Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.9, No.14, 2018

Influence of Momentum Effect on Stock Performance of Firms Listed in the Nairobi Securities Exchange

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Abstract:
This research article intended to establish the influence of momentum effect on stock performance of firms listed in Kenya. Nairobi Securities Exchange (NSE) is the most robust securities market in Eastern and Central Africa and among the best performing in the African continent. Despite this, there is still a lot to be desired in terms of upholding the efficient market hypothesis. Stocks here do not always uphold this theory despite the fact that the NSE is among the few African exchanges that are not weak form efficient. This study looked at all the listed firms in the NSE for the period between January 2004 to December 2015. The research was based on the efficient market hypothesis and behavioral finance theories. Descriptive research design was used and target population was all the listed firms in the NSE. Secondary data was used in the analysis where the researcher used market prices and risk free interest rates. These were obtained from the data vendors at the NSE and website of Central Bank of Kenya. Caharts four factor model was used in the analysis and hypothesis was tested using 0.05 level of significance. The researcher conducted diagnostic tests such as normality, linearilty and collinearity tests. Missing values in the data collected were corrected by the use of linear interpolation. The diagnostic tests showed that the data was good for analysis. Z test results showed that the momentum effect was statistically significant at 0.0165. The model was also statistically significant showing that the momentum effect influenced the returns for NSE at about 25.8%. the null hypothesis was therefore rejected. It was concluded that NSE stocks over the span of 12 years studied demonstrated momentum effect. Future researchers would be advised to study the momentum effect on a shorter span like 12 months where they are working with weekly prices. The researcher would also recommend future scholars to do a regional comparative study.

1.0 Introduction

Momentum effect is when some stocks outperform (underperform) the average returns in the past few months and continue to perform better (worse) than the average returns over the subsequent few months (Hameed & Kusnadi, 2002). Muga and Santamaría (2007a), observe that this is one of the challenges that still challenge the Efficient Market Hypothesis.

Security markets are a very critical part of the economy: they allow redistribution of financial resources among various economic entities (Pilinkus, 2010) Their performance is best captured in a securities market index, which should ensure that it assists investors in making prudent investment decisions. A securities market index should always give reliable information: however, this is not always the case. For instance, the Kenyan economy has been growing at 1.5%, 2.7%, 5.8%, 4.3%, 4.6%, 5.7% and 5.3% for the years 2008 through to 2014, while the NSE indices have not been reflecting this trend (KIPPRA, 2013): the NSE 20 share index declined in 2009, increased in 2010, decreased in 2011 and increased in 2012. The NASI decreased in 2009, increased in 2010, decreased in 2011 and increased in 2012 (KIPPRA, 2013). In their collection of literature, Aroni *et al* (2014), observe that EMH is steadily becoming deficient in providing explanations for the market behaviour. Osoro and Jagongo (2013), observe that the NSE 20 Share Index-may not at all times capture the most accurate information

In momentum effect, market efficiency predicts that any pattern that has been discovered by investors will gradually fade (Muga & Santamaría, 2007a). However, the above is exempted in case exploitation proves impossible or gains do not compensate risk and or costs involved. Zhang (2006), observes that if investors underreact to public information, they will underreact even more in cases of greater information uncertainty. Information asymmetry in stock price has no predictive model for its evolution (Iwarere & Barmish, 2014). To construct a feedback control trading strategy that adjusts the amount invested overtime is very important and performance was judged by studying the probability distribution associated with trading losses and gains. The researchers note that when linear feedback is in place, stock prices evolve over the lattice.

A study aimed at investigation the dynamics of security market indicators by (Sinha & Agnihotri, 2015) Sinha and Agnihotri (2014), considered three indices of market capitalization where: S & P BSE Sensex represented large capitalization firms, BSE mid-cap represented mid-capitalization firms and BSE small-cap representing small capitalization firms. Asset pricing models and portfolio allocation methods rely on the precision of volatility. The volume of traded stocks can be taken as proxy for the infomation flow in the market (Lamoureux & Lastrapes, 1990) in (Sinha & Agnihotri, 2014) and Securities Price Volatility has a direct link with information flow in the markets. Sinha and Agnihotri (2014), note that information is not disseminated in a regular way: informed traders always have an advantage over the non-informed traders in the shortrun. They futher observe that dissemination of information from trader to trader is correlated with the number of

transactions and arrival of new information can increase the traded volumes.

