

**“TESTING WHETHER CONTRARIAN INVESTMENT STRATEGY OFFER  
PROFITABLE OPPORTUNITY AT NAIROBI STOCK EXCHANGE”**

**UNIVERSITY OF NAIROBI  
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DECLARATION

This Research Project is my original work and has not been presented elsewhere for any other assessment or award.

Signature..........

Date... 18/11/05.....

Supervisor's Approval

This Research Project has been presented for examination with my approval as the University of Nairobi Supervisor.

Signature..........

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## DEDICATION

I dedicate this Academic piece to my late grandma, Priscilla Akong'o Nyalata. I wish you lived just a little longer...

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My sincere gratitude goes to the following people, who in their own way contributed to the successful completion of this project.

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## ABSTRACT

Contrarian investment strategy i.e. the act of buying past losers and selling previous winners have been studied widely in developed markets such as the US, and UK. In spite of the importance of studying past performance, very little research, if none, had been conducted to test if contrarian strategies hold in the Kenyan emerging stock market. This study therefore sought to bridge the gap in literature by being one of the pioneering works in this topic in Kenya by determining whether contrarian investment strategies offer profitable opportunities in the Kenyan Stock market. Monthly returns were calculated and winner and loser portfolios formed on the basis of their performance. The empirical findings suggest that contrarian investment strategy offer profitable opportunities at Nairobi Stock Exchange, especially in the short term.



# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background

Most individuals that buy and sell securities (stocks), do so under the assumption that the securities they are buying are worth more than the price that they are paying while the securities that they are selling are worth less than the selling price. But if markets are efficient and current prices fully reflect all information then buying and selling securities in an attempt to outperform the market will effectively be a game of chance rather than skill. Fama (1965) persuasively made the argument that in an active market that includes many well-informed and intelligent investors securities will be appropriately priced and reflect all available information. If a market is efficient, no information or analysis can be expected to result in out performance of an appropriate benchmark (Fama, 1965).

In an efficient market a security 's price will be a good estimate of its investment value, where investment value is the present value of the security's future prospects as estimate by well-informed and capable

analysts, (Sharpe et al, 2003). As investors seek to take advantage of opportunity created by temporary inefficiency they will cause the inefficiencies to be reduced denying the less alert and the less informed a chance to obtain large abnormal profit. As a consequence of the effort of such highly alert investors at any time securities price can be assumed to be equal the security investment value implying that security mispricing will not exist.

However market efficiency have not discouraged managers from designing investment strategies. Many recent studies have increased our understanding of portfolio of stocks (share) performance by trying to determine it determinants. The earlier studies analyze the relation between portfolio performance and share past returns, company size, price to earnings ratio, price to book ratio (Fama and French, 1992). In this study we explore portfolio performance in relation to contrarian investment strategy. Conrad and Kaul (1993) and DeBondt and Thaler (1985), hereafter D&T, show that contrarian strategies are profitable.

The *contrarian* hypothesis, also known as overreaction hypothesis implies simultaneously buying (long) previous losers and selling (short) previous winners in order to realize excess returns. The conventional wisdom is

that extreme previous losers are under valued due to investor overreaction possibly instigated by some adverse news and events. Given adequate time previous losers will out perform the market. Conversely the overvalued previous extreme winners will under perform the market in subsequent period. In other words following over reaction, eventually the price tends towards the fundamental value. D&T (1985) finds that extreme prior losers tend to outperform prior winners during the following years by about 25%. In addition loser portfolio seemed to experience exceptionally large general returns as late as 5 years after portfolio formation. The authors argued that their findings suggest that equity prices systematically overshoot due to excessive investor optimism and pessimism. This investor overreaction to information implies that price reversal maybe predictable from past information a fact that directly contradicts the EMH in its weak form. D&T (1985) study suggest revision in returns, i.e. stocks that have done poorly in the past will tend to do well in the future, but stocks that have done well in the past will not tend to do well in the future. The emerging trading strategy is one that investors invest in securities that have been performing poorly. It is this strategy that is referred to as *contrarian*.

## 1.2 Statement of the Research Problem

Investors are always in search of profitable investment trading strategy. Familiar strategies such as price to book ratio, price to earnings ratios have been tested using NSE data by choosing the best of these strategies. However if a company is doing well, its performance may be projected into the future well beyond what is reasonable on the basis of what we know about, for example the ability of other companies to compete away profits, that effective managers can get better appointments elsewhere, and that customer loyalty diminish. It is also possible that a group of investors think that firm changes e.g. moving from a loss position to profits, are more permanent than they really turn out to be. Such investors overreact.

Most empirical studies on *contrarian* strategy and *overreaction* hypothesis concentrates on the U.S and other developed stock markets. As is generally the case in most economic fields, once a phenomenon has been detected in the US market, it is then sought in other international markets. The findings of D&T (1985) that losers and winners, as determined by their performance relative to the aggregate stock market, consistently outperform and under perform the market in subsequent

periods, are supported by Power et al (1991); Mac Donald and Power (1991), Campbell and Limmack (1997) in the U.K., Mai (1995) in the French market, Alonso and Rubio (1990) in Spain, and DaCosta (1994) in Brazil among others. This phenomenon has also been observed in other financial markets that are not based on stocks. Stein (1989), as well as Mao et al (1989), finds that the markets for options and futures on treasury bonds also reflect an overreaction by the investors.

On the other hand, certain patterns have also been observed that completely contradict the overreaction theory. Jagadeesh and Titman (1993), for instance, detect that in the US market the strategy of buying stocks that have produced high returns and simultaneously selling those that have experienced falls, produces significant positive future returns when such portfolios are formed and kept for periods of three to twelve months. These results indicate a trend or **momentum** in the short-term returns. Rouwenhorst (1998) also document the presence of momentum in international capital markets including the Spanish stock market.

