AN EMPIRICAL ANALYSIS OF MOMENTUM IN PRICES AT THE NAIROBI STOCK EXCHANGE

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A MANAGEMENT RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE IN MASTERS OF BUSINESS ADMINSTRATION.

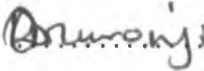## UNIVERSITY OF NAIROBI

FACULTY OF COMMERCE

DECLARATION

THIS RESEARCH PROJECT IS MY ORIGINAL WORK AND HAS NOT BEEN SUBMITTED FOR A DEGREE IN ANY OTHER UNIVERSITY

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DATED   11/01/2005

THIS RESEARCH PAPER HAS BEEN SUBMITTED FOR EXAMINATION WITH MY APPROVAL AS UNIVERSITY SUPERVISOR.

JOSEPHAT L. LISHENGA.........

DATED   11/01/2005

DEDICATION

To my mom
Damaris Shipiri

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LIST OF ABBREVIATIONS

N.S.E   —Nairobi Stock Exchange

N.Y.S.E — New York Stock Exchange

C.R.S.P   —Centre for Research in Security Prices

ABSTRACT

This study set out to determine the presence of momentum at the Nairobi Stock Exchange and the possibility of generating abnormal profits based on this anomaly. By examining whether momentum strategy employed on zero-cost portfolios for 3,6,9, and 12 month holding periods for a total of six years generates abnormal returns. The t-statistic is used to test the hypothesis. The results of the study show that stocks listed on the Nairobi Stock Exchange experience price continuation. Stocks experiencing a decline in their prices continue depreciating in price for a period not more than twelve months. On the other hand stocks experiencing price rise continue appreciating for a period not more than twelve months.

Portfolios constructed on these stocks and held for periods of six, nine and twelve months indicate that momentum profits are present on the Nairobi Stock Exchange. However returns on portfolios held for three months give insignificant results. The implication for this study is that its possible to beat the Nairobi Stock Exchange market by investing in stocks whose prices have shown an appreciation in the short term and divesting from stocks whose prices have depreciated in the short term. From the findings of this study it could be inferred that the Nairobi Stock Exchange is not efficient hence the presence of the momentum anomaly.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

In recent years a body of evidence on security returns has presented a sharp challenge to the traditional view that securities are rationally priced to reflect all publicly available information.

Hirshleifer (1998) documents some of the more pervasive anomalies, which include:

1) Event based return predictability, (Bernard and Thomas (1989,1990)).

2) Short-term momentum (positive short-term autocorrelation of stock returns for individual stocks and the market as a whole (Jegadeesh (1990); Rouwenhorst (1998)).

3) Long-term reversals (DeBondt and Thaler (1985,1987); Fama and French (1998)).

4) High Volatility of assets prices relative to fundamentals, (Shiller (1981,1989); Marsh and Merton (1986)).

5) Short run post-earnings announcement stock price drift in the direction of long term earnings changes, (DeBondt and Thaler (1987); Lakonishok et al. (1994)).

Numerous studies examine the profitability of trading strategies that exploit interdependence of time series returns. These studies show that these strategies could lead to abnormal returns.

Jegadeesh and Titman (1993) document that over a horizon of three to twelve months past winners on average continue to out perform past losers about 1 % per month showing that there is momentum in stock prices

By contrast DeBondt and Thaler (1985,1987) document return reversals over longer horizons. Firms with poor three to five year's performance earn higher average returns than firms that performed well in the past.

Givoly and Lakonishok (1979), Latane and Jones (1979) and Bernard and Thomas (1989) document that earnings momentum strategies earn significant abnormal returns. In their latter studies, Jegadeesh and Titman (1998) found a striking seasonality in momentum profits. They found out that winners outperform losers in all months except January; but losers significantly outperform winners in January.

On the international scene, several studies have been conducted on momentum strategies. Rouwenhorst (1979) in his study of profitability of momentum strategies for equities using a sample of twelve European countries, found the strategies to be profitable. Chan et al. (2002) examined profitability of momentum strategies implemented on international stock market indices. Their results provide significant evidence of momentum profits. According to their study momentum profits arise mainly from time series predictability in the currency markets. The study also found continuation to be stronger following an increase in the trading volume. This confirmed the informational role of volume and its applicability in technical analysis.

Rouwenhorst (1998) reports that emerging market stocks exhibit momentum. Bekeart et al (1997) on the hand found that momentum strategies are not consistently profitable for emerging for emerging markets, although they perform better when the investable indexes are examined.

Many studies have been conducted to find out the profitability of momentum strategies. Grinblatt et al (1995) attributed momentum profits to investors herding behaviour. He found out that the majority of mutual funds buy stocks based on their past returns, namely buying past winners and that funds showing the greatest tendency to buy past winners also tend to invest more intensely with the crowd than other funds do.
Earlier studies by Lakonishok (1992) show that pension fund managers either buy or sell in herds, with slightly stronger evidence that they herd around small stocks.

Chan et al. (1996) argued that long term continuation can be explained in part by under reaction to earning information, but price momentum is not subsumed by earnings news

and that a substantial portion of the momentum effect is concentrated around subsequent earnings announcement.

Lee and Swaminathan (1999) attributes momentum profits to trading volume. They did this by showing that past trading volume predicts both magnitude and the persistence of future price momentum, specifically, high (low) volume winners (losers) experience faster momentum reversals. Their finding of no significant price reversals over three years following portfolio formation refutes the presumption that price momentum is simply a market under reaction. Instead this evidence suggests that at least a portion of the momentum gain is better characterized as an overreaction.

According to Markowitz and Grinblatt (1999), a significant component of firm-specific momentum can be explained by industry momentum. Hong and Stein (1999) observed that short run continuation and long run reversals are more pronounced in small, low-analyst coverage stocks where information diffuses more slowly.

Conrad and Kaul (1998) argued that the profitability of momentum strategies could be entirely due to cross sectional variation in expected returns. This is opposed to behavioural models predictions about past winners and loser's .the behavioural models imply that the holding period abnormal returns are due to delayed overreaction to information, which pushes the prices of winners (losers) above (below) their long-term values. These models predict that in subsequent periods, the stock prices of winners and losers revert to their fundamental values. In contrast Conrad and Kaul (1998) suggest that higher returns winners in the holding period represent their unconditional expected rates of returns.

Jegadeesh and Titman (2002) found intriguing results relating to small versus large stocks and the long versus short position of the trading strategy, given the conventional wisdom that with learning, profit opportunities will be sustained longer when there are higher costs of implementation .the transaction costs explanation suggestion suggest that momentum profits will dissipate faster for larger stocks which are cheaper to trade, a and

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that because of the costs of short selling, the profits from trading past winners should be eliminated more quickly than the profits from trading past losers.

Johnson (2002) advanced the hypothesis that stochastic growth rates may account for some or the entire momentum anomaly.

1.2 STATEMENT OF THE PROBLEM

Does stock price going up considerably over several months imply anything about its price in the future? A response to this question according to efficient market hypothesis would be that past price changes do not predict future price changes.

However a large and growing body of evidence suggests that what past price movements mean for future price changes depends on the horizon. DeBondt and Thaler (1985,1987) states that in a period of three to five years, what goes up apparently comes down and vice versa. In the long term past losers earn higher returns than past winners.

Studies by Jegadeesh and Titman (1993) similarly provide evidence that in the short term what goes up tends to keep rising. For instance stocks whose price appreciated in the past continue rising in price for the next three to twelve months, whereas stocks whose prices have depreciated in the recent past, continue experiencing a price fall over the same time horizon.

Many money managers and stock analysts attempt to exploit this pattern of price momentum. For instance academic studies have documented that mutual funds typically buy past winners and sell past losers .in addition stocks with very strong buy recommendation from analysts typically experience high price momentum, while stocks with strong sell recommendation exhibit low price momentum, (Hong and Stein, (1999)).

In emerging markets research conducted on momentum strategies and their profitability give mixed up results. Bekeart et al. (1997) reported that momentum strategies are not consistently profitable in emerging markets, although they perform better when investable indices are examined.

Allauden et al.(1999) in their study, which provided evidence on profitability of momentum strategies from the pacific basin stock markets, reports that momentum medium term return continuation in a sample of six Asian stock markets does not yield

significant returns .the study attributed this finding to high volatility of returns and high transaction costs that characterized the markets under their study.

Given the inconsistency documented in the above studies in the emerging markets and the need to understand momentum strategies profitability so as to exploit them this study aimed at answering the question: "is it possible to beat the Nairobi Stock Exchange using momentum strategies?"

1.3 OBJECTIVES OF THE STUDY

1. To determine whether momentum strategies employed on portfolios of stocks listed on the Nairobi Stock Exchange yields abnormal returns.

2. To test whether the Nairobi Stock Exchange is an efficient market.

1.4 HYPOTHESIS OF THE STUDY

Null hypothesis

Stocks quoted on the Nairobi Stock Exchange do not exhibit momentum returns. Hence the difference between the winner and loser portfolios is equal to zero.

Alternative hypothesis

Stocks quoted on the Nairobi Stock Exchange exhibit momentum returns. Hence the difference between the winner and loser portfolios is not equal to zero.

1.5 IMPORTANCE OF THE STUDY

INVESTORS

Foreign and local investors whom the government is trying to attract in large numbers will find this study of great importance in making buy and sell decisions.

GOVERNMENT

In drawing policies affecting the companies, the government need to consider the effect of momentum on the firm's earnings, since it has direct influence.

MANAGEMENT

Since management is responsible for the daily running of the company, effects of momentum on their firm's stock prices may affect their actions either positively or negatively.

ACADEMICIANS

Scholars to conduct further research on the other stock market conditions and their implications on the level of market efficiency can use this study.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The concept of market efficiency is the foundation for much of the theoretical and empirical research in finance. The early test surveyed by Fama and French (1970) generally provide evidence in support of the efficient market hypothesis.

However some recent studies provide evidence of predictability of returns on market indices and size-sorted portfolios. For example Fama and French (1988) report negative serial correlation in market returns over observation intervals of three to five years, and Lo and McKinley (1997) report positive serial correlation in weekly returns.

For individual securities, statistical evidence against the random walk model for stock has been documented, but the extent of predictability of returns is generally considered economically insignificant. For instance French and Roll (1986) reports significant negative serial correlation in daily returns but suggest that it is small in absolute magnitude and that it is hard to gauge their economic significance.

In a more recent paper Lo and McKinley (1997) consider weekly holding period returns for individual securities. They report that both serial correlations are both statistically and economically insignificant.

2.2 EMPIRICAL STUDIES ON MOMENTUM STRATEGIES

Jegadeesh and Titman (1990) examined the predictability of returns on individual stocks. Their findings provided new evidence of stock return predictability. They found that negative first order serial correlation to be highly significant. Furthermore, significant positive serial correlation is found at longer lags, and the twelve-month serial correlation is particularly strong.

It is thus becoming increasingly clear that the traditional asset pricing models such as Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965), Ross (1976) Arbitrage Process Theory (APT) or Merton's (1973) Intertemporal Capital Asset Pricing Model (ICAPM) have had a hard time explaining the growing set of stylised facts.

In the context of the above models all of the predictable patterns in asset returns at both short and long term horizons, must ultimately be traced to differences in loadings on economically meaningfully risk factors. And there is little affirmative evidence to suggest that this can be done.

Research in experimental psychology suggests that most people overreact to unexpected dramatic news events. DeBondt and Thaler (1987) found out that in the long-term period of three to five years, portfolios of prior losers are found to out perform prior winners. They found out that, 36 months after portfolio formation the losing stocks had earned 25% more than the winners, even thou the latter are significantly risky.