2.0 Literature

This was first empirically determined in the early 1980s (Muga & Santamaría, 2007b) and it is an anomaly that continues to challenge the market efficiency hypothesis. The authors' notes that momentum effect is not exclusive to any one market: it exists both in developed and emerging markets though intensity in emerging markets is less than in developed markets. A study done by Zhang (2006), investigated the role of information uncertainty in price continuation anomalies and cross-sectional variations in stock returns. The author believed that if short-term price continuation was due to investor behavioural biases, greater price drifts ought to have been observed when there is greater informational uncertainty. This information uncertainty should produce relatively higher expected returns following good news and relatively lower returns following bad news. Studies agree that greater information uncertainty about the impact of news on stock value leads to higher expected stock returns following good news but lower expected returns following bad news relative to the returns of stocks about which there is less information asymmetry (Zhang, 2006; Muga & Santamaria, 2007).

Momentum effect and information asymmetry go hand in hand (Muga & Santamaria, 2007; Islam, 2014): information asymmetry is also know as leverage effect (Islam,., 2014). The author did a study aimed aZ testing the two variants of GARCH models in estimating stock returns volatility from three Asian countries: Malaysia, Singapore and India. For the symmetric model they used the standard GARCH while Threshold GARCH (T GARCH) was used for the asymmetric model. The study period was from 02/01/2007 to 31/12/2013 which involved 1724 observations from Malaysia, 1743 from Singapore and 1725 from India. The author observe that there is strong evidence that the daily stock returns can be characterised by the above two models. In the methodology, (Islam, 2014), used daily closing prices of stock index of each market collected from online database over the period from January 2007 to December 2013. The findings of the study indicated that the estimates of the standard GARCH parameters α and β were positive and statistically significant for all specifications. The values of β were found to be very high, ranging between 83% to 91% and this could imply persistent volatility clustering. On the results of asymmetry, T GARCH appeared to be significant and with the correct sign suggesting that the existence of momentum effect all in the three markets.

A research titled Fama on Bubbles whose main aim was to test Fama's views on rational bubbles and discussed whether such bubbles are consistent with Fama's empirical findings. Engsted (2014), argued that there is neglect on Fama's public statements about asset markets. On one hand, Fama expresses a strong belief in the rational efficient market paradigm: but on the other hand, he is completely silent about the paradigm that deals with rational bubbles. In respect to Fama's research, "irrational bubbles" appear 10 times in an article and in those few additional cases where the word "bubble" appears without "írrational" infront of it, it is clear that Fama refers to irrrational bubbles.

The research continues to discuss on how Fama completely ignored rational bubbles yet it was a hot topic in academic literature with both theoretical aand empircal contributions being published in the mid 1980's. Going further to the 1990's Fama completely ignored the discussion about bubbles and only gets back to it during the global financial meltdown of 2008. During his Nobel Laureate Lecture, Fama had a section labelled bubbles (Fama, 2014). In the literature review Engsted (2014), discusses how some findings deviated from Fama's observations. The first one concluded that a scatter diagram of longterm returns against price earnings ratio suggests substancially negative returns, on average, for the next 10 years while the second concluded that linear regression of price changes and total returns on the log valuation ratios suggest substancial declines in real stock prices and real stock returns below zero, over the next 10 years. In conlusion of the research, Engsted (2014), notes that it is still not known on Fama's views on rational bubbles.

A research on testing the market efficiency of the Czech Capital Market on some selected issues. The approach in this study was an analysis of stock return behaviour from year 1995 to 2005. Hajek (2007) notes that if time series of Index returns are dependent and their dependence are econometrically significant, then the market is inefficient in terms of the weak form EMH. The implication of weak form efficiency is the Random Walk Hypothesis (RWH), which indicates that future price changes are unpredictable and follow one another independently (Chen, 2008) and fundamental analysis may be used to investigate departures of stock prices from their fair values if the market reaches the weak form efficiency but fails to be semi-strong efficient. The author further notes that numerous studies have proved that stock returns are conditional heteroskedasticity.