In spite of the importance of studying past performance of stocks in predicting future performance, very little research, if none, has been conducted to test if *contrarian* strategies hold in the Kenyan emerging

stock market. Furthermore, the estimation period for stock returns vary from one study to another and one country to another. For example, Clare and Thomas (1995), Albert and Henderson (1995), De Bondt and Thaler (1985 and 1987), and Chopra et al (1992) employ two years, three years, three to five years, and five years respectively all of which can be interpreted as support for the long-run overreaction hypothesis. In Taiwan, Tsao (1994) use a return of five years in lieu of six months. Zarowin (1989) lends support for the short-run overreaction hypothesis via the use of a one-month return performance. How is it like in Kenya?

Most of these studies have focused on the developed markets. This study was therefore the first in attempting to fill the gap in literature by being one of the pioneering works on this topic in Kenya. More specifically, the study sought to answer the following pertinent question:

- Is the *Contrarian* Investment Strategy feasible at the NSE?

### 1.3 Objectives of the Study.

This study sought to achieve the following objective:

- To test whether *contrarian* investment strategy offer profitable opportunity.

### 1.4 Importance of the Study

Being one of the pioneering works on this topic in Kenya, the study will be of significance to the following groups of people:

#### i. Investors

This study will enlighten them on predicting portfolio future performance and consequently on possible ways of beating the market

#### ii. Academicians and researchers

The results to this study will assist in filling the knowledge gap and lay foundation for further research

**iii. Fund managers**

Assist this group in portfolio construction process and for their investment in securities.

**iv. Investment Advisors**

Assist them in advising their clients about what stocks to sell, buy or hold.



## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Overreaction

The overreaction hypothesis asserts that stocks that have performed poorly over a certain period of time will perform well over the subsequent and similar time interval. This means that winning stocks in period  $t$  tend to become losers in period  $t+1$ , and vice versa (Yang, 1998). Therefore *contrarian* strategies (taking a long position in past extreme loser stocks and a short position in past extreme winners) have been developed and exercised.

Kahneman and Tversky (1982) find out that people are in the habit of overreacting to unexpected and dramatic events. D&T (1985) provide evidence that large abnormal returns can be earned in the U.S. equity market by applying contrarian strategies to over the past half century of data.

The competing *momentum* theories assert that stock prices move slowly and smoothly over time (Fama and Blume, 1966), in contrast to the

*contrarian* theories that emphasize the abrupt and sharp change in price movements. Ball, Kothari, and Wasley (1995) indicate that stock prices *underreact* and *overreact* under the *momentum* and *contrarian* theories respectively, and that both theories are not consistent with the efficient market theory.

The estimation period for stock returns employed by Clare and Thomas (1995), Albert and Henderson (1995), De Bondt and Thaler (1985 and 1987), and Chopra, et al (1992) are two years, three years, three to five years, and five years respectively all of which can be interpreted as support for the long-run overreaction hypothesis. In Taiwan, Tsao (1994) offers the evidence that using a return of five years in lieu of six months supports the overreaction phenomenon. Zarowin (1989), controlling the size and January effects, also provide support for the short-run overreaction hypothesis via the use of a one-month return performance.

## **2.2. Evidence on Short-term overreaction**

Brown, et al (1988) and Atkins and Dyl (1990) present evidence that significant price reversals follow for securities that experience one-day price declines. A three-day price recovery for Fortune 500 firms suffering

price declines of 10 percent or more is by Bremer and Sweeney (1991). Liang and Mullineaux (1994) report the existence of the overreaction pattern for pre- and post-event fifty- to- two hundred days. Jegadeesh and Titman (1993) find positive returns over a 3- to 12-month holding period by purchasing loser stocks and selling winners. Chang, et al (1995) shows the monthly abnormal returns earned by implementing a contrarian strategy in the Japanese stock market. Pettengill and Jordan (1990) report that firms with the greatest monthly loss becoming the greatest winners in the subsequent month.

Lin (1988) makes use of the daily, weekly, and monthly return data for Taiwan's stock market to confirm the existence of overreaction. Hong (1988) also has provided support of overreaction in terms of weekly return. Lehmann (1990) and Howe (1986), examine the one-week equity returns concluding that overreaction hypothesis exist even without correcting for the bid-ask spreads and transaction costs.

### **2.3 Overreaction Vs Underreaction Hypothesis**

Certain patterns have also been observed that completely contradict the overreaction theory, both short-term and long-term. Jagadeesh and Titman

(1993) find that in the U.S market, the strategy of buying stocks that have provided high returns, and simultaneously selling those that have experienced falls, produces significant positive future returns when such portfolios are formed and kept for periods of three to twelve months. These results indicate a trend or momentum in the short-term returns. The following authors have also detected the same trend: Rouwenhorst (1998) in the Spanish stock market, Davidson and Dutia (1989) in the U.S and Kryzanowski and Zhang (1992) in the Canadian market.

Edwards (1968) suggest that the abnormal return obtained by the momentum strategies could be due to an underreaction by the prices to recent information, one to three months old, i.e. the news effect is gradually incorporated into the prices, so that they tend to have positive **autocorrelations** during these periods.

However, the overreaction hypothesis, (associated with the contrarian strategy) and the underreaction hypothesis (associated with the momentum strategy), are not necessarily contradictory, but rather are compatible with each other (Rodriguez and Fructuoso, 2000).

The underreaction hypothesis supposes that the investors do not react quickly enough to news about an isolated event. This suggests that the

after-event prices continue having their same positive or negative sign as they had during the event itself. The overreaction hypothesis on the other hand, suggests that while investors react with excessive pessimism about just one item, but a series of good or bad news releases, their initial overreaction in the long run causes a reverse in the trend of the prices, when these investors eventually realize that they have caused the market prices to deviate from their fundamental values.