Jegadeesh and Titman (1993) on the hand provided evidence that in a period of one to three years there exists price continuation. Stocks whose price has been on the upward trend keep rising while those whose price has been on the downward trend keep deteriorating for the next one-year. This price continuation is what is referred to as momentum effects.

Sharpe (1996) describes momentum strategy as involving buying those stocks that have recently appreciated in price .on the belief that their prices will continue rising due to a shift in their demand curves. Conversely those stocks that have had recently fallen significantly in price are sold on the belief that their demand curves have shifted downwards.

Studies by Givoly and Lakonishok (1979) Latane and Jones (1979) and Bernard and Thomas (1989) among others, document that earning momentum strategies earn significantly abnormal returns.

Jegadeesh and Titman(1993) examined variety momentum strategies that buy stocks with high returns over the previous three to twelve months and sell stocks with poor returns over the same period. They found that such strategies earn a profit of about 1 % per month for the following one year.

In another study Jegadeesh and Titman (1996) suggests that earlier findings were not a statistical fluke, since the momentum profits in January for their study were negative. This indicates that most previously reported negative returns in January were due to small and low-priced stocks, which are likely to be difficult to trade at the reported CRSP prices

For emerging markets, Beakert et al. (1977) found out that momentum strategies were consistently profitable: although they perform better when investable indexes are examined. Rouwenhorst (1997) conducted a study on international momentum strategies using a sample of twelve European countries, for the period between 1980 and 1995.he found that an internationally diversified portfolio past medium term winners outperforms a portfolio of medium term losers after correcting for risk by more than 1 %per month .he also found that return continuation to be present in all twelve samples countries and last for about one year. Return continuation is negatively related to firm size, but is not limited to small firms (Rouwenhorst, 1997).

Another study by Tong et al. (1997) examined profitability of momentum strategies, implemented on international stock markets indices. Their Results indicated statistically significant momentum profits in international diversified portfolio. Tong et al. (2000) extended the analysis of momentum strategies to the global equity markets and contributed to literature as follows:

1) They implemented the momentum strategies based on, individual stock market indices. As a growing number of international equity funds gain access

to foreign equity markets, Portfolio managers have to make top-down decisions on international asset locations.

2) They examined how foreign exchange movements affect the profitability of international momentum strategies. Profits from international momentum investment portfolios depend on the interrelationship between currency and equity markets. E.g. consider a US investor who implements a momentum strategy that involves buying British stocks. If British pounds tend to appreciate following a rise in the British equity market, the US investors profits when she liquidates the British stock portfolio and converts back the US dollars. In such a case, momentum profits do not come from return continuation in the equity market, but from interdependence between currency and equity markets.

3) They investigated whether trading volume information affects the profitability of momentum strategies. Volume was long received attention from technical analysts who believe that volume data provides important information about future price movements.

Tong et al. (2000) concluded that momentum profits are statistically and economically significant especially for short holding periods (less than four weeks). Although the momentum profits could be increased by exploiting exchange rate information. Their major source is price continuations in individual stock indices. The evidence in Tong et al (2000) also indicates that momentum profits cannot be completely explained by non-synchronous trading and are not defined to emerging markets although it seems that they diminish significantly after adjusting for beta risk. Momentum profits were reported to be high when momentum strategies were implemented on markets that experienced increases in volume in the previous period. This indicates that return continuation is stronger following an increase in trading volume.

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In a later study, Jegadeesh (1999) concluded that substantial portion of momentum effect is indeed concentrated around a subsequent earnings announcement. An earlier study by Lakonishok et al (1992) had provided evidence of pension fund managers either buying or selling in herds with slightly stronger evidence that they held around small stocks.

Grinblatt et al. (1995) in their study of momentum strategies and portfolio performance provided further evidence on herding behaviour by investors. They found out that the majority of mutual funds buy stocks based on their past returns, namely buying past winners, and that funds showing the greatest tendency to buy past winners also tend to invest more intensely with the crowd than other funds do.

2.3 EXPLANATIONS FOR MOMENTUM EFFECTS IN STOCKS

Given the persistence of momentum effects anomaly, it is important to understand its cause. Other authors have attempted to explain momentum effect e.g. Vishny et al (1998), Subrahmanyan et al (1998) and Hong and stein (1999) present behavioural models that are based on the idea that momentum profits arise because of inherent biases in the way investors interpret information. Others have argued that it is premature to reject the rational models and suggest that it is premature to reject the rational models and suggest that the profitability of momentum strategies may simply be compensation for risk.

However there seems to be consensus that the short horizon under reaction evidence cannot be explained in terms of risk. Bernard and Thomas (1989) rejected risk as an explanation for post earnings announcement drift, and Fama and French (1996) remark that the continuation results of Jegadeesh and Titman (1996) constitute the main embarrassment for their three-factor model.

2.3.1 UNCONDITIONAL EXPECTED RETURNS THEORY

Conrad and Kaul (1998) have argued that profitability of momentum strategies could be entirely due to cross-sectional variation in expected returns rather than to any predictable

time-series variations in stock returns. Specifically following Lo and McKinley 1990), Jegadeesh and Titman (1993) and others, they note that stocks with high (low) unconditional expected rates of return in adjacent time periods are expected to have high (low) realized rates of return in both periods.

Hence under the Conrad and Kaul (1998) hypothesis, momentum strategies yield positive returns on average each if the expected returns on stock of constant over time. Finding was inconsistent with study by Jegadeesh and Titman (1998) refuted Conrad and Kaul hypothesis.

2.3.2 OVERCONFIDENCE THEORY

Many economists would agree that their notion rationality should not be taken too, literally. First this notion implicitly assumes that individuals have an unlimited ability to both observe and process information. In reality investors do much of their analysis based on feelings, which can easily be influenced by behavioural biases

Behavioural finance offers an alternative paradigm to the efficient market theory, one in which individuals make systematic mistakes in the way they process information. The most prominent anomalies can be explained by 'investor overconfidence. Over confidence is one of the most strongly documented behavioural bases .in their summary of the micro-foundations of behavioural finance; DeBondt and Thaler (1995) stated the finding that people are overconfident as perhaps the most robust finding in the psychology of judgement. Moreover some evidence suggest that experts tend to be more overconfident that relatively inexperienced individuals (Griffin and Tvesky, 1992).

Experimental evidence also suggests that the degree to which individuals are overconfident depends on the situation. Overconfidence is generally stronger for more diffuse tasks for which feedback is slow than for more mechanical tasks that provide immediate and conclusive outcome feedback, such as solving arithmetic problems and weather forecasting (Einhorn, 1980)

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Evolutionary theories suggest that those individuals who appear to be the strongest and the smartest are more likely to attract mates and reproduce .The ability to act as thou one is strong and smart, therefore provides comparative advantage in the evolutionary competition for survival.

For similar reasons appearing to be confident might enhance short-term economic survival. Even in the money management business, where results are easy to measure and reward. Kent and Titman (1999) suspected that portfolio managers who appear more confident would more successfully attract clients. An important ingredient in this theory is that individuals can better fool others about their ability if they can first fool themselves.

In other words, self-confident individuals will appear to be more competent than individuals who are insecure about their own abilities. As a result individuals who successfully filter information in ways that add to their self-confidence, might in theory, be more successful than individuals who always interpret information rationally.

Overconfidence has both direct and indirect effect on how individuals process information. The direct effect discussed by Daniel et al. (1998), is simply that individuals place too much emphasis on information they collect themselves because they tend to ever estimate the precision of such information.

The indirect effect of overconfidence arises because individuals filter information and bias their behaviour in ways that allow them to maintain their confidence, (Daniel et al., 1998).
Psychologists have developed theories describe this type of behaviour. Among the theories developed are cognitive dissonance, attribution biases, and conservatism.
Daniel et al. (1998) and Barberis and Vishny (1998) discussed how this kind of biases could explain momentum effects. Interestingly these models illustrate how overconfidence can generate both overreaction and under reaction and how both reactions can be consistent with momentum effects. Specifically, Barberis and Vishny (1998)

described a conservative bias that results in investors over weighting their prior beliefs and thereby under reacting to new information using representative agent models.

However, Hong and Stein (1999) argued that it is impossible to make predictions linking trading horizons to the temporal pattern of autocorrelations. Second neither the Barberis et al. (1998) model nor the Daniel et al. model seem to be able to easily generate their prediction that both continuation and reversals are more pronounced in stocks with thinner analyst coverage. A further difference is that this model allows for a differential impose response to public and private shocks.

In Daniel et al. (1998) investors are found to estimate investments value together with the precision of their valuation. Because of attribution, they overweighed information that confirmed their original valuation and under weighted information that was inconsistent with their views. As a result their estimates of the precision of their valuations increased over time, which could produce momentum as a sort of delayed overreaction.

However, Lee and Swaminathan (1998) findings refute the common presumption that price momentum is simply a market under reaction. Instead the evidence suggests that at least a portion of the initial momentum gain is better characterized as an overreaction.

A later study by Hong and Stein (1999) developed a unified theory of how under reaction and overreaction explains momentum trading. In their study they modelled a market populated by two groups of agents each being able only to process some subset of the available public information. The two agents: news watchers and momentum traders are bounded rationally and reversals are ascribed to the interaction at the market place. Less of the action in their model comes from particular cognitive biases that they ascribed to individual traders and more of it came from the way these traders interact with one another.

The news watchers make forecasts based on signals that they privately observe about future fundamentals: their limitation is that they do not condition on current or past

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prices. Momentum traders, in contrast, do not condition on past prices changes. However their limitation is that their forecasts must be simple functions of the history of past prices.

In addition to Hong and Stein (1999), imposing the above constraints on the information processing abilities of their traders in their model they made a further assumption, which was more orthodox in nature. They assumed that private information diffuses gradually across the news watchers population.

Hong and Stein (1999) showed that when only news watchers are active prices adjust slowly to new information thus leading to under reaction but never overreaction. When momentum traders are added it is tempting to conjecture that, since they condition on past prices, they arbitrage away any under reaction left behind by the news watchers. With sufficient risk tolerance, one might expect that they may force the market to become approximately efficient.

However it turned out that this intuition is incomplete if momentum traders are limited to simple strategies. For example suppose that a momentum trader at time t must base his trade only on the price change over some prior interval, say from t-2 to t-1. They showed that momentum trader' attempts to profit from under reaction caused by news watchers lead to perverse income.

The initial reaction of price in the direction of fundamentals is indeed accelerated, but this comes at he expense of creating an eventual overreaction to any news. This is true even when momentum traders are risk neutral.

The key to the above result is the assumption that momentum traders use simple strategies-that is they do not condition on all public information. Continuing with the example if momentum traders order at time t is restricted to being a function of just the price change from time t-2 to t-1, it is clear that it must be an increasing function. On the average the simple trend chasing strategy make money. But if one could condition on

more information, it would become apparent that the strategy does better in some circumstances than in others.

In particular the strategy earns the bulk of its profits in the momentum cycle (shortly after substantial news has arrived to the news watchers), and loses money late in the cycle, by which time prices have already overshot long -run equilibrium values. To illustrate the above point, suppose there is a single dose of good news at time t and no change in fundamentals after that. The news watchers cause prices to jump at time t, but far enough, so that they are still bellow their long run values .at time t+1 there is a round of momentum purchases and those momentum buyers who get in at this time make money. But this round of momentum trading creates further price increase, which sets off more momentum buying, and so on. Later momentum buyers (i.e. those buying at time t+i for some i) lose money, because they get in at price above the long run equilibrium.

Thus the crucial insight is that early momentum buyers impose a negative externality on late momentum buyers. Ideally one uses a momentum strategy because a price increase signals that there is good news about fundamental out there that is not fully incorporated into prices.