Heteroskedasticity-consistent variance r-ratio test is used because it ensures that in case of uncorrelated returns the variance ratio asymptotically approaches unity even if the variance is time-variable. Prices of new issues are determined by investment bankers while prices of existing issues are determined by the forces of demand and supply (James, 2012). Another study was on Banks and their effects on global interest has been of interest to everyone especially in connection to the 2008/2009 global financial crises conducted by Komo and Ngugi (2013). This study observed that most of the African stocks, with exception of the Nairobi Securities exchange are rarely affected by global crisis (the most recent being the 2008/2009 financial meltdown). In

conclusion, Hajek (2007), notes that weak form EMH cannot be validated on the Czech stock Market. Daily price changes on individual stocks and indices are systematically linearly dependent and dependencies cannot be explained by the non-trading factor, historical information on stock prices or indices may have statistically significant values.

Another conclusion made by the study is that the Czech stock market seems weak form efficient when the lower frequency data (weekly) are applied: short term dependencies must be exploited to become abnormally profitable. Homm (2009), did a research titled 'Testing for Speculative Bubbles in Stock Markets, A comparison of Alternative methods'. The author compares the observations from initial sample and this is extended forward until all observations are included. This is according to Philips, Wu, and Yu, (2011), who used the model to estimate the date of emergence of a bubble in the National Association of Securities and Dealers in Automated Quotations (NASDAQ) Stock Index.

A study to comparing the investors perceptions on NASI and NSE as performance measurement indicators sought to find out whether the introduction of NASI eliminated bias or brought any improvement. Osoro and Jagongo (2013), specific objectives were to find out whether there exists a difference between the NSE 20 Share Index, to find out whether difference exists in the Influence of the two indices and underlying market capitalization, and to find out whether difference exists in the Influence of the two indices and the underlying stock price. Their last objective was to find out which of the two indices is a better performance measure indicator. Osoro and Jagongo (2013) adopted three theories in their research namely; price pressure theory, imperfect subsitutability theory and information theory.

They adopted a comparative study to compare the two indices. They observed that investors perception would be affected by the reliability, accuracy, effectiveness and representativeness of the two indices. In their methodology, Osoro and Jagongo (2013), a correlation analysis was adopted where a z test was adopted at a 5% level of significance. The population of the study consisted of the then 52 listed companies at the NSE and 17 NSE member firms who were actively trading. Primary and secondary data was used in the analysis, where primary data was collected through self administered questionnaires and interview guides while secondary data was collected through a purchase at the NSE data vendors. In respect to primary data, random sampling was used to select one analyst from each of the 17 NSE member firms.

The findings of the research found that there was no statistically significant difference between the NSE 20 Share Index and the NASI: their z statistical showed a result of 1.148 while the z critical was at 1.96 at 5% level of significance. However from their primary data, Osoro and Jagongo (2013), the key informants were of the opinion that there was a significant difference between the two. Their second objective aimed at establishing the correlation between the two indices using product moment correlation. The results indicated a correlation co-efficient of 0.807. The results also found a strong correlation between NASI and market capitalization (coefficient of 0.96) and that of NSE 20 Share index and market capitalization with a correlation co efficenct of 0.65. objective three aimed at determining the Influence of blue chip companies stock market performance and the overall stock performance. The researchers found that there was a very weak correlation of 0.24 and 0.02 for NASI and NSE 20 Share Index respectively. The statistical results indicated that there was a significant difference between the two indices and stock price movements. Through the primary data, the researchers also found out that 70% of the respondents felt that there was a direct Influence of the performance of NASI and that of other market indicators such as market capitalization, turnover and share price movements.