Barberis, et al (1998), Hong and Stein (1999), and Daniel et al (1998), have expressed theories that try to explain the coexistence between those two different behavior patterns in the capital market, and use models that attempt to reflect the investors' behavior.

1 Barberis, Shleifer and Vishny (1998): ' A model of Investor Sentiment'

These authors proposed a model that explains underreaction by *conservatism* and overreaction by *representativeness heuristic*. In their model, earnings follow a random walk but investors do not realize this, rather they switch between two regimes i.e. they think earnings are either *mean-reverting* or *trending*.

Underreaction occurs when investors conserve the mean reverting regime when earnings change and overreaction occurs when they switch to trending regime after a stream of shocks in the same direction and eventually believe that earnings surprises are a true representative of future earnings.

An important manifestation of the representativeness heuristic is that people think they see patterns in truly random sequences. When a company has a consistent history of earnings growth over several years, and is accompanied by analysts' glowing reports of its future earnings, investors might conclude that the past history is representative of an underlying earnings growth potential. In investors' minds, "good companies are representative of successful companies, and successful companies generate strong earnings, earnings that in turn lead to higher returns." On the other hand, "poor companies are representatives of low earnings and disappointing returns"

2 Daniel, Hirshleifer and Subramanyam (1998).

They proposed a theory of under and overreaction based on two psychological biases viz, Investor overconfidence and self-

attribution. In their model, overconfident informed traders (trading with the rational uninformed) overweight their private signals causing the stock price to overreact i.e. investors overreact to private information signals and underreact to public signals.

As investors update their confidence in a biased manner with self attribution, overreaction is sustained i.e. when a confirming public signal arise, confidence rises, and this is followed by long run correction consistent with long-run negative autocorrelation.

### 3 Hong and Stein (1999).

They focus on the interaction between heterogeneous agents other than the psychology of the representative agent. Their model features two types of agents; i) the news watchers and ii) the momentum traders. The news watchers make forecasts based on signals that they observe about future fundamentals and do not condition on current or past prices. Momentum traders on the other hand, do condition on past prices but ignore fundamental information.

Solving their models, they (i.e. Hong and Stein, 1999) conclude the following;

- With only news watchers, there is underreaction but never overreaction (this follows from the gradual diffusion of information and the non extraction of information from prices).
- When momentum traders are introduced, they arbitrage away any underreaction left by news watchers and hence improve market efficiency by accelerating price adjustments to new information.
- As momentum traders start profit taking, the correction phase starts with early momentum buyers profiting at the expense of late momentum buyers, thus there is a long-term negative autocorrelation in prices.

Despite the empirical finding that favours the overreaction hypothesis, both short term and long term, some researchers however suggest different explanations for this market inefficiency. Cox and Peterson (1994), for instance, in the belief that price reversal is the combined result of a bid-ask bounce and the extent of market liquidity, do not find evidence consistent with an overreaction hypothesis.



Ball et al (1995) detect that the apparent one-week profitability of contrarian trading largely disappears after calculating returns from bid instead of ask prices. Moreover, Amihud and Mendelson (1987) argue that most tests in terms of the trading rule provide unrealistic answers mainly because of the simulated bid-and-ask spread in "Back-test" investment decisions. In addition to the problem of the bid-and-ask spread, some other puzzles such as firm size effect, seasonality, risk stationarity and micro-structural biases have been proposed.

Chan (1988), using a simple asset-pricing model, the CAPM, to control the risk change, observed a very small return from contrarian investment strategies, which might not be economically significant. Ball and Kothari (1989) further proved that the model and estimation methods used to evaluate the overreaction hypothesis are sensitive to the results because of the time-varying risk of arbitrage strategies.

Jones (1987) argues the overreaction effect can be explained by the January effect. Supporting Jones' argument, Pettengill and Jordan (1990) also provide evidence that most of the overreaction effect arises in January. Additionally, Lin (1992) finds the existence of an overreaction effect in Taiwan's stock market, especially in January. Nevertheless, the

overreaction disappears after taking the factor of risk variation into account.

Zarowin (1990), while reexamining D&T's evidence on stock market overreaction i.e. the tendency for losers over the prior 3-year period to outperform winners during that period in the subsequent 3-year period; finds that losers' superior performance over winners during the 3-year *test period* is due, not to investor overreaction, but to size discrepancies between winners and losers since losers tend to be smaller than winners. Liu et al (1993) also provide evidence that the overreaction effect exists only for small firms in Taiwan.

Conrad and Kaul (1993) demonstrate that micro- structural biases causes long-term returns with an upward bias, as it generally accumulates shortterm (monthly) returns of the winners and the losers over long periods of time (3 to 5 years). Blume and Stambaugh (1983), Roll (1983) and Dissanaikie (1994), also make similar conclusions and demonstrate that the returns for individual periods are upwardly biased as a result of measurement errors in the prices due to: the bid-ask spread, non-synchronous trading and/or price discreteness.

Furthermore, Conrad and Kaul (1993), and Ball et al(1995) find an upward bias in the returns of the lower priced stocks compared higher priced stocks and show that if losing stocks, on average, have lower prices than the winners, then the returns of the arbitrage portfolio will show an upward bias that is not related to an overreaction by the market.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

The basic idea behind the overreaction hypothesis is the possibility that the stock prices deviate systematically from their basic values, so that by using the information available on their past returns, the direction of their changes could be predicted. The tests that were employed therefore aimed at measuring the extent to which a systematic residual return that is different from zero after a given reference month is associated with a systematic residual return that is different from zero, in the opposite direction, during the previous months.

#### **3.1 Research Design**

The data utilized for this study was sourced from the NSE database, of share prices.