But sometimes a price increase is the result not of news but just of previous rounds of momentum trade. Because momentum traders cannot directly condition on whether or not news has recently arrived, they do not know whether they are early or late in the cycle. Hence they must live with the externality and accept the fact that sometimes they buy when earlier rounds of momentum trading have pushed prices past long-run equilibrium values.

Although Hong and Stein (1999) make two distinct bounded-rationality assumptions their model can be said to unify under reaction and overreaction in the following sense. They began by modelling a tendency by one group of traders to under react to private information. They then showed that when a second group of traders tries to exploit this under reaction with a simple arbitrage strategy, they only partially eliminate it, and in so

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doing, create an excessive momentum in prices that inevitably culminates in overreaction. Thus the very existence of under reaction sows seed for over reaction, by making it profitable for momentum traders to enter the market. Or said differently the unity lays in the fact that Hong and Stein (1999) model gets both under reaction and over reaction out of just one primitive type of shock, gradually diffusing news about fundamentals. There are no exogenous shocks and no liquidity motivated traders.

2.3.3 ANALYST DELAY IN ADJUSTING FORECASTS THEORY

Klein (1990) found that analyst remain overly optimistic in their forecast for companies that have experienced poor stock price performance. One conjecture is that it may not be in analyst best interest to be the first messenger with bad news (a negative forecast) because doing so might antagonize corporate managers. Analysts may prefer to remain optimistic and wait for additional confirmatory evidence of poor earnings before slowly modifying their estimates.

Chan et al (1999) investigated the returns of momentum strategy around earnings announcement and future analysts' revisions for the portfolio formed on the standardized unexpected earnings and past analysts' revision. Their findings were similar to the findings for the price momentum portfolios. The market was pleasantly surprised around earnings announcement for the winners up to two quarters after portfolio formation and vice versa for the loser.

Meanwhile analysts gradually revised down ward their earnings forecast s for all companies. The down ward revision was more pronounced for past losers. All in all the association between prior returns and prior earnings news as well as the sluggishness in the markets response to the past earnings surprise provides further evidence that the market is slow in fully responding to new information.

Another of evidence compatible with the sluggish response of market participants are the, long time it takes to analyst to adjust their forecasts. According to Hong and Stein (1999) both short term and long-term continuation reversals should be more pronounced in those small, low-analyst coverage stocks where information diffuses more slowly.

This inertia in revising forecasts may not be helping the market to assimilate new information in a timely fashion. Analysts are especially slow in revising their estimates in firms with the worst performance. This may be due to the incentives analysts have to maintain good relations with corporate managers (Givoly et al., 1979).

2.3.4 TRADING VOLUME THEORY

Several theoretical papers conjecture that there is a relationship between trading volume and predictable patterns in short horizons security returns. Blueme et al. (1994) showed that volume provides information that cannas be deduced from the price statistic and demonstrated that traders who use information contained in the volume statistic do better than those who do not.

Campbell et al. (1993) argued that because the variation in the aggregate demand of the liquidity also generate large levels of the trade, volume information can help distinguish between price movements that are due to fluctuating demands of liquidity traders and those that are due to changes in expected returns. An implication of these models is that price changes accompanied by large trading volume tend to be reversed.

Wang (1994) examines the link between the nature of heterogeneity among investors and the behaviour of trading volume and its relation to the price dynamics. In the model uninformed investors trade against informed investors and will revise their positions when they realize their mistakes. When the returns are higher in the previous period it could be due to private information informational investors or simply buying pressure from non-informational reasons. If it is due to private information the high-realized

returns accompanied by high volume in the past will be followed by high future returns. If it is due to non-informational reasons the high-realized return will be followed by low future returns.

Conrad et al. (1994) provides empirical evidence on the relations. They report that high transaction securities experience price reversals, while the returns of low transactions securities are positively auto correlated, a result that seems to be consistent with Campbell et al. (1993).

Rouwenhorst (1998) examined whether the volume information could result to momentum. He found profits and weekly returns to be higher for portfolios of countries with high lagged trading volume than portfolios of countries with low lagged trading volume. This indicates that price continuation is stronger following an increase in trading volume.

Lee and Swaminathan (1999) in their study of price momentum and trading volume found that past trading volume predicts both the magnitude and the persistence of future price momentum. Specifically high (low) volume winners (losers) experience faster momentum reversals

Chan et al. (2000) also examined whether the volume information could affect the momentum profits for a sample of seventeen markets. They reported that the profits and weekly returns were higher for the portfolios of countries with high lagged trading volume than for the portfolios of countries with low lagged trading volume. This indicates that price continuation is stronger following an increase in trading volume. This result is inconsistent with the conjuncture that momentum profits arise from under reaction to information due to insufficient trading .it also contradicts the prediction of Campbell et al (1993) and the empirical evidence in Conrad et al (1994).

Finally the evidence also suggests that price continuation cannot be explained by non-synchronous trading. According to non-synchronous hypothesis when trading volume is

high at time t-1, so that there will be less return continuation at time t. On further examination of non-synchronous trading, hypothesis Chan et al (2000) found out that not all momentum profit could be explained by this theory. Although the theory holds that when there is non-synchronous trading, index returns are likely to be auto correlated so that momentum strategies that exploit return continuation seem to be profitable.

To mitigate the effect of non-synchronous trading, Tong et al (2000) implemented the strategy with a lag of one week: that is buying winner countries and selling loser countries stocks one week one week after evaluating their past performance .If all components of underlying stock indices trade at least one week, this procedure was adequate in eliminating any spurious momentum profits due to non synchronous trading. Certainly if the stocks trade much more frequently and momentum builds up within a week, the above correction procedure will over adjust for the non-synchronous trading bias and then the momentum profits will be under stated.

Besides the beta they also calculated the variance of high volume and low volume momentum portfolios. They found variance of high volume portfolios to be lower than that of low volume portfolios, and therefore refuted the conjuncture that the profits to high volume portfolios are due to higher total risks the risk adjusted return.

2.3.5 DIFFERENT BETAS IN THE UP AND DOWN MARKETS
Another explanation for the momentum profits is that the simple beta adjustment is not adequate in reflecting compensation for risk. As reported by Rouwenhorst (1998), the winners and the loser's could have different betas in up and down markets. To evaluate this possibility Chan et al (2000) regressed the excess U.S dollar returns (in excess of risk free rate) of their momentum portfolios on the excess of the Morgan Stanley Capital International world index, but allowed for different betas in the up and down markets.

For the momentum effects to be consistent with market dependent betas, winners will have higher betas in up market and lower betas than losers in a down market. Chan et al

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(2000) provided evidence that was partially consistent with the above explanation. Their evidence shows that winner countries have lower betas than loser countries during the down market. After the adjustment for the changing betas in the up and down market, the risk-adjusted returns become smaller and statistically significant only for the two-week holding period.

Chan et al (2000) also performed similar risk adjustment for returns of momentum portfolios partitioned by high and low past trading volume. Their results showed that for momentum portfolios with low past trading volume the risk adjusted returns are generally insignificant for short horizons. Therefore even thou the returns for momentum strategies under low trading volume, they do not fully explain the results to momentum strategies when trading volume is high.

Besides the beta Chan et al (2000) also calculated the variance of high volume and low volume momentum portfolios. They found variance of high volume portfolios to be lower than that of low volume portfolios, and therefore refuted the conjuncture that the profits to high volume portfolios are due to higher total risks the risk adjusted return.

2.3.6 SIZE OF STOCKS THEORY

Lakonishok et al. (1992) provides evidence of pension fund managers' tendency to buy past winners and sell past losers in herds with slightly stronger evidence that they herd around small stocks. In addition Hong and Stein (2001), reported that short run continuation and long run reversals should be more pronounced in small stocks.

Jegadeesh and Titman (2001) found intriguing results relating to small versus large stocks and the long side versus short side of trading strategy, given the conventional wisdom that learning, profit opportunities will be sustained longer when there are higher costs of implementing the strategies.

The transaction costs explanation suggests that momentum profits will dissipate faster for stocks, which are cheaper to trade, and that because of the costs of short selling the

profits from trading past winners should be eliminated more quickly than profits from trading past losers. On examining raw returns, Jegadeesh and Titman (2001) found reversals for the large firms but for small firms they did find somewhat stronger evidence of post-holding period return reversals.

2.3.7 STOCHASTIC GROWTH RATES

There does appear to be few more flagrant affronts to the idea of large excess returns to simple momentum strategies in the stock market. So naturally do these profits suggest under reaction by the market and so unpromising seems the attempt to associate the rewards with risk factors, that asset pricing theories have mostly seen the task as simply one of deciding which sort of irrationality is at work.

Johnson (2002) suggests that the case for rational momentum effect is not hopeless, he advanced the hypothesis that stochastic growth rates may account for some or all of the momentum anomaly .He argued that stock prices depend on growth rates in a highly sensitive, non-linear way. Ceteris peribus recent performance is correlated with levels of expected growth rate, which is monotonically related to risk.

Infact a simple standard model of firm's cash flows discounted by an ordinary pricing kernel can deliver strong positive correlation between past-realized returns and current expected returns. The framework is simplified and ignores many features crucial to valuing real firms. Johnson (2002) sought to call attention to a direct, plausible and rational mechanism that may contribute to the momentum effects phenomenon.

The key to Johnson (2002) model is stochastic expected growth rate .By their nature such growth rates affects returns in highly non-linear way, and the dynamics they imply differ from those of familiar linear factors. Specifically the curvature with respect to growth rates of equity prices is extreme: their log is convex. This property means that growth rate risk rises with growth rates. Assuming that exposure to this carries a positive price, expected returns then rise with growth rates. Other things equal, firms that have recently had large positive price moves are more likely to have had positive growth rate shocks,

than other firms, with negative growth shocks more likely among poor performers. Hence a momentum sort will thus tend to sort according to growth rate levels, and hence by end of period expected returns.

When it comes to mimicking actual empirical results the basic model, runs into some Problems. Most noticeably to achieve large effects growth rate shocks must decay quite slowly. But this persistence implies risk premier and the associated risks will also be persistent. By contrast excess returned to portfolios formed according to momentum vanish for holding periods beyond one year. Moreover violating differences between high and low momentum portfolios are not large in past formation periods suggesting that Johnson (2002) addresses this and other shortcomings of the original model with a natural extension allowing shocks to growth rates to be episodic.

More precisely he envisioned a precise a two-regime process in which persistent shocks occur only in the more infrequent short-lived state. This introduced a characteristic time scale beyond which effects would be undetectable. The switching model can also explain the Fact that either short or long term portfolio formation periods capture changes in the subsequent expected returns.

While the enhanced model sacrifices the tractability of the original its premise is not artificial. The intuition is simply that the persistent growth rate shocks represent major changes in a business condition like those associated with fundamental technological innovation. Such innovations do tend to be rare and episodic. Moreover technological shocks are likely to be common within sectors, which might account for industry component of momentum profits reported by Markowitz and Grinblatt (1999).

Recent work by Berk et al (1999) demonstrates that a rich variety of return patterns including momentum effects can result from the variation of exposures over the life cycle of firms endogenously chosen projects. Johnson (2002) complimented the above line of research by pointing out a more direct channel from Cash flows to momentum in returns.

In conclusion Johnson (2002) implies that past performance is essentially acting as: first an instrument for persistent change in expected dividend. Secondly, Perhaps the most fundamental objective to risk based explanations of objection is that risk is part of the story that seems absent. Momentum strategies do not appear officially dangerous. Johnson (2002) skirted the above issue by not identifying the state price density covariance with which of which is the relevant measure of dangerousness.

The empirical task in the above study is first to establish to establish weather there is a systematic and persistent component to growth rate shocks at all. And secondly to establish whether exposure to those components is associated with positive expected returns independent of momentum.