A likert scale of 1-5 was used in finding out which among the NSE 20 Share Index and NASI was a better performance indicator. On reliability, the NSE 20 Share Index performed better with a mean of 4.1 and NASI a mean of 3.8 while on accuracy and representation, the NASI was better with an average of 4.2 and 4.2 respectively as compared to the NSE 20 Share Index with an average of 3.7 and 3.7 respectively. The inferential statistics, Z test indicated that the results were noZ statistically significant.

A research titled a GARCH approach to measuring efficiency: a case study of Nairobi Securities Exchange was done by Owido, Onyuma, & Owuor (2013). The authors adopted a GARCH approach because of the weakness of the Ordinary Least Squares (OLS) where it assumed a constant variance error term and this assumption does not hold always. In their approach they dismissed the OLS approach because of its assumption of a constant error term. They observed that economic data has been known to exhibit volatility clustering such that fluctuations in returns are not uniform over a period of time. They also observed that the one or more relevant independent variables may have been omitted from the model such that the predictor variables may not explain the model well thus leading to conclusions that may be wrong.

The above researchers concluded that the NSE is not efficient in weak form. The P-P and Q-Q plot results indicated that the distribution of returns were not quite linear in the middle and tail sections. The data indicated that the distribution was skewed to the right. The researchers also indicated that there was significant degree of autocorrelation betweeen adjacent and near adjacent observations which implied non-randomness. The data showed significant partial autocorrelation between Monday and Friday, Monday with Thursday and Wednesday but not Monday and Tuesday returns. The study concluded that Monday returns, as it was the norm, can be said

to be lower than other days returns. They observed that stock returns on a particular day would depend on the previous activity and in particlular the previous three days.

It was found that changes in stock liquidity coincide with a later movement into the stock by retail investors (Karuitha, Onyuma, & Mugo, 2013). A potential explanation, the authors observe, could be due to funding problems faced by the retail investors and that is why individual investors may not be the first to take shares that are cheap. The researchers accepted the null hypothesis that stock splits cause portfolio shifts which are related to stock liquidity changes. A study by Aroni (2011), on factors influencing stock prices for firms listed in the NSE concentrated on factors such as inflation, exchange rates, interest rates and money supply. The author employed secondary data obtained from NSE and CBK statistics. In modelling, a multiple regression was used to estimate the effect of the selected factors on stock prices. The findings were that inflation, exchange rates and interest rates were statistically significant and money supply-though exhibiting positive correlation-was noZ statistically significant. Aroni (2011), notes that inorder for investors to forecast future trends, they need to formulate appropriate investment strategy by constantly reviewing their current financial and economic conditions.

Literature has suggested that the four factor model is the best model in measuring the momentum effect: This is evident in the works of (Titman, Wei, & Xie, 2009), (Sapp & Tiwari, 2004), (Agarwalla, Jacob, & Varma, 2013), (Zhang, 2006) and (Avramov & Chordia, 2006). The four factor model brings the momentum effect in addition to the three factors identified previously by Fama.

Several studies have been conducted in support of the four factor model which I intend to use in this study: Titman et al., (2009) did research on capital returns and stock returns. The authors observes that increased investment expenditures should be viewed positively. This is because higher expenditure is associated with greater investment opportunities and also higher investment expenditure may indicate that capital markets have greater confidence in the market. Titman et al., (2009), however also notes the drawbacks of event studies supporting the two arguments above. They note that there is tendency for firms to publicly announce only those investment expenditures that are likely to be viewed positively and that higher stock prices may make it easier for firms to increase investment expenditures. The authors note that with increased investment expenditure, it may actually result in negative returns.

These negative returns may occur if investors fail to appreciate management incentive to oversell their firms, stock returns subsequent to an increase in investment expenditure are likely to be negative. This is especially for managers who are empire builders (Titman et al., 2009). Investors tend to undereact to empire building implications of increased investment expenditures. When firms increase their investment expenditure, most tend to underperform form their benchmark over the following five years. This underperformance is most prevalent moreso around earnings announcements. In the methodology, they used three different strategies: the first they used characteristic-based benchmarks portfolios which measures size, book to market values and momentum effects. The second approach used is the Caharts model of calculating excess returns. Finally they used Chopra et al model to examine returns around a short window sorrounding the firms announcement dates. The intercept of Caharts four factor model captures the risk-adjusted returns which is also known as the momentum effect.