### **3.2 The Population**

The study sample composed of all the securities listed in the NSE from 1996 to 2002. However, securities that experienced suspension or delisting during the period of the study was dropped. Appendix 1 shows currently listed securities at NSE.

### **3.3 Data collection design**

In this study, secondary data sources from the NSE were employed i.e. monthly security returns adjusted for dividends and bonus issues , if any, of stock that was traded on the NSE.

### **3.4 The Variables and Variable Measurements of The Study**

Returns (r): Monthly returns adjusted for dividends,

Model:

The market model will be used to calculate monthly returns for each of the stock in the sample.

$$R_{i,t} = \frac{P_{t+1} - P_{t0} + \text{Div}}{P_{t0}}$$

Where;  $R_{i,t}$  is the return on security  $i$  on period  $t$

$P_{t+1}$  closing price at time  $t+1$

$P_{t0}$  opening price at time  $t_0$

Winners (w): Portfolio consisting of stocks with the highest share price returns

Cumulative average returns are calculated for each stock and winners are determined as five stocks with the highest cumulative returns (upper deciles)

Losers (l): Portfolio consisting of stocks with the lowest (possibly negative) share price returns.

Cumulative average returns are calculated for each stock and losers are determined as five stocks with the lowest cumulative returns (lower deciles)

Arbitrage portfolio ( $A_p$ ): measured by the difference between loser and winner portfolios at the end of the test period.

$$CAR (a_p) = CAR_{l,t} - CAR_{w,t}$$

### 3.5 Hypothesis testing

Focus was on stocks that had shown extreme returns in the one- year period, from which two portfolios, one for the winners and another for losers were formed. The winners are stocks that seem to be favored by the market, and the market is too optimistic about their future performance. The losers are stock that seems not to be favored by the market, and the market is too pessimistic about their future performance. The performance of the two portfolios were then monitored over the next one month, six months, one year, two years, three years and four years, to determine whether there were revision in returns of the two extreme portfolios. The recommended practice is to revise the portfolio after every four years, **Sharpe (1999)**.

The hypotheses tested in this study was thus stated:

1. *H<sub>0</sub>*: The performances of a portfolio consisting of winners remain unchanged.

*H<sub>a</sub>*: The performances of a portfolio consisting of winners do not remain unchanged.

2. *Ho*: The performances of a portfolio consisting of losers remain unchanged.

*Ha*: The performances of a portfolio consisting of losers do not remain unchanged.

3. *Ho*: The difference between the two portfolios is equal to zero

*Ha*: The difference between the two portfolios is not equal to zero

### **3.6 Data Analysis**

The first portfolio consisted of only companies with lowest share price return, if possible negative return (losers) during the calendar year 1997, 1998 and 1999. The subsequent performance was then monitored over the following intervals, one month, six months, one year, two years, three years and four years.

The second portfolio consisted of only companies with highest share price returns, if possible positive return (winners) during the calendar year 1997, 1998 and 1999. The subsequent performance was then



monitored over the following intervals, one month, six months, one year, two years, three years and four years.

1. The sign test was carried out to determine whether there is any reversal.
2. The regular Pearson correlation coefficient was used to compare the returns of both winners and losers. A significant negative correlation indicates that the returns from the two portfolios move in different directions.
3. Accept or fail to accept the null hypotheses decision was made based on 90% level of significance. The decision rule was that we reject the null hypotheses if the computed  $t$  lies outside the tabulated acceptance region.

## CHAPTER FOUR

### 4.0 DATA ANALYSIS AND FINDINGS

#### 4.1 Introduction

The returns of both winner and loser portfolios were analysed for the subsequent three-year formation periods. The Contrarian hypothesis holds that loser stocks will outperform winner stocks in the subsequent periods (D&T, 1985). The sign tests were performed to determine if there were any revision in returns for the subsequent periods.

The percentage change in the mean returns and correlation coefficient for the two portfolios for the subsequent test periods were also calculated to determine which portfolio offered greater returns/loss in the subsequent periods.

A summary of the means and relevant statistics for the winner and loser portfolio are exhibited in **Appendix 2**.

## **4.2 Short-term Contrarian hypotheses**

Evidence has been provided on the existence of overreaction over shortterm periods of one month to two-year periods (Penttegill and Jordan, 1990). In this study, we examine the possibility of overreaction in the next one-month, six month; one year and two years test periods.

### **4.2.1 Winner Portfolio for the next One Month**

Using sign tests, the hypotheses were to be rejected at 90% level of confidence. In both three portfolio formation periods i.e. 1997,1998, &1999,  $t$  calculated was found to lie outside the critical acceptance region and therefore the first null hypothesis was rejected. The performance of portfolios consisting of winners for the next one month did not remain unchanged.

Percentage change in the portfolio means also indicate that winner portfolio had a negative percentage return in the subsequent periods. In the subsequent one-month portfolio revision, the winner portfolio had a decline in returns of -93.6%, -95% and -99.9% for 1997, 1998 and 1999 test periods respectively.

The correlation coefficient between winner and loser portfolio returns was negative in 1997 and 1998 formation periods implying that their returns move in different directions for the next one month.

The independent sample test for equality between two means in the one month period indicate that the calculated p-values were greater than the hypothesized 0.10 significance level in all the three test periods thus we fail to reject the null hypothesis that the difference between the two means remain the same. There is no significance difference between the two portfolio means.

#### **4.2.2 Loser Portfolio for the next One month**

The performance of loser portfolio for the next one month in the three portfolio formation periods indicate the  $t$  calculated lies outside the acceptance region thus we reject the second null hypothesis that the performance of loser portfolio does not remain unchanged.

Percentage mean difference in the subsequent test periods also indicates that loser stocks gained by a higher percentage i.e. 126%, 117.8% and 97.9% in the 1997,1998 &1999 test periods respectively.