PART THREE: RESEARCH METHODOLOGY

3.1 POPULATION

The population of this study comprised of all the firms listed on the Nairobi Stock Exchange as at December 31st 1997(appendix1).

3.2 DATA

This study made use of secondary data on stocks for the period January December 1997 to December 2003.The data was obtained from the N.S.E database. The list of quoted firms was obtained from the Nairobi stock Exchange library.

3.3 STRATEGY FORMULATIONS AND EVALUATION

3.3.1 TRADING STRATEGIES

The momentum/relative strength portfolios were constructed as in Jegadeesh and Titman (1993). At the end of each month all stocks with a return history of at least 12 months are ranked in descending order based on their j-month return (j=3,6,9,12) and assigned to one of three portfolios .The 15 highest past performers are assigned to a portfolio referred to as winner portfolio whereas the 15 lowest performers are assigned to portfolio referred to as loser portfolio. The middle portfolio comprising of 30% of the quoted stocks is excluded from the study. The study makes use of 70% of the population, which was considered to be a good representation of the entire population under study. The winner and loser portfolio are equally weighted at formation and held for k subsequent months (k=3,6,9,12 months) during which time they are not rebalanced. The holding period exceeds the interval over which information is available (monthly) which creates an overlap in the holding period returns.

This study follows Jegadeesh and Titman (1993) who reports the monthly average returns of k strategies each starting one month a part. This is equivalent to composite portfolios in which each month 1/k of the holdings are revised. For example toward the end of the month the j=6,k=3 portfolios of winners consist of 3 parts: a position carried over from

an investment of one KSH. At the end of month t-3 in the firms with the highest prior 6-month performance as of t-3 and two similar positions resulting from a KSH invested in top-performing firms at end of month t, the first of these holdings were liquidated and replaced with a unit KSH investment with the highest 6-month performance as at time t. Thus the study tested 16 strategies made up of combinations of j=3,6,9,12 and k=3,6,9,12.

3.3.2 ANALYSIS OF THE STRATEGIES

Step one: computation of monthly returns

The stock returns were computed by adding monthly dividend the stock price differential for the month under consideration and dividing this by the stocks' beginning of period price as indicated in the formula below.

$$Rs_{(t)} = \frac{(PE-PB)+DIV}{PB}$$

Where:

PE $\rightarrow$ Stock price at time t

PB $\rightarrow$ Stock price at time t-1

DIV $\rightarrow$ Monthly dividend

Rst $\rightarrow$ Return on the stock at time t

S $\rightarrow$ Stock number (1-45)

t $\rightarrow$ Time (1-72 months)

Step two: Computation of j-month return

The j-month (j=3,6,9,12) return for each stock was computed by averaging its monthly return for j months and dividing this by j as shown in the formula below.

$$R_s(j) = \sum \frac{Rs(t)}{j}$$

$R_{s(j)}$ → average monthly return for stock s for j-months

$R_{s(t)}$ → monthly return for stock s at time t

j → number of months (j=3,6,9,12)

Step three: Ranking of stocks and portfolio formation

The stocks were ranked based on their j-month returns and assign the top and bottom 15 stocks to winner and loser portfolios respectively.

Step four: Computation of portfolio returns

The portfolios were then held for k-months (k=3,6,9,12) after which there returns were computed. To compute this return, the monthly return for each stock in the portfolio for k-months is summed and the total divided by the number of stocks in the portfolio (15). Using the formula given below.

$$R_{W(j/k)} = \sum_{S=1}^{15} \left\{ \sum_{t=1}^{k} Rs_{(t)} \right\}/j$$

$$R_{L(j/k)} = \sum_{S=1}^{15} \left\{ \sum_{t=1}^{k} Rs_{(t)} \right\}/j$$

Where

$R_{W(j/k)}$→ Average monthly return on winner portfolio held under j-month/k-month strategy

$R_{L(j/k)} \rightarrow$ Average monthly return on loser portfolio held under j-month/k-month strategy

   s $\rightarrow$ number stock(1-15)

   t $\rightarrow$ time(1-k)

   k $\rightarrow$ holding period (k=3,6,9,12)

Step five: Computation of zero-cost portfolio return

The returns on the zero-cost portfolio were computed by subtracting the average monthly return on the loser portfolio from that of the winner portfolio. The formula used is given below;

$$R_{(W-L)(j/k)} = R_{W(j/k)} - R_{L(j/k)}$$

Step six: Testing for significance of the portfolio's average return

Statistical tool used to test the significance of this returns was the t-test, which was computed at 95% level of significance. The maximum allowed error using this tool is 0.05.

CHAPTER FOUR: DATA ANALYSIS

4.1 DETECTION OF MOMENTUM

Table 1 below reports the monthly returns for the stocks incorporated in this study. The returns were computed using the market model in which the stocks closing price for the month is added to its monthly dividend and the closing price subtracted from the sum of the two .the resulting figure is then divided by the stocks price at the beginning of the month to obtain the returns indicated in the table below. The first row gives the name of the firm, whereas the first column gives the month for which the return is computed. The returns in the tables indicate that there exists price continuation in stocks for periods less than 12 months.

TABLE I: STOCKS MONTHLY RETURNS

1998	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SNG	0.094	-0.138	-0.080	0.000	-0.457	0.120	-0.286	-0.010	-0.394	-0.158	1.079	-0.152
KENAIR	0.255	-0.121	0.000	0.006	-0.006	-0.125	0.214	-0.035	-0.146	0.014	0.014	0.042
NIC	0.000	0.060	0.000	-0.358	0.338	-0.077	0.060	-0.056	-0.119	-0.095	-0.119	-0.017
FIREST	0.234	0.017	-0.102	-0.321	-0.042	0.043	0.000	0.006	-0.116	0.000	-0.063	0.067
PANAFR	-0.090	-0.079	-0.029	0.000	-0.088	-0.032	0.000	-0.008	-0.076	-0.127	0.042	0.000
EABL	0.072	-0.038	0.020	-0.039	-0.026	0.141	0.028	0.000	-0.063	-0.057	0.051	0.000
DUNLOP	0.040	-0.038	0.000	-0.030	-0.113	1.093	-0.150	-0.819	-0.055	-0.231	-0.140	0.058
MARSH	0.045	0.037	-0.012	0.000	0.000	0.012	-0.012	-0.345	-0.055	-0.038	0.000	0.010
NBK	0.111	-0.114	0.008	-0.168	0.010	0.119	-0.149	-0.050	-0.053	-0.111	-0.250	0.000
DTK	-0.011	0.000	0.023	-0.089	0.073	0.000	-0.091	0.000	-0.038	0.039	0.050	0.000
EAPORT	0.625	-0.077	-0.042	-0.130	-0.200	0.100	0.045	-0.130	-0.038	-0.026	-0.040	-0.025
TOTAL	0.000	0.143	-0.100	-0.120	-0.074	-0.068	0.000	0.000	-0.037	-0.063	-0.081	0.000
KPL	0.011	0.099	-0.010	-0.152	0.060	0.096	0.000	0.021	-0.035	-0.052	-0.066	-0.335
KCB	0.045	0.012	-0.159	0.014	0.007	0.043	-0.041	0.021	-0.035	-0.151	0.017	0.017
ARM	0.072	0.031	-0.050	-0.032	-0.272	0.343	-0.278	0.000	-0.031	-0.048	0.000	0.050
EACABL	0.000	-0.241	0.136	0.000	-0.040	-0.121	-0.025	0.026	-0.025	-0.026	0.011	0.016
CARB	0.117	0.134	-0.184	0.000	0.008	0.088	0.037	-0.064	-0.015	0.000	-0.031	-0.008
EXP	0.017	-0.092	-0.028	-0.057	-0.225	-0.226	-0.017	0.025	-0.008	0.042	0.008	-0.048
HFCK	0.003	0.042	0.050	-0.048	-0.040	-0.141	0.030	-0.088	-0.006	-0.026	0.100	-0.130
SERENA	0.429	-0.188	0.025	-0.129	-0.169	0.145	-0.058	0.004	-0.004	-0.115	-0.039	0.104
BOC	-0.015	0.046	0.029	-0.021	-0.036	0.008	0.053	0.000	0.000	0.000	0.014	0.000
ABAUM	0.000	0.000	0.029	0.000	0.000	-0.031	0.000	0.000	0.000	0.097	0.000	-0.006
UNGA	0.000	0.292	1.213	-0.003	-0.079	-0.794	-0.077	-0.083	0.000	0.000	0.000	0.000
SASINI	0.011	0.274	-0.074	-0.286	-0.113	0.056	0.000	0.000	0.000	0.000	0.000	0.085
CFC	0.023	0.139	0.000	-0.166	0.053	-0.042	-0.014	-0.059	0.000	0.000	0.000	0.040
BBK	0.043	0.008	0.132	-0.321	0.075	0.000	0.030	-0.010	0.000	-0.025	0.025	0.176
JUB	0.110	0.062	0.047	0.000	-0.122	0.013	-0.225	-0.032	0.000	0.000	0.000	0.000
CARGEN	0.124	0.061	0.042	-0.350	0.038	-0.148	0.043	0.000	0.000	0.000	0.029	-0.028

UCHUMI	0.282	-0.130	0.092	-0.179	0.154	0.022	-0.098	0.024	0.000	0.012	0.000	0.081
ICDC	0.435	0.030	-0.216	-0.119	0.270	-0.106	-0.025	0.026	0.000	-0.175	-0.030	0.313
KAKUZI	0.000	0.156	0.144	0.024	-0.077	0.108	0.090	0.034	0.013	-0.079	-0.029	0.029
LIMTEA	0.007	0.000	-0.007	0.007	0.000	0.000	-0.008	0.000	0.015	0.000	-0.013	0.000
GWK	-0.012	0.306	0.171	0.200	0.000	0.000	-0.135	-0.037	0.015	0.000	0.030	0.044
BAMB	0.021	0.081	0.000	-0.125	-0.057	0.061	0.007	-0.163	0.017	-0.067	-0.063	-0.010
SCBK	0.058	-0.100	-0.067	0.048	-0.023	0.047	-0.044	-0.029	0.018	-0.094	0.039	0.313
KENOL	0.000	0.354	0.015	-0.191	-0.036	0.038	0.036	0.000	0.026	-0.034	-0.027	0.000
CMC	0.529	-0.042	-0.574	-0.224	-0.079	0.007	0.000	-0.007	0.029	0.000	0.000	0.000
REAVIP	-0.091	-0.025	-0.096	-0.007	-0.100	0.063	-0.104	0.050	0.032	0.000	-0.046	-0.024
BBOND	0.171	0.038	-0.111	-0.017	0.017	0.042	0.120	0.036	0.034	-0.013	-0.068	-0.072
BAT	0.020	0.000	-0.100	-0.011	-0.011	0.023	-0.033	0.057	0.087	0.070	0.047	0.107
NMG	0.000	0.015	0.030	0.464	0.040	-0.500	0.143	-0.042	0.087	-0.024	0.008	0.138
CBERG	0.111	0.186	-0.234	0.000	-0.050	0.000	0.000	-0.053	0.111	-0.200	-0.100	0.000
CTRUST	0.007	0.022	0.000	0.000	-0.029	-0.059	-0.156	0.000	0.000	0.000	-0.037	0.000