Daniel, Grinblatt, Titman, and Wermers, (1997), did a research on measuring mutual fund performance with characteristic based benchmarks. They also adopted Cahart model approach. They identified a matching passive portfolio return for each fund return. This passive return which is substracted from the fund return to generate alpha, a weighted average of the returns of a one-month treasury bill. Cahart matching passive portfolio is based on the covariance of the fund returns with the returns of characterstic-based factor portfolios.

Sapp and Twari (2004) did a study titled, Does stock return momentum explain the smart money effect? The researchers also used the Cahart model. According to the authors, stock momentum phenomenon can be able to explain the smart money effect. Literature shows that investors prefer to invest in stocks that were recent winners. According to the authors, smart money effect is the ability to select good stocks. Investors have the ability to base their investment decisions on fund specific information-they have the ability to identify superior managers and invest accordingly. Smart money effect is best explained by the stock return momentum. Sapp and Twari, (2004) conducted research to establish whether investors are chasing funds with momentum styles or they are just naively chasing funds with large past past returns.

If investors chase funds with momentum styles in an effort to exploit return momentum, then smart money effect may have an explanation consistent with a group of sophisticated fund investors taking advantage of cheap momentum strategies. They also examine whether funds with high momentum momentum exposure persistently enjoy positive cashflows as would be the case if investors were successful in indentifying fund managers that follow momentum strategies. The research period was from 1970 to year 2000. The authors rank funds at the start of each quarter in the sample period in deciles, based on their exposure to the momentum factor and then examine the proportion of funds within each decile to examine the proportion of funds within each decile that experiences positive net cash flows during the formation of quarters and the next four quarters. In the findings, (SAPP & TWARI, 2004) observed that only 49% if the funds in the top momentum decile enjoy positive net

cash flows in the formation quarter, while 34% of the funds enjoy positive net cash flows after four quarters. Their findings also show not only that fund investors are able to identify superior managers with their cash flows but they also do not identify momentum increment styles.

L'Her, Masmoudi, and Suret, (2004) did a study that aimed in establishing evidence to support the four factor pricing model from the Canadian stock market. The study was conducted between 1960 and april 2001 where they found that size factor returns are substancially greater in january than other months. They found that momentum returns are always significant except in January. Book to market factor returns are positive (negative) and highly (barely) significant in down markets (up markets). L'Her et al. (2004), note that Fama and French three factor pricing model captures most market anomalies except the momentum anomally. Sood and Tellis (2009), did a study entitled, 'Do innovations really pay off? Total stock market returns to innovations'. The authors note that literature from critics highlight that stock markets react positively to announcements of immediate earnings but negatively to announcements of investment in innovation that have uncertain long term pay off. They used Caharts momentum factor among other models on 5481 announcements from 69 firms and 19 technologies between 1977 and 2006.

The study used monthly market data obtained from the Nairobi Securities Exchange for the periods from 2004-2015. This translated to 12 years or 144 observations which Hajek (2007), acknowledges that such a period is significant enough to obtain robust data for analysis. All firms of the exchange were studied (with exception of Hutching Biemer and Kurwitu Venturers) and data was analysed according to its availability. For instance, if a firm was not listed or had been suspended, the data that is available is the only that was used in the analysis.

3.0 Methodology

Secondary data is data that the researchers did not collect for themselves directly from the respondents (Greener, 2008), and it could lead to discovering unforeseen or unexpected relationships for it is unbiased. Secondary data was obtained from the data vendors at the Nairobi Securities exchange, Central Bank and Capital Markets Authority in addition to some data being obtained from the NSE data vendors. This data was the monthly price movements for the years starting on January 2004 and ending on December 2015. Empirical studies have supported this span of time as being sufficient in analysis. These include Kadilli (2014), whose study was for 12 years, that of Hajek (2007), which was for 11 years and that of Miralles-Marcello *et al* (2014), which adopted 10 years and that of Amata and Muturi (2016), who used a period of 13 years in their study . Secondary data was collected with the aid of a data collection sheet where information on daily price movements, monthly risk free interest rates, turnover, number of shares outstanding, dividends paid in a particular year, market capitalization, NSE 20 share index, NSE All Share Index, FTSE NSE 15 Index and FTSE NSE 25 Index was obtained. This data was obtained from NSE, CMA, Central Bank and Kenya National Bureau of Statistics (KNBS) as was the case of Amata and Muturi (2016).