**Table 1: Portfolio Performance for the next one month**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
Jan 1998	0.0874	0.1301	-93.6	126	-38.85	15.19	-0.2235	0.44
1998	0.8123	-0.4922	100	100	-	-	-0.954	0.00027
Jan 1999	0.0395	0.0878	-95	117.8	-11.44	7.431	-0.759	0.6516
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
Jan 2000	0.00059	-0.0157	-99.9	97.9	-45.46	16.93	0.603	0.737
Accept (A)/Fail to Accept (F)					F	F		

#### 4.2.3 Winner portfolio for the next six months

The same analysis as for the one above was done for the winner portfolio for the next six months to determine if there was any revision in returns in the subsequent periods. Similar results were obtained as per the sign tests i.e. we reject the null hypothesis that the returns of winners remain unchanged in the subsequent six-month test period.

Panel B and C of table 1 indicate negative correlation between winner and loser for the next six months, while in 1997 test period, the coefficient was positive indicating that the returns were moving in the same direction.

Tests for the difference between the means in two out of three test periods indicate that there is no significant difference between winner and loser portfolios for the next six months.

#### **4.2.4 Loser portfolio for the next Six months**

Analysis of loser portfolio for the next six months indicate that  $t$  calculated in the sign tests lies outside the acceptance region in all the three test periods, thus we rejected the null hypothesis that the return of losers remain unchanged.

The percentage difference between the means in all test periods was positive and significant though this increase declines in the subsequent test periods.

**Table 2: Portfolio Performance for the next six months**

Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
Jan to June 1998	0.1164	0.179	-91.5	82.1	-9.577	4.907	0.6721	0.749
1998	0.8123	-0.4922	100	100	-	-	-0.954	0.00027
Jan to June 1999	0.2976	-0.0858	-70.2	82.6	-4.575	5.474	-0.4721	0.0208
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
Jan to June 2000	0.0302	-0.1395	-96	81.4	-9.34	5.903	-0.283	0.22
Accept (A)/Fail to Accept (F)					F	F		

#### 4.2.5 Winner Portfolio for the next one year

Tracking the performance of winner portfolio for the next one year reveals that winner portfolio continues to register negative returns in subsequent test periods. There was a decline in returns of -74% in 1997, -54.9% in 1998, and -87% in 1999 test periods.

#### **4.2.6 Loser Portfolio for the next one year**

Similar analysis as for the one above was conducted for losers. Loser portfolio continued to register positive returns (gains) especially in 1997 test period, even though there was no significant difference between portfolio means in 1997 and 1999 test periods. Tests of difference between means in 1998-test period indicate that there is significant difference between the two portfolio means.



**Table 3: Portfolio Performance for the next one Year**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- differen CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
1998	0.3587	0.3046	-74	161.3	-5.67	4.297	0.5479	0.838
1998	0.8123	-0.4922	100	100	-	-	-0.954	0.00027
1999	0.4515	-0.2241	-54.9	54.5	-2.353	3.606	0.0842	0.005
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
2000	0.1206	-0.0755	-87	89.9	-3.23	3.881	-0.489	0.465
Accept (A)/Fail to Accept (F)					F	F		

#### 4.2.7 Winner Portfolio for the next two years

Statistical analysis indicate that winner portfolio continued to loose even in the subsequent two year period i.e. percentage decline in mean returns were

-96%, -56.7% and -74.1% in 1997,19981nd 1999 test periods respectively.

Sign tests also reveal that there was reversion in returns of the winner portfolio.

#### 4.2.8 Loser Portfolio for the next two years

Loser portfolio continued to register positive returns in all the test periods, though marginal gains were realized in the progressive periods. Test of significance between the portfolio means also indicate that there was no significant difference between the means in 1997 and 1999 formation periods.

**Table 4: Portfolio Performance for the next two years**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- differ CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
1999	0.0395	-0.1822	-96	63.3	1.00	4.491	0.678	0.531
1998	0.8123	-0.4922	100	100	-	-	-0.954	0.00027
2000	0.3514	-0.3720	-56.7	24.4	-4.92	1.04	-0.7936	0.0007
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
2001	0.2584	-0.0074	-74.1	99	-3.115	4.2	0.1011	0.318
Accept(A) /Fail to accept(F)					F	F		

### 4.3 Long term Contrarian hypothesis

Long-term overreaction hypothesis exist for periods beyond two years. In this study we examined the possibility of overreaction for the subsequent three-year period, evidence of long-term overreaction hypothesis.

Sign test analysis shows that the  $t$  calculated do not lie within the acceptance region in most of the test periods and thus we rejected the null hypotheses that the returns of both winners and losers remain unchanged in the subsequent periods.

The correlation coefficient of the two portfolio returns were positive in 1998 and 1999 formation periods indicating that the returns of winners and losers moved more or less in the same direction.

**Table 5: Portfolio Performance for the next three years**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
2000	0.2715	-0.187	-80	62.4	-6.004	2.812	-0.076	0.0724
1998	0.8123	-.4922	100	100	-	-	-0.954	0.00027
2001	0.3073	0.1208	-69.3	125	-3.853	3.857	0.254	0.393
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
2002	0.3385	0.2337	-66	131	-1.714	5.97	0.603	0.725
Accept(A) /Fail to accept(F)					F	F		

## CHAPTER FIVE

### 5.0 CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH.

#### 5.1. Conclusion

The objective of this study was to establish whether contrarian investment strategies offer profitable opportunities at Nairobi Stock Exchange. This information enables investors to decide on which stocks to buy, hold and sell in order to realize greater returns. Studies in developed markets such as the US have produced results indicating that this strategy is profitable both in the short-term and long-term.

A number of explanations have been given that favors overreaction hypothesis such as bid-ask- spread, firm size effect, seasonality, risk and micro-structural biases.