1999	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SNG	0.136	0.000	0.008	-0.053	-0.050	-0.417	0.152	-0.083	-0.041	0.000	-0.067	0.018
KENOL	0.118	0.000	0.000	0.000	0.267	-0.204	0.165	-0.035	-0.118	-0.010	-0.086	-0.039
CARGEN	0.000	-0.109	-0.060	0.000	0.000	-0.200	0.000	0.000	0.000	-0.026	-0.135	0.094
NIC	0.161	0.042	0.042	-0.119	0.000	-0.189	-0.067	0.089	-0.049	0.081	0.000	0.100
NBK	-0.298	-0.364	-0.250	-0.084	0.133	-0.176	-0.071	0.038	-0.074	0.000	-0.027	0.056
JUB	0.125	0.000	0.000	0.000	0.000	-0.136	0.053	0.000	0.000	0.036	-0.021	0.127
ABAUM	0.015	-0.022	-0.021	-0.125	0.000	-0.067	0.071	-0.067	0.000	0.081	0.000	-0.008
EXP	0.000	0.333	0.000	-0.077	-0.152	-0.063	-0.010	-0.144	-0.169	-0.133	0.038	-0.037
DUNLOP	0.648	0.163	0.258	-0.234	-0.125	-0.048	0.000	-0.080	-0.007	-0.020	-0.153	0.120
UNGA	-0.048	-0.192	-0.106	-0.265	0.240	-0.032	-0.233	-0.130	-0.375	-0.019	-0.029	0.040
BAT	0.258	0.058	0.103	0.000	0.128	-0.031	-0.085	-0.087	0.070	-0.157	0.006	0.000
HFCK	0.380	0.074	0.135	-0.007	-0.007	-0.022	-0.046	-0.040	-0.229	-0.029	-0.361	-0.059
EAPORT	0.140	0.013	0.014	-0.506	0.430	-0.021	0.036	0.000	-0.034	-0.177	-0.028	0.000
CBERG	0.146	0.021	0.015	0.127	0.075	-0.012	0.059	0.467	-0.091	0.121	-0.088	0.000
KCB	0.000	-0.049	-0.059	-0.182	-0.011	-0.011	0.000	-0.102	-0.038	0.032	0.010	0.000
ARM	-0.048	-0.167	-0.105	0.143	0.000	0.000	-0.075	-0.279	0.388	0.000	0.035	0.000
REAVIP	0.000	-0.143	-0.071	0.091	0.000	0.000	-0.167	0.000	-0.090	-0.016	0.000	0.000
CMC	0.000	-0.152	-0.091	-0.067	0.000	0.000	0.071	0.000	0.017	0.071	0.000	0.000
NMG	0.007	-0.033	-0.041	-0.036	-0.015	0.000	-0.200	0.058	0.000	0.000	0.175	-0.007
UCHUMI	0.011	-0.024	-0.038	-0.005	0.031	0.000	0.000	0.010	-0.075	-0.375	0.000	0.000
CARB	0.072	-0.012	-0.007	-0.067	0.000	0.000	0.014	-0.148	0.041	-0.133	0.010	0.000
BBK	0.083	-0.011	0.000	-0.068	0.000	0.000	0.018	-0.013	-0.045	0.000	-0.318	0.000
FIREST	0.125	0.000	0.007	0.000	0.000	0.000	0.000	0.000	-0.176	0.175	-0.021	0.120
KPL	0.150	0.028	0.022	-0.083	0.027	0.000	-0.027	0.000	-0.091	0.020	0.000	0.020
EACABL	0.154	0.040	0.029	-0.136	0.000	0.000	0.000	0.000	0.003	-0.481	0.000	0.000
EABL	0.250	0.056	0.071	0.069	0.013	0.006	0.013	0.069	-0.029	-0.389	0.146	0.143
BBOND	0.109	0.000	0.000	0.014	0.014	0.007	0.000	0.000	-0.320	-0.091	0.010	0.000
PANAFR	0.000	-0.111	-0.063	0.880	-0.234	0.007	0.103	-0.050	0.368	0.000	0.000	0.000
GWK	0.007	-0.042	-0.043	0.000	0.014	0.007	-0.007	-0.014	-0.179	0.167	-0.204	-0.103
CDC	0.012	-0.023	-0.028	0.072	-0.005	0.010	0.031	0.030	0.010	0.000	0.000	0.000
BOC	0.070	-0.021	-0.011	-0.014	0.014	0.014	-0.014	0.000	-0.014	0.062	-0.075	0.000
SASINI	0.000	-0.150	-0.077	-0.089	0.059	0.019	0.000	0.018	-0.018	-0.043	-0.091	-0.070
DTK	0.190	0.045	0.071	0.000	-0.040	0.042	-0.040	0.000	-0.167	0.017	0.042	0.280
CTRUST	-0.115	-0.235	-0.160	-0.019	-0.157	0.047	0.044	-0.021	-0.076	-0.010	-0.029	0.070
KENAIR	0.080	-0.012	0.000	0.000	0.080	0.049	-0.194	-0.051	-0.092	0.016	0.016	0.031
SERENA	-0.265	-0.235	-0.172	0.007	-0.026	0.057	0.007	0.064	0.070	0.012	-0.059	-0.050
TOTAL	0.122	0.000	0.000	-0.043	0.050	0.058	0.040	0.000	-0.096	-0.055	-0.038	-0.040
KAKUZI	-0.021	-0.167	-0.095	0.042	-0.104	0.071	0.008	0.000	-0.174	0.000	-0.064	0.008
CFC	0.298	0.064	0.108	-0.067	0.000	0.071	0.000	0.000	0.000	0.034	-0.167	0.000
SCBK	-0.096	-0.197	-0.150	0.043	-0.020	0.146	0.036	-0.035	0.027	-0.061	-0.015	0.000
BAMB	0.481	0.120	0 164	0.000	-0.167	0.160	0.034	-0.008	0.008	0.000	0.000	0.000

2000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GWK	-0.345	-0.065	0.000	0.034	0.034	-0.144	-0.047	-0.175	0.085	0.422	-0.011	0.011
BOC	-0.340	0.000	0.008	-0.023	-0.023	-0.095	0.093	-0.064	-0.051	0.054	0.000	0.074
EXP	-0.333	-0.045	0.013	0.000	0.000	-0.016	-0.081	-0.029	0.000	-0.032	0.088	0.000
KAKUZI	-0.329	0.037	-0.282	-0.043	-0.043	0.000	-0.060	0.000	-0.016	-0.161	0.058	0.000
HFCK	-0.265	-0.190	0.029	-0.068	-0.068	-0.012	-0.007	-0.200	0.250	0.100	-0.182	-0.016
UNGA	-0.256	-0.019	0.036	0.376	0.376	0.154	-0.010	-0.129	0.107	0.000	0.000	0.000
JUB	-0.192	0.052	0.069	-0.046	-0.046	0.000	0.011	0.000	-0.168	0.038	0.000	0.000
ARM	-0.160	0.000	0.100	0.182	0.182	-0.077	-0.111	0.150	0.000	-0.130	0.125	-0.111
PANAFR	-0.111	-0.125	0.000	0.000	0.000	0.000	-0.048	-0.015	-0.086	-0.056	-0.059	-0.209
SASINI	-0.045	-0.071	-0.077	-0.194	-0.194	0.259	0.000	-0.014	-0.072	0.063	0.029	0.000
ABAUM	-0.040	0.000	0.000	-0.028	-0.028	0.000	-0.058	-0.077	-0.017	-0.153	-0.050	0.000
BAT	-0.039	0.000	0.342	-0.388	-0.388	0.000	0.053	0.000	0.200	-0.028	0.014	-0.099
KCB	-0.029	-0.118	0.000	-0.117	-0.117	0.075	0.040	-0.154	0.136	0.080	0.074	-0.310
EABL	-0.028	0.007	0.064	-0.067	-0.067	0.000	0.000	0.045	0.114	0.064	-0.012	-0.061
EACABL	-0.023	0.000	-0.079	-0.188	-0.188	0.000	-0.333	0.150	0.601	-0.122	-0.175	-0.125
CTRUST	-0.023	0.023	0.000	0.000	0.000	-0.045	0.000	0.000	0.000	0.150	0.000	0.000
KPL	-0.022	0.033	-0.064	-0.136	-0.136	-0.145	0.000	-0.060	-0.021	-0.196	0.135	0.071
KENAIR	-0.019	-0.108	0.071	0.040	0.040	0.000	-0.025	-0.103	0.236	0.040	0.006	-0.017
CFC	-0.014	-0.021	0.102	0.056	0.056	-0.125	-0.125	0.000	-0.048	-0.030	-0 010	-0.010
CBERG	0.000	-0.050	0.079	0.024	0.024	0.257	-0.023	-0.110	0.000	-0.204	-0.067	0.000
BBK	0.000	-0.077	-0.042	-0.022	-0.022	-0.017	-0.017	0.018	0.012	0.092	-0.105	-0.106
BROND	0.000	0.000	-0.072	-0.192	-0.192	0.000	-0.013	-0.013	0.108	0.110	0.055	0.010
CMC	0.000	0.000	-0.167	-0.200	-0.200	0.000	0.006	-0.032	0.000	-0.027	0.000	-0.047
NMG	0.000	-0.089	-0.022	-0.211	-0.211	0.042	0.014	-0.040	0.028	-0.027	-0.007	0.000
KENOL	0.000	0.400	-0.204	0.077	0.077	-0.089	0.065	-0.061	0.052	-0.025	-0.013	-0.064
TOTAL	0.000	0.000	0.000	0.010	0.010	-0.010	0.111	0.045	-0.043	0.027	-0.027	0.000
BAMB	0.000	0.010	0.067	-0.054	-0.054	0.057	0.113	0.000	0.008	0.031	0.000	0.015
UCHUMI	0.006	0.089	0.012	-0.011	-0.011	0.000	0.036	0.023	0.000	0.074	0.090	-0.049
DTK	0.010	0.000	0.077	-0.036	-0.036	-0.213	-0.070	-0.100	-0.167	0.067	-0.081	-0.048
NBK	0.010	-0.198	-0.012	-0.013	-0.013	0.013	0.176	0.000	0.025	0.037	0.176	-0.400
SERENA	0.013	0.000	0.012	-0.079	-0.079	0.060	-0.009	0.063	0.000	-0.050	0.037	0.000
REAVIP	0.022	-0.158	-0.050	0.053	0.053	0.000	0.000	-0.088	-0.041	0.071	0.000	-0.200
EAPORT	0.027	0.000	-0.126	0.149	0.149	-0.039	0.223	-0.071	0.000	-0.032	-0.025	-0.008
SCBK	0.027	0 018	0.310	0.000	0.000	-0.382	0.136	0.080	0.019	0.000	-0.036	-0.066
FIREST	0.031	-0.030	-0.188	-0.038	-0.038	-0.200	0.087	-0.076	0.039	0.000	0.000	-0.025
CARB	0.045	0.000	0.000	-0.014	-0.014	-0.130	-0.020	-0.020	-0.063	0.311	-0.017	-0.310
NIC	0.080	0.000	0.074	-0.060	-0.060	0.028	0.238	0.038	0.000	-0.120	-0.063	-0.204
SNG	0.117	-0.073	-0.020	0.005	0.005	-0.080	0.017	0.148	0.057	-0.027	0.007	-0.014
DUNLOP	0.213	-0.124	-0.059	-0.025	-0.025	0.051	0.000	0.000	0.000	-0.040	-0.111	0.000
ICDC	0.238	-0.231	0.250	-0.105	-0.105	0.050	0.022	-0.021	0.141	-0.038	0.050	-0.123