Hypothesis one intended to test the Influence of the momentum effect and the performance of Nairobi Securities Exchange indices. Cuthbertson and Nitzsche (2004), observes that the price that an investor is prepared to pay today for a stock depends on the price they think they can obtain at some point in the future. (Zhang, 2006), suggests the use of Four-Factor Model to measure the momentum effect which is appears as follows:

$$R_{it} - R_{ft} = \alpha + b_{iM}\left(R_{mt} - R_{ft}\right) + s_i SMB_t + h_i HML_t + m_i UMD_t + \varepsilon_{it}$$

Where:

$R_{it} - R_{ft}$ is the excess return of portfolio i in excess of the risk free rate in month t

$R_{mt} - R_{ft}$ are the excess returns of the market value weighted portfolio

UMD_t is the return difference between portfolios of past winners and past losers and this is the variable that is used to capture the momentum factor. Sood and Tellis (2009), observe that the price momentum accounts for the persistence effect in stock returns.

SMB is the size premium which represents the return differential portfolios of small and large stocks. This is obtained by taking the difference between the five big size deciles and five small size deciles

HML is the value premium which represents the return differential of stocks with high book-to-market values and low book-to-market values.

b_{iM} is coefficient of the market risk premium

s_i is the coefficient of the size premium

h_i is the coefficient of the return difference

ε_{it} is the error term of security returns

α is alpha value of security returns

In order to establish the accuracy of the results, the researcher conducted diagnostic tests. These tests included Autocorrelation tests, linearity tests, normality tests, multicollinearity tests and homoscedasticiy, hetoroscedasticity tests. Homoscedascity can be noted to be a situation where dependent and independent variables have equal variances, while heterscedasticity is when unequal variances exist (Saunders, Lewis, & Thornhill, 2009). If there is a high degree of correlation between independent variables, this is called multicollinearity (Kothari, 2004). Saunders et al., (2009), on the other hand observes collinearity or multicollinearity as the absence of correlation between two or more independent variables. When collinearity is present, it becomes difficult to separate the effects of individual variables. Multicollinearity was measured by the help of Variance Inflation Factor (VIF) and tolerance factors (Kothari, 2004) (Saunders et al., 2009). The authors note that a small tolerance (below 0.1) and large Variance Inflation Factor (VIF) of greater than 10 usually indicates high collinearity. It can also be said to be presence of multicollinearity if there is low tolerance accompanied by large standard error and non-significance of the results.

When the value of dependent variable at time t is related to its value at the previous period, this is called autocorrelation or serial correlation (Kothari, 2004). The test used to establish autocorrelation is called the Durbin Watson Test whose values ranges from zero to four. A value of two indicates no autocorrelation, zero positive and four negative autocorrelation. Normality tests were established by the use of Q-Q plots. Partial correlation measures the relationship between a dependent variable and a particular independent variable while holding all other factors constant (Kothari, 2004). This test aimed at eliminating the effects of other variables.

4.0 Results

Table 4.1: Collinearity Diagnostics on the Influence of momentum factor and performance of NSE 20 Share Index

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	MOMENTUM EFFECT
1	1	1.706	1.000	.15	.15
	2	.294	2.411	.85	.85

a. Dependent Variable: NSE_20_SHARE

Data was obtained from the monthly market reports sold by the data vendors at the Nairobi Securities Exchange (NSE) running from January 2004 to December 2015. An important observation is that for monthly prices, the norm of most securities markets is to provide prices on the last trading day of the month. Therefore, these are not the average monthly prices per se. This totalled 12 years which translates to 144 months under observation. This is in line with the literature where similar studies used an average period of 10 years. A total of 69 companies were analysed. These are companies that had listed in at least a year analysis period. Some companies delisted before the analysis period was over while others listed much later in the analysis stage and others listed in between the period under the study and delisted before the period under the study was finalized. Some data was also obtained from the Kenya National Bureau of Statistics (KNBS) relating to inflation rates for the period under the observation.