From the foregoing analysis in chapter four, the first two hypotheses were rejected implying that there was reversion in returns in both winner and loser portfolios.

Also, the percentage change in returns was positive for losers and negative for winners in all the formation periods. That is to say, for instance, an

investment of Ksh.10M in both winner and loser portfolio at the beginning of the period would yield greater returns in loser stock than in winner stock. The equality of means hypothesis was not rejected in both periods, though we expect the winner returns to have higher mean returns than losers. Thus, on the basis of the foregoing analysis, the following conclusions were reached;

- The returns of winners do not remain unchanged
- The returns of Losers do not remain unchanged
- Loser portfolio offers greater returns than winner portfolios in both short and long term periods.

In general, contrarian investment strategy offers profitable opportunities at NSE. The results of this study can be explained by several factors.

- i) Overreaction of investors to news
- ii) Attitude of Kenyan investors of ignoring small stocks and concentrating on big stocks.

However, it is important to note that this investment strategy involve a high degree of turnover due to frequent reconstitution of portfolios (monthly). An investor would incur substantial transaction costs, and therefore it remains to be seen whether it would be profitable after such costs were fully accounted for.

## 5.2 Limitations of the study

- i) The period of the study i.e. 6 years, could have influenced the findings of this study. Similar studies conducted in developed markets employ longer periods. For instance, DeBondt and Thaler, (1985) utilized 32-year period. The short period in this study has been necessitated by the fact that until 1989 when the regulatory body was established, trading at NSE was disorganized and minimal records was kept until then. The data covered in this study period are organized and more reliable than before.
- ii) Some listed companies were omitted in the sample due to unavailability of data and de-listing of others throughout the study period. This reduction in sample size could have affected the calculations in the study.

## 5.3 Suggestions for Further Study

- i) The most important contribution of this study is the pioneering examination of overreaction hypothesis at NSE. Another study to determine the causes of this phenomenon at NSE would be in

order. For instance, determining if the result of this study are driven by size, seasonality or risk.

- ii) It would be important also to replicate the study to cover a longer period of time than the period utilized in this study, say 10 years.
- iii) A different methodology of forming the winner and loser portfolios, such as buy- and -hold strategies, could be utilized in a similar study.



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## APPENDICES

### Appendix 1

#### LIST OF COMPANIES STUDIED AT NAIROBI STOCK EXCHANGE

1. Brook Bond Ltd Ord. 10.00
2. Kakuzi Ltd. Ord. 5.00
3. Rea Vipingo Plantations Ltd. Ord. 5.00
4. Sasini Tea and Coffee Ltd. Ord. 5.00
5. Car and General (K) Ltd. Ord. 5.00
6. CMC Holdings Ltd. Ord. 5.00
7. Hutchings Biemer Ltd. Ord. 5.00
8. Kenya Airways Ltd. Ord. 5.00
9. Marshalls (E.A) Ltd. Ord. 5.00
10. Nation Media Group. Ord. 5.00
11. TPS Serena Ltd. Ord 5.00
12. Uchumi Supermarkets Ltd. 5.00
13. Barclays Bank Ltd. Ord. 10.00
14. CFC Bank Ltd. Ord. 5.00
15. Diamond Trust Bank (K) Ltd Ord. 4.00
16. Housing Finance Co. Ltd. Ord 5.00
17. I.C.D.C Investment Co. Ltd. Ord. 5.00
18. Jubilee Insurance Company Ltd. Ord. 5.00

19. Kenya Commercial Bank Ltd. Ord. 10.00
20. National Bank of Kenya Ltd. Ord. 5.00
21. NIC Bank Ord. 5.00
22. Pan African Insurance Ltd. Ord. 5.00
23. Standard Chartered Ltd. Ord. 10.00
24. Athi River Mining Ltd. Ord. 5.00
25. BOC Kenya Ltd. Ord.5.00
26. Bamburi Cement Ltd. Ord. 5.00
27. BAT (K) Ltd. Ord. 5.00
28. Carbacid Investment Ltd. Ord.5.00
29. Crown Berger Ltd. Ord.5.00
30. Dunlop Kenya Ltd. Ord. 5.00
31. E.A. Cables Ltd Ord. 5.00
32. E.A. Portland Cement Ord. 5.00
33. E.A. Breweries Ltd. Ord.10.00
34. Sameer Africa (Firestone) Ltd. Ord. 5.00
35. Kenya Oil Co. Ltd. Ord. 5.00
36. Mumias Sugar Co. Ltd. Ord. 2.00
37. Kenya Power & Lighting Co. Ltd. Ord. 5.00
38. Total Kenya Ltd. Ord. 5.00
39. Unga Group Ltd. Ord. 5.00

40. Bauman and Co. Ltd. Ord 5.00
41. City Trust Ltd. Ord. 5.00
42. Eaagads Ltd. Ord. 5.00
43. Williamson tea (K) Ltd. 5.00
44. Kapchorua Tea Co. Ltd. Ord. 5.00
45. Kenya orchards Ltd. Ord. 5.00
46. Limuru tea Co. Ltd. Ord. 20.00
47. Standard Newspapers Group Ord. 5.00

**Appendix 2**  
**Panel A: 1997 Formation Period**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1997	1.38	-0.497	100	100	-	-	-0.8435	0.00049
Jan 1998	0.0874	0.1301	-93.6	126	-38.85	15.19	-0.2235	0.44
Jan to June 1998	0.1164	0.179	-91.5	82.1	-9.577	4.907	0.6721	0.749
1998	0.3587	0.3046	-74	161.3	-5.67	4.297	0.5479	0.838
1999	0.0395	-0.1822	-96	63.3	1.00	4.491	0.678	0.531
2000	0.2715	-0.187	-80	62.4	-6.004	2.812	-0.076	0.0724
Accept(A) /Fail to accept(F)					F	F		

