012</td>
<td>0.0015</td>
</tr>
</tbody>
</table>

Average 0.00759 0.0233 0.0147 0.0225 0.00544 0.0135 0.02813 0.0114 0.00766 0.0139

Source: Research Data

28
There is no clear pattern of average returns for February to December for the portfolios as depicted by the figure above.

### 4.4 THE CHI-SQUARED TEST

The chi-squared test was used to find out whether there was any statistically significant difference between the actual (observed) average returns and hypothesized (expected) average returns. The contingency tables for the observed and expected average returns are attached in appendix 5. From the results in appendix 5, the observed value of chi-squared test is 0.170585 and this is smaller than the 5 per cent critical value (16.92) and is also smaller than the 1 per cent critical value (14.68) at 9 degrees of freedom. Thus, the null hypothesis cannot be rejected.
Therefore, there is strong evidence that there is no significant relationship between size effect and January effect at the NSE for the period studied. Therefore, the month in question does not have an impact on the returns of either small or large sized companies.

4.5 MANN-WHITNEY U TEST
The Mann-Whitney U test was also used to find out whether the average January returns and the average February to December returns for the ten portfolios were equal. The results of the test are as shown in appendix 6. Using a significance level of 0.05 and two-tailed test, the acceptance region is \(-1.960 \leq Z \leq 1.960\). As the calculated value (-1.8367) falls in the acceptance region, we accept the null hypothesis that there is no significant relationship between size effect and January effect at the NSE for the period studied. The same results were obtained above using the Chi-Squared test. This implies that the investors at the NSE cannot use the size of a company or the month in question to predict stock returns but they can use risk and its proxies in their analysis.
CHAPTER FIVE

5.0 SUMMARY AND CONCLUSION, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 SUMMARY AND CONCLUSION
The objective of this study was to investigate whether the size effect and the January effect are interrelated at the NSE. To achieve this objective, monthly returns were calculated for ten portfolios formed on the basis of size. The average returns were tested for equality using the chi-squared and Mann Whitney U tests. This study concludes that there is no significant interrelationship between size effect and January effect at the NSE. This can be explained by the fact that it is possible that the NSE market is still very small having only fifty four (54) quoted companies. Due to its size, the market is dominated by a few well informed investors or brokers. Thus, investors' expectations have little influence on stock prices and returns.

The study has thus failed to reject the null hypothesis. This implies that no investor is better off or worse off on average by choosing to invest in either small or large sized companies in January or any other month of the year. This could mean that the NSE is an efficient market at least in the weak form. This is because size and month seem not to impact on stock returns and therefore investor can use risk and its proxies to estimate stock returns.

The recommendations therefore from this study are: It is not necessary for investors to consider the month in question when making decisions whether to invest in the stocks of small or large sized firms. Therefore, investors can make use of risk and its proxies in estimating returns for stocks.
The CAPM could thus be used to estimate returns of assets at the NSE since the various past studies did not seem to find the presence of anomalies in the market.

5.2 LIMITATIONS OF THE STUDY

Period covered by the study

The study covered a period of eight years from 1 January 1999 to 31 December 2006. This was due to lack of availability of data for the previous years in the form that was required by the study since the NSE software that contained the data had crushed and they had no back up for the database. The stock brokerage firms did not have the data in the format required for the study. It is possible that the shortened period could have affected the findings of this study. Related studies have used longer periods such as 17 years (Keim, 1983) and 50 years (Banz, 1981).

Size of the NSE

The NSE is still a small sized market having a total of fifty four (54) listed companies. The related researches have been conducted on large stock markets and thus it might be probable that the small size of the market contributed to the results obtained in this study.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

The research mainly focused on the interrelationship of size effect and January effect at the NSE. Based on this, the following are the recommended areas for further research.

1. It is important that a similar study is conducted a few years later to cover a longer period. A period of say fifteen years would be long enough to depict any patterns in the stock returns.
2. A model that uses asset values (either book or market) could also be another alternative to using market capitalization in the computation of size. Such a model was used by Banz (1981) where he used total market value of outstanding common stock to represent firm size.

3. There is also need to conduct a similar research using value added portfolios to investigate whether the results will be any different. Mamun and Visaltanachoti (2005) in their study did not find evidence of a size effect in equally weighted portfolios and a reversed size effect in value weighted portfolios. Value weighted portfolios assign relatively less weight to the smaller firms in the different decile portfolios.
REFERENCES


Dear Sir,

RE: RESEARCH DATA

I am a postgraduate student at the Faculty of Commerce, University of Nairobi. In partial fulfillment of the Master of Business Administration (MBA), I am currently undertaking a study on the interrelationship between the size effect and January effect. I am requesting for the following data from 1 January 1992 to 31 December 2006 for the companies listed at the NSE.

1. Daily stock prices.
2. Market capitalization at the beginning of each year.

The information provided will be used solely for academic purpose. I thank you in advance for your assistance and cooperation.