For objective one which was measuring the momentum effect as a securities behaviour, data was entered into excel spread sheets that related to each firm that had been listed during the period under review. A total of 69 spread sheet were used classifying companies in accordance to the current sectors as identified by NSE. For each spreadsheet, the researcher would have 14 columns containing the following details: Year (column A: this started from 2004 to 2015), Month (Column B which started from January 2014 to December 2015), Price at the close of the month (Column C which captures the last trading price of the month. In case this price was missing, the last nearest trading price was used), Previous Months closing price (Column D), Returns of the Month (Column E), monthly risk free rate of return (Column F), excess returns over the risk free rate of return (Column G), UMD_t (ColumnH), total shares (Column I), market capitalization (Column J), SMB (Column K), par value of the companies per share (Column L), Total nominal value (Column M) and HML (Column 14). Returns of the Month would be obtained by:

$$Returns\ of\ the\ Month = \frac{Today - Previous}{Previous} * 100$$

Excess returns would be obtained by taking Returns of the Month less the monthly risk free rate of return. The risk free rate of return for every month was obtained from the website of the Kenya National Bureau of Statistics for the months starting from January 2004 to December 2015. It is important to note that the monthly prices in stock markets simply reflected the prices at the last day of trading of that particular month as opposed to the average prices of that particular month. This is how stock markets operate even in cases of daily prices, which are normally the closing prices as opposed to the actual average of that day. If on a particular month data

was not present in the excel sheets obtained from the NSE data vendors, the researcher would use the most recent daily trading data for that particular month. This happens especially if the firm did not trade on the last day of the month as provided by the NSE data vendors.

Column G captured the differences between the returns of the stock of the month and the risk free rate of return as provided by the Central Bank. This would be used to obtain the excess return of the stock on a month as explained by the Capital Asset Pricing Model (CAPM) (Frank J. Fabozzi, CFA, Focardi, & Jonas, 2014). Excess return is used to obtain real return from the stock since any investor can be able to get the risk free rate without any effort or financial management skills. Column I would give the total shares outstanding on a particular stock for a specific month as obtained from the CMA Library. Column J which captured market capitalisation was obtained by taking the price at the end of the month (Column C) and multiplying it by the total shares outstanding (Column I). Column L captured the par value of a stock. This was obtained from the monthly prices provided by the NSE data vendors. Column M was about the nominal value of a firm. This was the product of par value (Column L) and the total shares outstanding (Column L). Column N was called High Minus Low (HML). Zhang (2006), guided the computation of HML where they noted this represents the value premium according to the Cahart Model.

Zhang (2006), show that the HML is obtained by taking the nominal value of a stock on a particular month and dividing it by its corresponding market capitalisation. This was done on a month-by-month basis. Cahart model suggests that HML represents the value premium. The model suggests that high minus low equals the return differential between the stocks with high book to market ratios and low book to market ratios. This was obtained by dividing book values (also known as nominal values) by the market values (also known as market capitalisation).

SMB which means Small Minus Big was obtained obtained by further analysis of column N (HML). This followed Cahart model as suggested by (Zhang, 2006). This was done by: First, posting monthly data for all stocks on different spread sheets. Since the research was for 12 years, this translated to 144 spread sheets. Second, for each of the monthly spread sheets, data was sorted from the largest to the smallest. The upper half was classified as high HML while the lower half was classified as low HML. Thirdly, the difference between the large HML and low HML was obtained and the difference was the SMB factor. This is what was posted on Column K and was the same for all stocks.