**Panel B: 1998 Formation Period**

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	Btw W and L	W and L
1998	0.8123	-0.4922	100	100			-0.954	0.00027
Jan 1999	0.0395	0.0878	-95	111.8	-11.44	7.431	-0.759	0.6516
Jan to June 1999	0.2976	-0.0858	-70.2	82.6	-4.575	5.474	-0.4721	0.0208
1999	0.4515	-0.2241	-54.9	54.5	-2.353	3.606	0.0842	0.005
2000	0.3514	-0.3720	-56.7	24.4	-4.92	1.04	-0.7936	0.0007
2001	0.3073	0.1208	-69.3	125	-3.853	3.857	0.254	0.393
Accept(A) /Fail to accept(F)					F	F		

### Panel C: 1999 Formation Period

Descriptives Years	Sample mean		% change in return		Sign test (t) at 90% Sig level		Correlation (r)	t- difference CI = 0.1
	W	L	W	L	W	L	W and L	W and L
1999	0.728	-0.7515	100	100	-	-	-0.768	0.0042
Jan 2000	0.00059	-0.0157	-99.9	97.9	-45.46	16.93	0.603	0.737
Jan to June 2000	0.0302	-0.1395	-96	81.4	-9.34	5.903	-0.283	0.22
2000	0.1206	-0.0755	-87	89.9	-3.23	3.881	-0.489	0.465
2001	0.2584	-0.0074	-74.1	99	-3.115	4.2	0.1011	0.318
2002	0.3385	0.2337	-66	131	-1.714	5.97	0.603	0.725
Accept (A)/Fail to accept(F)					F	F		

**APPENDIX 3: A reproduction of SPSS output of Sign Tests**

**Sign Test: 1997 winners and Jan\_1998 Winners**

**Descriptives**

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Winners	6	.93	2.78	1.380	.6935	.481
Valid N	6					

**T-Test**

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
JAN_1998	6	8.740E-02	8.152E-02	3.328E-02

**One-Sample Test**

	Test Value = 1.3805					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_1998	-38.854	5	.000	-1.2931	-1.3602	-1.2260

**Sign Test: 1997 Losers and Jan\_1998 Losers.**

**Descriptives**

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Losers	6	-1.40	-.10	-.4970	.5632	.317
Valid N	6					

**T-Test**

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
JAN_1998 Losers	6	.1301	.1011	4.128E-

**One-Sample Test**

	Test Value = -0.4970					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_1998 Losers	15.19	5	.000	.6271	.5439	.7103

## Sign Test: 1997 Winners and Jan\_Jun 1998 winners.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Winners	6	.93	2.78	1.380	.6935	.481
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN- 98 W	6	.1164	.3233	.1320

#### One-Sample Test

	Test Value = 1.3805					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN- 98 W	-9.577	5	.000	-1.2641	-1.5301	-.9981

## Sign Test: 1997 Losers and Jan\_Jun 1998 Losers.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Losers	6	-1.40	-.10	-.4970	.5632	.317
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN 98 L	6	.1790	.3375	.1378

#### One-Sample Test

	Test Value = -0.4970					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN 98 L	4.907	5	.004	.6760	.3984	.9536



## Sign Test: 1997 Winners and 1998 Winners.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Winners	6	.93	2.78	1.380	.6935	.481
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
1998 W	6	.3587	.4416	.1803

#### One-Sample Test

Test Value = 1.3805						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
98 W	-5.667	5	.002	-1.0218	-1.3851	-.6584

## Sign Test: 1997 Losers and 1998 Losers.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Losers	6	-1.40	-.10	-.4970	.5632	.317
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
98 L	6	.3046	.4569	.1865

#### One-Sample Test

Test Value = -0.497						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
98 L	4.297	5	.008	.8016	.4257	1.177

## Sign Test: 1997 Winners and 1999 Winners.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Winners	6	.93	2.78	1.380	.6935	.481
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
99 W	5	0.0036	11528.6	5155.749

#### One-Sample Test

Test Value = 1.3805						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
F14	1.000	4	.374	5154.6237	-5836.64	16145.89

## Sign Test: 1997 Losers and 1999 Losers.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Losers	6	-1.40	-.10	-.4970	.5632	.317
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
99 L	6	-.1822	.1717	7.011E-

#### One-Sample Test

Test Value = -0.497						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
99 L	4.491	5	.006	.3148	.1736	.4561

## Sign Test: 1997 Winners and 2000 Winners.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Winners	6	.93	2.78	1.380	.6935	.481
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 W	5	.2715	.4130	.1847

#### One-Sample Test

Test Value = 1.3805						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 W	-6.004	4	.004	-1.1090	-1.5028	-.7153

## Sign Test: 1997 Losers and 2000 Losers.

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1997 Losers	6	-1.40	-.10	-.4970	.5632	.317
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 L	6	-.1870	.2700	.1102

#### One-Sample Test

Test Value = -0.497						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 L	2.812	5	.037	.3100	8.784E-02	.5321

## Sign Test: 1998 winners vs. Jan\_1999 winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Winners	6	.64	1.07	.8123	.1668	2.783E-02
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_1999 W	6	3.950E-	.1655	6.755E-02

#### One-Sample Test

	Test Value = 0.8123					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_1999 W	-11.441	5	.000	-.7728	-.9089	-.6367

## Sign Test: 1998 Losers vs. Jan\_1999 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Losers	5	-1.04	-.23	-.4922	.3320	.110
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_1999 L	5	8.780E-02	.1745	7.805E-02

#### One-Sample Test

	Test Value = -0.4922					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_1999 L	7.431	4	.002	.5800	.4136	.7464