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2001	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EXP	-0.218	-0.288	0.000	0.000	0.000	-0.019	-0.118	-0.333	-0.107	-0.030	0.000	0.077
CTRUST	-0.174	-0.189	-0.016	-0.096	-0.053	0.013	0.000	0.000	-0.012	0.188	0.011	-1.000
UNGA	-0.167	-0.130	0.140	-0.087	-0.101	-0.031	-0.097	-0.114	-0.242	0.000	-0.186	-0.043
REAVIP	-0.167	-0.128	0.100	0.000	-0.227	0.137	0.034	-0.067	0.036	-0.017	0.088	-0.065
CMC	-0.115	-0.117	-0.143	-0.167	-0.100	0.000	0.000	0.111	-0.160	-0.048	0.063	0.035
HFCK	-0.113	-0.115	-0.050	-0.018	-0.107	0.000	0.000	-0.180	-0.073	0.053	-0.125	0.143
TOTAL	-0.109	-0.099	0.088	-0.266	-0.118	-0.036	-0.093	-0.071	-0.297	0.281	-0.024	-0.050
KPL	-0.106	-0.087	-0.212	-0.116	-0.228	0.036	-0.069	-0.185	0.068	-0.096	-0.085	-0.008
ABAUM	-0.079	-0.079	-0.182	-0.007	0.232	0.000	0.000	0.000	0.000	0.000	-0.012	-0.018
DUNLOP	-0.078	-0.071	-0.036	0.047	0.009	-0.018	-0.036	0.000	-0.104	0.053	0.000	0.000
SASINI	-0.071	-0.068	-0.029	-0.091	0.000	-0.108	0.000	-0.065	-0.216	-0.026	-0.073	-0.102
FIREST	-0.068	-0.038	-0.158	-0.063	-0.067	-0.043	0.045	0.000	-0.121	0.033	0.181	-0.067
KAKUZI	-0.055	-0.038	-0.040	-0.167	0.025	-0.049	-0.077	-0.056	0.000	0.066	0.021	-0.027
CFC	-0.053	-0.029	0.032	0.005	-0.109	-0.012	-0.006	-0.030	-0.024	0.000	0.087	0.046
FANAFR	-0.051	-0.029	-0.083	-0.045	0.124	0.059	0.076	0.004	0.015	-0.022	-0.037	0.938
SERENA	-0.045	-0.025	0.027	0.003	-0.003	-0.026	-0.003	-0.030	-0.081	0.088	0.031	0.030
SCBK	-0.030	-0.015	-0.189	0.103	0.020	0.077	-0.018	-0.145	0.000	0.053	0.020	-0.064
NMG	-0.021	-0.014	-0.113	-0.095	-0.211	0.022	0.076	-0.020	-0.129	0.178	-0.141	0.012
SNG	-0.007	-0.011	0.643	-0.561	0.515	0.007	-0.286	0.327	-0.041	0.000	-1.000	0.000
BOC	-0.005	0.000	-0.097	0.000	-0.274	-0.082	0.107	-0.016	-0.049	0.034	0.000	0.000
ARM	0.000	0.000	0.125	0.000	0.000	0.000	-0.111	0.000	-0.075	0.081	0.000	0.000
EAPORT	0.000	0.000	0.000	0.009	-0.025	-0.043	-0.091	-0.100	0.000	-0.111	0.631	-0.019
KCB	0.000	0.000	0.263	0.030	-0.019	-0.294	-0.056	0.147	-0.210	0.104	0.088	-0.135
JUB	0.000	0.000	-0.029	-0.044	-0.077	0.047	-0.032	-0.145	0.131	-0.014	0.069	-0.003
BBOND	0.005	0.026	0.040	-0.058	0.010	0.020	0.020	-0.029	-0.085	-0.044	0.029	-0.033
BAMB	0.022	0.033	-0.067	-0.071	0.077	-0.080	0.049	0.019	-0.145	-0.064	-0.091	-0.168
KENAIR	0.022	0.034	-0.176	0.027	0.078	0.072	0.000	-0.118	-0.127	0.015	0.094	-0.046
BAT	0.023	0.037	-0.079	0.052	-0.098	0.000	0.000	-0.091	-0.100	0.089	0.020	-0.020
DTK	0.029	0.046	-0.011	0.023	-0.098	-0.042	-0.043	0.000	0.000	-0.182	0.000	0.000
EABL	0.039	0.058	0.026	0.000	0.000	-0.031	0.032	0.031	0.000	0.006	-0.012	-0.073
BBK	0.039	0.067	0.051	-0.037	-0.082	0.172	0.000	-0.094	-0.071	0.091	-0.064	0.068
UCHUMI	0.061	0.091	-0.069	-0.064	-0.023	0.029	0.017	-0.089	-0.098	-0.054	-0.036	-0.037
CBERG	0.071	0.092	-0.010	-0.158	0.063	-0.306	0.059	-0.032	0.008	-0.148	0.269	-0.091
GWK	0.071	0.188	0.073	-0.029	0.000	0.030	0.029	-0.038	-0.069	0.011	-0.198	-0.091
KENOL	0.116	0.194	0.045	-0.172	-0.045	-0.048	0.000	-0.021	0.051	0.014	0.014	-0.257
ICDC	0.118	0.200	-0.009	0.101	-0.200	-0.021	-0.122	-0.030	0.000	-0.013	-0.013	-0.051
CARB	0.138	0.292	0.006	-0.080	-0.007	0.243	0.000	-0.239	0.000	0.000	0.029	-0.014
NIC	0.144	0.000	-0.151	-0.032	-0.067	0.071	0.047	-0.115	-0.191	0.351	0.007	-0.020
NBK	0.283	0.000	0.029	-0.143	-0.100	0.111	0.017	-0.082	0.000	0.268	-0.099	-0.094
EACABL	0.329	0.000	-0.117	0.000	-0.026	0.021	0.026	0.000	-0.005	0.000	-0.015	-0.061

2002	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CMC	0.023	-0.056	-0.059	0.156	0.081	0.355	-0.225	0.048	0.273	0.214	0.485	-0.168
REAVIP	0.000	0.000	-0.067	0.036	-0.034	0.107	-0.145	-0.057	-0.040	0.042	0.000	0.000
EABL	0.000	0.026	0.000	0.013	-0.044	0.192	-0.122	0.057	0.108	0.081	0.060	0.104
KAKUZI	0.000	0.000	-0.167	0.000	-0.033	-0.034	-0.116	-0.232	-0.184	-0.013	-0.098	0.062
KPL	-0.093	-0.066	-0.388	0.000	-0.140	0.000	-0.105	-0.156	-0.077	0.100	0.992	-0.247
JUB	0.068	0.000	-0.076	0.026	-0.035	0.036	-0.067	0.075	-0.013	-0.032	0.027	0.039
BOC	0.000	0.000	-0.050	0.000	-0.018	-0.036	-0.056	-0.039	-0.020	0.313	0.143	0.000
ARM	-0.250	0.333	-0.200	0.125	0.028	0.000	-0.054	0.429	-0.020	-0.122	0.105	-0.053
CTRUST	-0.010	0.000	0.016	-0.005	0.000	-0.049	-0.041	0.000	0.000	0.000	0.000	0.000
ABAUM	-0.030	0.119	0.006	-0.006	0.034	-0.065	-0.035	0.030	-0.419	0.000	0.000	0.060
FIREST	0.000	0.086	-0.066	0.070	-0.138	0.221	-0.031	-0.019	-0.013	0.000	0.133	0.029
GWK	-0.271	0.000	-0.059	-0.094	-0.040	-0.012	-0.030	-0.188	-0.246	0.122	0.000	0.591
HFCK	-0.125	0.071	-0.200	0.167	-0.114	0.129	-0.029	0.103	-0.200	0.167	0.286	-0.222
UCHUMI	-0.117	-0.248	-0.059	-0.168	-0.009	-0.073	-0.020	-0.200	0.250	0.100	0.136	0.000
CBERG	0.000	0.000	0.000	-0.167	0.000	0.000	-0.010	0.000	0.400	-0.143	0.167	0.000
SCBK	0.069	-0.055	-0.087	0.021	0.083	0.038	-0.009	0.009	0.083	0.026	0.000	0.000
BBOND	-0.253	0.000	-0.046	0.000	-0.097	0.000	0.000	-0.036	-0.074	-0.140	0.000	0.151
ICDC	-0.081	-0.029	-0.364	-0.024	0.049	-0.116	0.000	-0.026	0.000	0.378	0.020	0.106
TOTAL	-0.056	-0.129	0.000	-0.392	-0.028	1.400	0.000	-0.238	-0.063	0.233	0.189	0.000
DTK	-0.022	0.023	-0.139	0.000	0.097	0.059	0.000	0.000	0.006	0.215	0.000	-0.055
BBK	0.000	0.103	0.000	-0.145	0.088	0.063	0.000	-0.006	-0.018	-0.036	0.188	-0.053
CARB	0.000	0.014	0.000	0.000	0.000	0.000	0.000	-0.014	0.014	-0.028	-0.093	0.165
EXP	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.029
DUNLOP	0.040	0.010	0.000	-0.105	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NIC	0.076	-0.012	-0.200	-0.008	0.043	0.094	0.000	-0.069	-0.007	0.231	0.121	0.000
MARSH	-0.727	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.098
KCB	0.063	-0.047	-0.012	-0.063	-0.307	-0.010	0.010	0.005	-0.110	0.075	0.500	-0.267
KENOL	0.545	-0.012	-0.006	-0.150	-0.014	0.043	0.021	0.067	0.019	0.049	0.088	0.157
SERENA	0.000	-0.039	-0.017	0.000	-0.059	0.009	0.025	-0.033	0.016	0.169	0.011	0.000
NMG	0.045	0.326	0.033	-0.365	0.000	-0.025	0.026	0.125	0.033	0.118	0.625	0.000
PANAFR	0.000	-0.223	-0.277	0.000	0.000	0.000	0.027	0.000	0.000	-0.067	0.000	0.000
KENAIR	0.062	0.039	-0.081	-0.014	-0.034	0.007	0.035	-0.096	-0.076	0.000	-0.016	-0.117
NBK	0.000	0.000	0.000	-0.100	0.000	-0.074	0.040	-0.077	0.063	0.569	-0.100	0.000
CFC	0.005	-0.016	0.000	0.000	-0.017	-0.034	0.053	0.000	0.033	0.011	-0.032	-0.011
SASINI	-0.099	0.060	0.000	-0.067	0.071	-0.133	0.058	0.000	-0.076	-0.055	0.000	0.000
EACABL	0.033	-0.053	-0.083	-0.152	0.000	0.021	0.070	0.183	-0.039	-0.023	0.000	0.059
EAPORT	0.008	0.000	-0.147	-0.027	0.168	0.000	0.088	0.000	-0.007	-0.007	-0.030	0.000
BAT	0.020	0.010	-0.089	-0.011	0.011	0.011	0.140	-0.113	0.053	0.040	0.155	-0.092
UNGA	-0.015	-0.164	-0.486	0.091	0.333	0.075	0.163	0.040	0.058	0.000	0.000	0.000
BAMB	0.021	-0.059	0.000	-0.063	0.067	0.047	0.194	0.050	0.012	-0.012	0.286	0.222
SNG	0.008	0.040	0.000	-0.237	-0.200	0.100	0.375	0.603	-0.072	0.017	0.104	0.000