Yours Faithfully,

Christabel Lukale Osango

MBA Student No. D61/P/7106/05

Supervising Lecturer

Mr. Herick O. Ondigo

Lecturer, Department of Finance and Accounting

University of Nairobi
APPENDIX 2

LIST OF QUOTED COMPANIES AT THE NAIROBI STOCK EXCHANGE (NSE)

SEGMENT AND COMPANY

Agricultural Segment

1. Unilever Tea
2. Kakuzi Ltd
3. Rea Vipingo Plantations
4. Sasini Ltd

Commercial and Allied Segment

1. Access Kenya Group Ltd
2. Car and General
3. CMC Holdings
4. Huchings Biemer
5. Kenya Airways Ltd
6. Mashalls (E.A) Ltd
7. Nation Media Group
8. Scangroup Ltd
9. Standard Group Ltd
10. TPS Eastern Africa (Serena) Ltd
11. Uchumi Supermarkets

Finance and Investment Segment

1. Barclays Bank
2. CFC Bank
3. Diamond Trust Bank
4. Equity Bank Ltd
5. Housing Finance Company
6. ICDC Investments
7. Jubilee Holdings Ltd
8. Kenya Commercial Bank
10. National Industrial Credit Bank
11. Pan Africa Insurance Holdings Ltd
12. Standard Chartered Bank
13. Kenya Re-insurance Corporation

**Industrial and Allied Sector**

1. Athi River Mining Ltd
2. B.O.C Kenya
3. Bamburi Cement
4. British American Tobacco
5. Carbacid Investments
6. Crown Berger
7. East African Cables
8. East African Portland Cement
9. East African Breweries Ltd
10. Eveready East Africa Ltd
11. Kenya Oil Company
13. Kengen Ltd
14. Mumias Sugar Company
15. Olympia Capital Holdings
16. Sameer Africa Ltd
17. Total Kenya
18. Unga Group
Alternative Investment Market Segment Sector

1. A. Baumann & Co.
2. City Trust
3. Eaagads Ltd
4. Express Kenya
5. Williamson Tea
6. Kenya Orchards
7. Kapchorua Tea
8. Limuru Tea
APPENDIX 3

LIST OF THE SAMPLE OF COMPANIES QUOTED ON THE NAIROBI STOCK EXCHANGE BETWEEN THE PERIOD 1 JANUARY 1999 TO 31 DECEMBER 2006

SEGMENT AND COMPANY

Agricultural Segment

Unilever Tea
Kakuzi Ltd
Rea Vipingo Plantations
Sasini Ltd

Commercial and Allied Segment

Car and General
CMC Holdings
Huchings Biemer
Kenya Airways Ltd
Mashalls (E.A) Ltd
Nation Media Group
Standard Group Ltd
TPS Eastern Africa (Serena) Ltd
Uchumi Supermarkets
Finance and Investment Segment

Barclays Bank
CFC Bank
Diamond Trust Bank
Housing Finance Company
ICDC Investments
Jubilee Holdings Ltd
Kenya Commercial Bank
National Bank of Kenya
National Industrial Credit Bank
Pan Africa Insurance Holdings Ltd
Standard Chartered Bank

Industrial and Allied Sector

Athi River Mining Ltd
B.O.C Kenya
Bamburi Cement
British American Tobacco
Carbacid Investments
Crown Berger
East African Cables
East African Portland Cement
East African Breweries Ltd
Kenya Oil Company
Kenya Power & Lighting Co.
Sameer Africa Ltd
Total Kenya
Unga Group

Alternative Investment Market Segment Sector
A. Baumann & Co.
City Trust
Eaagads Ltd
Express Kenya
Williamson Tea
Kenya Orchards
Kapchorua Tea
Limuru Tea
### APPENDIX 4

**Portfolios based on size**

<table>
<thead>
<tr>
<th>PORTFOLIO</th>
<th>Market Capitalisation in &quot;000&quot;</th>
<th>PORTFOLIO 1</th>
<th>PORTFOLIO 2</th>
<th>PORTFOLIO 3</th>
<th>PORTFOLIO 4</th>
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**Notes:**
- K.P.L.C: Kenya Power and Lighting Company
- N.I.C Bank: National Industrial Credit Bank
- CFC Bank: Commercial Finance Company
- K.C.B: Kenya Commercial Bank
- B.A.T: Bamburi Africa (Banking, Agriculture, Trade)
- E.A.Breweries: E.A. Breweries
- Bamburi Ceramic: Bamburi Ceramic
- Standard Chartered: Standard Chartered Bank
- Barclays Bank: Barclays Bank
- K.P.L.C: Kenya Power and Lighting Company
- N.I.C Bank: National Industrial Credit Bank
- CFC Bank: Commercial Finance Company
- K.C.B: Kenya Commercial Bank
- B.A.T: Bamburi Africa (Banking, Agriculture, Trade)
- E.A.Breweries: E.A. Breweries
- Bamburi Ceramic: Bamburi Ceramic
- Standard Chartered: Standard Chartered Bank
- Barclays Bank: Barclays Bank
# APPENDIX 5

## Chi-squared test

### Contingency Table of Observed Frequencies (O) and Expected Frequencies (E)

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<th>Total</th>
<th>Portfolio</th>
<th>January</th>
<th>Feb to Dec</th>
<th>Total</th>
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<td>Total</td>
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### Chi Squared

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Total | 0.170585 |
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Total: 119.3 90.5

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