## Sign Test: 1998 Winners vs. Jan Jun 1999 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Winners	6	.64	1.07	.8123	.1668	2.783E-02
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN-99 W	6	.2976	.2756	.1125

#### One-Sample Test

	Test Value = 8123					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN-99 W	-4.575	5	.006	-.5147	-.7415	-.2880

## Sign Test: 1998 Losers vs Jan Jun 1999 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Losers	5	-1.04	-.23	-.4922	.3320	.110
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN 99 L	5	-8.58E-02	.1660	7.424E-02

#### One-Sample Test

	Test Value = -.4922					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN 99 L	5.474	4	.005	.4064	.2481	.5647

## Sign Test: 1998 Winners vs. 1999 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Winners	6	.64	1.07	.8123	.1668	2.783E-02
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
1999 W	6	.4515	.3756	.1533

#### One-Sample Test

Test Value = .8123						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
1999 W	-2.353	5	.065	-.3608	-.6697	-5.18E-02

## Sign Test: 1998 Losers vs. 1999 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Losers	5	-1.04	-.23	-.4922	.3320	.110
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
1999 L	5	-.2241	.1663	7.438E-02

#### One-Sample Test

Test Value = -.4922						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
1999 L	3.604	4	.023	.2681	.1095	.4266

## Sign Test: 1998 Winners vs. 2000 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Winners	6	.64	1.07	.8123	.1668	2.783E-02
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 W	6	.3514	.2295	9.369E-02

#### One-Sample Test

Test Value = .8123						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 W	-4.920	5	.004	-.4609	-.6497	-.2721

## Sign Test: 1998 Losers vs 2000 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Losers	5	-1.04	-.23	-.4922	.3320	.11C
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 L	5	-.3720	.2571	.1150

#### One-Sample Test

Test Value = -.4922						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 L	1.045	4	.355	.1202	-.1249	.3653

## Sign Test: 1998 Winners vs. 2001 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Winners	6	.64	1.07	.8123	.1668	2.783E-01
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2001 W	5	.3073	.2931	.1311

#### One-Sample Test

Test Value = .8123						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2001 W	-3.853	4	.018	-.5050	-.7844	-.2256

## Sign Test: 1998 Losers vs 2001 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1998 Losers	5	-1.04	-.23	-.4922	.3320	.1103
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2001 L	5	.1208	.3554	.1589

#### One-Sample Test

Test Value = -.4922						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2001 L	3.857	4	.018	.6130	.2742	.9518



## Sign Test: 1999 Winners vs. Jan 2000 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Winners	5	.60	.93	.7280	.1673	2.800E-02
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_2000 W	5	5.896E-04	3.578E-02	1.600E-02

#### One-Sample Test

Test Value = 0.7280						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_2000 W	-45.458	4	.000	-.7274	-.7615	-.6933

## Sign Test: 1999 Losers vs Jan 2000 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Losers	6	-2.28	-.35	-.7515	.7575	.574
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_2000 L	6	-1.57E-02	.1065	4.346E-02

#### One-Sample Test

Test Value = -.7515						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_2000 L	16.93	5	.000	.7358	.6483	.8234

## Sign Test: 1999 Winners vs. Jan Jun 2000 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Winners	5	.60	.93	.7280	.1673	2.800E-02
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN-00 W	5	3.025E-02	.1670	7.468E-02

#### One-Sample Test

	Test Value = .7280					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN-00 W	-9.343	4	.001	-.6977	-.8570	-.5385

## Sign Test: 1999 Losers vs. Jan Jun 2000 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Losers	6	-2.28	-.35	-.7515	.7575	.574
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
JAN_JUN 00 L	6	-.1395	.2540	.1037

#### One-Sample Test

	Test Value = -.7515					
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
JAN_JUN 00 L	5.903	5	.002	.6120	.4031	.8209

## Sign Test: 1999 Winners vs. 2000 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Winners	5	.60	.93	.7280	.1673	2.800E-02
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 W	5	.1206	.4209	.1882

#### One-Sample Test

Test Value = .7280						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 W	-3.227	4	.032	-.6074	-1.0087	-.2061

## Sign Test: 1999 Losers vs 2000 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Losers	6	-2.28	-.35	-.7515	.7575	.574
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2000 L	6	-7.55E-02	.4266	.1742

#### One-Sample Test

Test Value = -.7515						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2000 L	3.881	5	.012	.6760	.3250	1.026

## Sign Test: 1999 Winners vs. 2001 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Winners	5	.60	.93	.7280	.1673	2.800E-02
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std Error Mean
2001 W	5	.2584	.3371	.1508

#### One-Sample Test

Test Value = .7280						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2001 W	-3.115	4	.036	-.4696	-.7910	-.1482

## Sign Test: 1999 Losers vs. 2001 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Losers	6	-2.28	-.35	-.7515	.7575	.574
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std Error Mean
2001 L	5	7.382E-03	.4040	.1807

#### One-Sample Test

Test Value = -.7515						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2001 L	4.200	4	.014	.7589	.3737	1.144

## Sign Test: 1999 Winners vs. 2002 Winners

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Winners	5	.60	.93	.7280	.1673	2.800E-02
Valid N	5					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2002 W	5	.3385	.5080	.2272

#### One-Sample Test

Test Value = .7280						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2002 W	-1.714	4	.162	-.3895	-.8738	9.482E-02

## Sign Test: 1999 Losers vs. 2002 Losers

### Descriptives

#### Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1999 Losers	6	-2.28	-.35	-.7515	.7575	.574
Valid N	6					

### T-Test

#### One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
2002 L	5	.2357	.3695	.1653

#### One-Sample Test

Test Value = -.7515						
	t	df	Sig. (2-tailed)	Mean Difference	90% Confidence Interval of the Difference	
					Lower	Upper
2002 L	5.974	4	.004	.9872	.6349	1.339