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2003	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HFCK	-0.857	0.056	0.061	0.000	0.407	0.183	-0.091	-0.050	-0.036	-0.105	0.059	0.111
NMG	-0.041	0.049	0.000	0.094	0.075	-0.050	0.000	0.042	0.021	0.440	0.022	-0.103
FIREST	0.011	0.130	0.000	-0.050	0.268	0.141	-0.192	-0.048	0.033	0.300	-0.077	0.250
UNGA	0.038	0.382	-0.105	0.765	0.000	-0.108	0.274	0.030	0.159	0.094	0.105	0.464
ABAUM	0.038	0.000	0.000	0.000	0.000	-0.091	-0.032	0.133	0.006	0.363	0.079	0.000
JUB	0.069	0.243	0.200	0.059	0.296	-0.200	0.000	0.007	0.084	0.318	0.055	0.229
KAKUZI	0.099	0.006	-0.006	0.025	0.652	0.000	-0.016	-0.048	0.089	-0.275	0.368	-0.109
BAT	0.111	0.083	0.138	-0.027	0.444	-0.135	-0.100	-0.044	0.059	0.256	-0.019	0.000
ARM	0.111	0.230	0.789	0.282	0.355	-0.162	0.157	0.037	0.225	0.310	-0.045	0.000
CFC	0.117	0.199	-0.025	-0.081	0.829	-0.038	-0.280	0.278	0.125	0.000	0.304	0.067
KENAIR	0.132	0.000	-0.008	-0.034	0.226	-0.078	-0.127	-0.083	0.003	0.045	0.000	0.000
NIC	0.135	0.143	-0.042	0.109	0.412	-0.167	0.022	0.071	0.085	-0.117	0.057	0.014
TOTAL	0.136	0.080	0.222	-0.030	0.039	0.053	-0.116	0.016	0.050	0.419	0.000	0.273
CMC	0.143	0.000	0.031	0.172	0.638	-0.105	0.070	0.095	0.130	0.000	0.000	0.000
PANAFR	0.143	0.625	0.042	0.033	0.143	0.000	0.000	-0.192	0.099	0.368	0.286	0.065
EAPORT	0.154	0.083	0.723	0.250	0.486	-0.308	0.091	-0.037	0.180	-0.019	0.157	-0.034
GWK	0.166	0.176	0.017	0.148	0.457	-0.186	0.037	0.000	0.102	0.000	0.012	0.294
SCBK	0.167	0.014	0.063	0.192	0.044	-0.011	0.071	0.075	0.077	0.643	0.038	-0.209
BBK	0.189	0.084	0.034	0.133	0.066	-0.034	0.024	0.053	0.069	-0.028	-0.011	0.000
EACABL	0.200	-0.093	0.000	0.051	0.301	-0.104	0.000	0.150	0.063	0.035	0.102	0.000
DTK	0.202	0.016	0.142	0.448	0.381	-0.138	0.240	0.100	0.174	0.000	0.000	0.000
CBERG	0.207	-0.112	0.200	0.000	1.556	-0.261	-0.071	0.115	0.204	-0.028	0.369	-0.005
BOC	0.222	0.136	-0.015	0.279	0.159	0.027	0.100	0.000	0.114	0.055	0.052	0.262
KENOL	0.224	-0.046	0.040	0.000	0.346	0.143	-0.059	0.250	0.112	0.325	0.311	-0.022
ICDC	0.252	0.063	-0.007	0.033	0.146	0.144	0.000	-0.031	0.075	0.419	0.068	-0.149
CARB	0.257	0.000	0.022	0.095	0.154	0.000	0.000	0.026	0.069	0.450	0.009	0.265
SNG	0.257	-0.295	-0.128	0.737	1.306	-0.376	0.252	0.106	0.232	0.031	0.167	0.314
UCHUMI	0.347	0.109	0.089	0.016	-0.024	0.058	-0.024	0.048	0.077	0.425	0.097	0.103
BBOND	0.414	0.000	-0.071	-0.077	0.067	0.203	-0.266	0.050	0.040	-0.110	-0.035	0.330
REAVIP	0.440	0.250	-0.289	0.156	0.676	-0.194	0.053	0.570	0.208	0.006	0.114	0.000
SASINI	0.458	0.000	0.000	-0.029	0.294	0.000	-0.100	0.102	0.091	0.059	0.429	-0.111
BAMB	0.485	-0.082	0.222	-0.018	0.296	0.000	-0.099	-0.029	0.097	0.196	0.189	-0.124
SERENA	0.615	-0.129	-0.093	0.000	0.163	-0.132	-0.050	0.005	0.047	0.047	0.520	0.007
NBK	0.667	0.092	-0.160	0.055	0.905	0.240	0.000	-0.083	0.214	0.091	0.042	0.000
KCB	1.545	-0.179	0.272	0.026	0.650	0.051	-0.015	-0.008	0.293	0.039	0.159	-0.020
KPLC	2.434	-0.294	0.125	0.037	0.482	-0.169	0.000	-0.029	0.323	0.118	0.000	-0.013
EXP	0.000	0.056	-0.040	0.097	0.000	0.000	0.000	-0.032	0.010	-0.034	0.014	-0.055
EABL	0.000	0.046	0.169	0.384	0.023	-0.067	0.168	0.000	0.090	0.096	0.000	0.000

4.2 ANALYSIS OF MOMENTUM STRATEGIES

The momentum portfolio were formed based on J-month returns and held for K-months. The values of j (formation period) and k (holding period) for the different strategies are indicated in the first column and row respectively. The stocks were ranked in ascending order on the basis of J-month returns. Equally weighted portfolio of stocks in the lowest past return decile formed the loser portfolio whereas an equally weighted portfolio of stocks in the highest decile formed the winner portfolio. Table II below shows the average monthly returns of the different winner and loser portfolios as well as the zero-cost portfolio (winner-losers portfolio), for the 32 strategies tested this study. The T-statistic for the portfolios is reported in brackets.

TABLE II: RETURNS OF RELATIVE STRENGTH PORTFOLIOS

		J	3	6	9	12
3	Loser		0.0147	0.0146	0.0151	0.0186
			2.71)	(2.60)	(2.75)	(2.83)
3	Winner		0.0172	0.0175	0.0183	0.0189
			(3.69)	(3.74)	(3.82)	(3.87)
3	Winner – Loser		0.0015	0.0029	0.0032	0.0043
			(1.21)	(2.19)	(2.97)	(3.14)
6	Loser		0.0234	0.0237	0.0211	0.0204
			(1.39)	(1.41)	(1.35)	(1.23)
6	Winner		0.0295	0.0310	0.0292	0.0281
			(4.01)	(4.07)	(3.98)	(3.89)
6	Winner – Loser		0.0061	0.0073	0.0081	0.0076
			(2.39)	(3.42)	(3.69)	(3.51)
9	Loser		0.0161	0.0138	0.0133	0.0129
			(1.19)	(1.16)	(1.13)	(1.09)
9	Winner		0.0258	0.0241	0.0232	0.0210

		(4.57)	(94.33)	(4.12)	(4.11)
9	Winner - Loser	0.0097	0.0103	0.0099	0.0081
		(3.13)	(3.89)	(3.18)	(2.98)
12	Loser	0.0084	0.0184	0.0189	0.0198
		(1.23)	(1.37)	(1.40)	(1.44)
12	Winner	0.0313	0.0302	0.0285	0.0282
		(4.94)	(4.85)	(4.73)	(4.71)
12	Winner –Loser	0.0129	0.0118	0.0096	0.0094
		(3.69)	(3.35)	(2.92)	(2.87)

4.2.1 3-month formation/3month holding period strategy

From the table above an equally weighted portfolio formed from stocks in the bottom deciles of previous 3-months performance held for 3 months, yields a return of 1.47% per month, 0.15% less than the top decile portfolio, which reports 1.72%. Significance test employed on the returns of 0.15% show that the return is insignificant.

The finding is consistent with previous studies in different markets. Jegadeesh and Titman (1993) reports that 3-months/3 months strategy yields statistically insignificant returns for the period 1965 – 1989 using data from the CRSP daily returns file. On conducting a similar study which skips a week after portfolio formation and computing returns of J=3, K=3 strategy, Jegadeesh and Titman (1993) conclude that the strategy yields 0.41% more monthly return. This indicates that the J=3, K=3 strategy returns are significantly reduced by transaction costs.

A different study by Rouwenhorst (1998) reports that J=3, K=3 zero-cost international portfolios formed on stocks in European stock markets yield the least return of 0.07% among the 32 strategies tested.

4.2.2   3-month formation/6-month holding period strategy

This strategy yields an average monthly return of 1.75% on winner portfolios and 1.46% on loser portfolio. This leads to an average monthly return of 0.29% on zero-cost portfolio, which is statistically significant. However this strategy yields superior returns compared to J=3, K=3 strategy by providing double return to the zero-cost portfolio.

Employing similar strategy on CRSP stocks, Jegadeesh and Titman (1993) observed that the zero-cost portfolio yield a statistically significant average monthly return of 0.58%. Zero-cost international portfolio constructed on European stocks by Rouwenhorst (1998) yield an average monthly return of 0.88%. This strategy yields higher returns compared to the J=3, K=3 strategy.

4.2.3   3-month formation/9-month holding period strategy

This strategy yields a return of 1.51% on the loser portfolio and 1.83% on the winner portfolio. The zero-cost portfolio gives a statistically significant average monthly return of 0.32%. Jegadeesh and Titman (1993) report a return of 0.61% on the zero-cost portfolio whereas Rouwenhorst (1998) observes that international zero-cost portfolio comprising of European stocks yields an average monthly return of 0.82%. The internationally diversified portfolio yield higher return compared to the portfolio drawn from stocks traded on a single stock exchange.

4.2.4   3-month formation/12-month holding period strategy

Momentum portfolio for loser held under the J=3, K=12 strategy yields an average monthly return of 1.86% whereas for winners yield 1.89% return. The zero-cost portfolio yields an average monthly return of 0.43%. This return is statistically significant as indicated by a test of 3.14 which is greater than the critical value of 2.07 similar study conducted on European stocks by Rouwenhorst (1998) reports that zero-cost portfolio held under J=3, K=12 strategy yields average monthly return of 0.82% which are

statistically significant. Jegadeesh and Titman (1993) report a return of 0.69% on zero-cost portfolio held under the J=3, K=12 strategy.

4.2.5   6-month formation/3-month holding period strategy

Portfolio constructed under this strategy yield a return of 2.34% for losers and 2.95% for winners. Statistical test conducted on this returns show that they are statistically significant. The zero-cost portfolio yields a significant return of 0.61% since its t-test value of 2.39% is greater than critical value of 2.23. This return exceeds the J=3, K=3 return on zero-cost portfolio by 0.46%. Jegadeesh and Titman (1993) observed that zero-cost portfolio constructed on CRSP stocks and held under this strategy yield statistically significant average monthly return of 0.84%. Similar strategy employed on International diversified zero-cost portfolio of European stocks by Rouwenhorst (1998) yields a return of 1.13% three times the return on N.S.E stocks.

4.2.6   6-month formation/6-month holding period strategy

Under this strategy, the winner portfolio yields an average monthly return of 3.10% whereas loser portfolio yields 2.37%, which returns are both statistically significant. The zero-cost portfolio yields a statistically significant average monthly return of 0.73%. Past similar study by Jegadeesh and Titman (1993) on CRSP stocks observed that zero-cost portfolio under this strategy yields a monthly of 0.95%. For internally diversified portfolios, Rouwenhorst (1998) observes that zero-cost portfolio under this strategy yields a statistically significant monthly return of 1.16%.

4.2.7   6-month formation/9-month holding period strategy

Loser portfolio under this strategy yields an average monthly return of 2.11% whereas the winner portfolio yields an average monthly return of 2.9%, both returns are statistically significant as indicated by t-statistic. The subsequent zero-cost portfolio yields an average monthly return of 0.81%. The t-static indicates that this return is significant. Jegadeesh and Titman (1998) found out that zero-cost portfolio held under this strategy for CRSP stocks yield a return of 1.02% whereas Rouwenhorst (1998) internationally diversified zero-cost portfolio yields a monthly return of 1.12%, which are statistically significant.

4.2.8   6-month formation/12-month holding period strategy

An average monthly return of 2.81% is observed on the winner portfolio whereas the loser portfolio yields a monthly return of 2.04%. The subsequent zero-cost portfolio yields a return of 0.76%.t-test conducted on this return indicates that they are statistically significant. Other studies observed that this strategy yields momentum profits. For instance Rouwenhorst (1998) observed that a zero-cost internationally diversified portfolio held under J=6, K=12 strategy yields a return of 0.91%. Jegadeesh and Titman (1993) report that similar strategy yields a statistically significant return of 0.86% on zero-cost portfolio.

4.2.9   9-month formation/3-month holding period strategy

Winner portfolio under this strategy generates monthly return of 2.58% whereas loser portfolio yields an average of 1.61%. The respective zero –cost portfolio yields a return of 0.97%, which is statistically significant. Jegadeesh and Titman (1993) observed that similar strategy yields an average monthly return of 1.09% for zero-cost portfolio of CRSP stocks. For zero-cost portfolio of European stocks, Rouwenhorst (1998) observed that they yield a statistically significant return of 1.24%.

4.2.10   9-month formation/6-month holding period strategy

The loser and winner portfolios generate an average monthly return of 1.38% and 2.41% respectively. The zero-cost portfolio yields a return of 1.03%, which is statistically significant as indicated by the t-test of 3.89, which is higher than the critical value of 2.45. Zero-cost portfolio of internationally diversified stocks yields a higher monthly average return of 1.29% as observed by Rouwenhorst (1998). Jegadeesh and Titman (1993) similarly observed that zero-cost portfolio of CRSP stocks yields a return of 1.21%.

4.2.11 9-month formation/9-month holding period strategy

This strategy yields an average monthly return of 1.33% and 2.32% on loser and winner portfolios. The zero-cost portfolio generates a statistically significant average monthly return of 0.99%. The t-static value computed on this return of 3.18 is greater than the critical value of 2.45. Internationally diversified zero-cost portfolio in Rouwenhorst (1998) study, generate an average monthly return of 1.07% whereas Jegadeesh & Titman (1993) notes that zero-cost portfolio of CRSP stocks held under this strategy yields average return of 1.05%.

4.2.12 9-month formation/12-month holding period strategy

Under this strategy the winner and loser portfolio generate an average monthly 2.10% and 1.29% respectively. The zero-cost portfolio yields a statistically significant return of 0.81%. Jegadeesh and Titman (1993) observed that the zero-cost portfolio held under similar strategy for CRSP stocks generates a return of 0.82%, which is statistically significant. For internationally diversified zero-cost portfolio, Rouwenhorst (1998) report an average monthly return of 0.82% which return is reported to be significant statistically.

4.2.13 12-month formation/3-month holding period strategy

The loser and winner portfolios generate average monthly return of 0.84% and 3.13% respectively. The zero-cost portfolio generates the highest statistically significant monthly returns compared to all the other returns on zero-cost portfolios of 1.29%. Rouwenhorst (1998) observed that the 12-month/3-month strategy generates a return of 1.35%. Jegadeesh and Titman (1993) report that zero-cost portfolio yield an average monthly return of 1.31% under this strategy. They noted that the most successful zero-cost strategy selects stocks based on their returns over past 12 months and then holds the portfolio for 3 months.

4.2.14   12-month formation/6-month holding period strategy

This strategy generates an average monthly return of 1.84% and 3.02% on the loser and winner portfolios respectively. The zero-cost portfolio generates statistically significant monthly returns of 1.18% which return is slightly lower than that for the J=12, K=3 strategy. Jegadeesh and Titman (1993) observed that zero-cost portfolio for CRSP stocks yielded a monthly return of 1.14% whereas Rouwenhorst (1998) observes that zero-cost portfolio on European stocks yield a return of 1.15%. Both returns are statistically significant.

4.2.15   12-month formation/9-month holding period strategy

The loser and winner portfolios under this strategy generate an average monthly of 1.89% and 2.85% respectively. The zero-cost portfolio held under this strategy yields an average monthly return of 0.96%. Statistical carried out on this return indicates that they are significant. The 12-month/9-month strategy employed for zero-cost portfolio of European stocks by Rouwenhorst (1998) show that the yield statistically significant monthly return of 0.89%. Whereas Jegadeesh and Titman (1993) report that for zero-cost portfolio selected from CRSP stocks the monthly average return is 0.93%.

4.2.16   12-month formation/12-month holding period strategy

The winner portfolio yields a monthly average of 2.82% while the loser portfolio yields a monthly average of 2.07%. The zero-cost portfolio yields a monthly average return of 0.94% which return is significant. Rouwenhorst (1998) reports average monthly return of 0.64% on zero-cost portfolio held under this strategy. Jegadeesh and Titman (1993) that zero-cost portfolio of CRSP stocks yields an average monthly return of 0.68%.

TABLE III: ANNUAL STATISTICAL ANALYSIS OF MOMENTUM STRATEGIES RETURNS

The table below is a summary of statical analysis of momentum strategies tested under this study. The annual mean return, standard deviation, variance and Pearson correlation of each of the formation period are presented in the table below.

J		Mean	Standard deviation	Variance	Pearson Correlation	Annual Return
3	Loser	0.0158	0.0566	0.0032	0.5600	20.70
3	Winner	0.0180	0.0787	0.0062	0.4922	23.87
6	Loser	0.0222	0.0490	0.0024	0.9318	30.15
6	Winner	0.0295	0.0608	0.0037	0.9666	41.75
9	Loser	0.0140	0.0436	0.0019	0.8763	18.16
9	Winner	0.0235	0.0500	0.0025	0.9803	32.15
12	Loser	0.0166	0.0548	0.0030	0.9946	21 84
12	Winner	0.0296	0.0490	0.0024	0.9871	41.91

Conclusion

The returns of all the zero-cost portfolios are positive and range between 0.15% and 1.29%, with the 3-months/3-month strategy giving the least average monthly return and 12-month/3-month generating the highest average monthly return. All these returns are statistically significant at 95% level of confidence except for the 3-month/3-month strategy.

For the 3-month holding period (K=3), the excess return from buying winners and selling losers increases with the length of the return interval used for ranking (J). The average monthly returns range between 0.15% for J=3, K=3 and 1.29% for J=12, K=3. This observation holds for the K=6,12 holding periods. However for K=9 holding period the returns increase for J=3,6,9 but decline for J=12.

For 3-month formation period, zero-cost portfolio returns increase with increase in holding period (K). The average returns for the K=12 are approximately 3 times more than for K=3. The 6-month formation period shows a similar trend except for K=12 where the returns are less than for 9-month holding period.

The monthly returns for 9-month formation period are at their highest for 6-month holding period after which they decline. The 12-month formation period returns decline with the holding period. The 12-month formation period winner portfolios generate the highest average monthly of the 16 strategies tested under this study.

Thus the findings of this study negate the null hypothesis that stocks traded on the N.S.E do not experience momentum returns, and fails to reject the alternative that stocks traded on the N.S.E exhibit momentum.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY

This study set out to determine whether stocks quoted on the Nairobi stock exchange exhibit momentum and determine whether momentum strategies on zero cost portfolios drawn from N.S.E Stocks generate abnormal returns. The study was conducted for stocks quoted on the N.S.E for the period between 1994 to 2003. Monthly and j- month (3,6,9,12) stock returns were computed and ranked in descending order then clustered into three deciles. The first and third decile

(Winner and loser) stocks respectively were held for k (3,6,9,12) months, for which their returns were computed. The zero cost portfolio returns were subsequently computed and the statistical significance ascertained. The K-month/J-month strategies were found to yield significant monthly returns except for the 3-month/3-month holding strategy. The monthly returns on zero-cost portfolio strategy range between 0.15% and 1.29%. This translates to an average annual return of 2.93% and 20.07%.

The three 3-month/3-month holding period's monthly returns experience the highest volatility of all the portfolio strategies tested. The standard deviation for the winner portfolio under this strategy is 0.0787 On general it was observed that the winner portfolios for J=3,6,9/K=3,6,9,12 strategies. Experience high volatility compared to their comparative loser portfolios. The 12-month formation period portfolios however have the winners experiencing lesser volatility compared to the losers.

5.2 CONCLUSIONS

This study documents returns continuation in the stocks trading on the Nairobi Stock Exchange for the period 1998-2003 .the portfolios of past winners outperformed then portfolio of past losers for the entire period under the study. Thus the study rejected the null hypothesis that momentum profits do not exist on portfolio of stocks quoted on the

N.S.E. The findings are therefore inconsistent with the joint hypothesis of market efficiency since its possible to beat the market with momentum strategies.

The findings of this study concur with previous studies on momentum strategy returns. For instance Jegadeesh and Titman (1993) concluded they trading strategies that buy past winners and sell past losers realize significant abnormal returns over the 1965-1989 period. The strategy examined in detail by Jegadeesh and Titman (1993) selected stocks based on past 6-month returns and held them for 6 months. The strategy realized a compounded excess return of 12.01% per annum on average. Additional evidence indicates that the profitability of the relative strength strategies is not due to their systematic risk nor lead-lag effects, resulting from delayed stock price reactions to common factors.

Rouwenhorst (1998) documents the presence of return continuation in stocks of 12 European countries during the period 1980-1995. Rouwenhorst (1998) added that momentum returns hold for both large and small firms than large firms. These findings are remarkably similar findings for the United States by Jegadeesh and Titman (1993). The cause of momentum returns in Kenya stock market a topic for future research.

5.3 LIMITATIONS OF THE STUDY

Like emerging markets there exists a problem of liquidity in the market. Some companies which formed part of the population of the study had long periods of no trading, others traded on very few occasions, a list of such companies are attached in appendix ii. Since these companies ranked in the middle when stocks returns were ranked they however did not affect the results of the study. Inconsistency regarding issuance of dividends by firms complicated the study for some of the firms. It was however assumed that firms that did not declare dividends for some of the periods of the study did issue zero dividends.

Due to limitation of time and resources the study made use of the prices on the last trading day of the month as proxy for ending stock price and beginning stock price for the

succeeding month. It could have been better if daily stock prices were weighted to obtain the stocks monthly prices.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

This is a pioneering study of the momentum anomaly at the Nairobi stock exchange by testing momentum strategy employed on non-composite portfolios. A more concrete study could be done using overlapping portfolios. This will improve the strength of the t-test employed in assessing the hypothesis.

There is need for a study to determine why momentum strategy employed for periods of three months yield inconclusive results unlike the other momentum strategies.

There is need to determine the sources of momentum profits established in this study, hence this will make a good basis for further study.

APPENDIX I: LISTED COMPANIES

STANDARD NEWS GROUP
KENYA AIRWAYS
NIC BANK
FIRESTONE
PAN AFRICA INSURANCE
E.A BREWERIES LIMITED
DUNLOP KENYA (OLYMPIA CAPITAL HOLDINGS)
MARSHALLS
NATIONAL BANK
DIAMOND TRUST KENYA
E.A PORTLAND CEMENT
TOTAL KENYA
KENYA POWER & LIGHTING LIMITED
KENYA COMMERCIAL BANK
ATHI RIVER MINING
E A.CABLES
CARBACID LIMITED
EXPRESS KENYA
HOUSING FINANCE COMPANY
TPS SERENA
BOC KENYA
A BAUMANN
UNGA LIMITED
SASINI TEA & COFFEE
CFC BANK
BARCLAYS BANK
JUBILEE INSURANCE
CAR & GENERAL
UCHUMI LIMITED
IICDC INVESTMENTS
KAKUZI LIMITED
LIMURU TEA
GEORGE WILLIAM
BAMBURI CEMENT
STANDARD CHARTERED
KENYA OIL LIMITED
CMC HOLDINGS
REA VIPINGO
BROOKE BOND
BAT KENYA LIMITED
NATION MEDIA GROUP
CROWN BERGER
CITY TRUST LIMITED
KENYA ORCHARDS

APPENDIX II: THE BAD COMPANIES

1. Kapchorua Tea Company
2. Eaagads Limited
3. Limuru tea Company
4. Mumias Sugar Company
5. Marshalls
6. Car and General
7. City Trust Limited

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