Column H represents UMDt and this is the momentum factor that the researcher intended to achieve on objective one. This was obtained by taking the return premium obtained on Column G for further analysis. This further analysis necessitated the researcher to open a work sheet by following these steps. First, the return premium for every firm was posted on a general spread sheet where the firms were in columns and monthly data in rows. Second, this was transposed to have the firms as rows and monthly data as columns. Thirdly, each column was uploaded on a different spread sheet . Forth, data on each spread sheet was arranged from the largest to the smallest. The positives were named gains while negatives were called losses. An aggregate of the two was obtained and this is what was called the momentum effect (UMDt) according to the Cahart model. The momentum effect that appeared on column H was similar for all firms for the period under the study.

Table 4.2 shows descriptive statistics on the stock prices from January 2004 to December 2015. In the case of Unilever, its highest price in the period was Sh. 117 with the lowest Sh. 47.5 and the standard deviation was 17.1 and average price for the period amounted to Sh. 81.26. For Eegaads, the highest price was Sh.69.5, minimum Sh. 13.6, Sh. 32.2 and a standard deviation of 12.65. Kakuzi had a lowest price of Sh. 19 with the maximum of Sh. 355, mean price of Ksh. 82.24 with a standard deviation of Sh. 78.29. Kapchorua Tea had the highest price at Sh. 218, lowest Sh. 63, mean Sh. 117.37 and a standard deviation of 31.07. Limuru Tea on the other hand had a maximum price of 1200 and a minimum price of 171, mean price of Ksh. 446.51 with a standard deviation of 305. Rea Vipingo had a minimum price of Sh. 7.4, maximum of Sh. 28, mean price of Ksh. 17.27with a standard deviation of 4.63. Sasini had a mean price of Sh. 19.46, maximum and minimum of Sh.141 and 4.3 respectively and a standard deviation of 19.82. Williamson had a mean of 172.84, maximum and minimum of 414 and 46 respectively and a standard deviation of 90.02.

Car and General had a mean price of Ksh. 35.69, maximum and minimum of Ksh. 60 and 10.65 respectively and a standard deviation of 50. CMC (delisted in August 2011 and rebranded to alfutain) had a mean of Ksh. 35.7, maximum and minimum price of Ksh. 181 and 9.8 respectively with a standard deviation of 35.83. The price difference was attributed to the fact that the company did a stocks split in January 2007 and was also in bear run caused by its corporate governance problems which eventually led to its delisting. Marshalls had a mean price of Ksh. 19.91, maximum and minimum price of Ksh. 44 and 9 respectively and a standard deviation of 9.37. Sameer had a mean of Ksh. 9.19, maximum and minimum of Ksh. 27.25 and 3.5 respectively and a standard deviation of 5.49. Barclays Bank had a mean price of Ksh. 86.83, maximum and minimum price of Ksh. 459 and 10.65 respectively, and a standard deviation of 94.85. This could be attributable to the fact that Barclays did a one for five stocks split in January 2007, and another one of one for four in January 2011. CFC (currently known as Stanbic) had a mean price of Ksh. 78.92, a maximum and minimum price of Ksh. 368 and

38.75 respectively and a standard deviation of 38.18.

DTB had a mean price of KSh.108.58, maximum and minimum limit of Ksh. 270 and 25.75 respectively and a standard deviation of 67.22. DTB has been a very steady stock. Equity had a mean value of Ksh.67.50, maximum and minimum limit of Ksh. 304 and 13.45 respectively and a standard deviation of 70.54. The price fluctuations were partly due to a stock split of one for 10 that was done in March 2009. Housing Finance had a mean of Ksh. 23.84, a maximum and minimum price limit of Ksh. 55.5 and 8.5. In case of I&M Bank, the mean price was Ksh.117.55, with a maximum and minimum price of Ksh. 140 and 85 respectively and a standard deviation of 14.63.

Table 4.2 Descriptive Statistics on Secondary Data

Firm	Mean	Mode	Std Devn	Skewness	Range	Count
UNILEVER	81.26	80	17.10	0.18	69.5	53
Eegads	32.20	17	12.65	0.57	55.9	143
KAKUZI	82.24	35	78.29	2.16	336	143
KAPCHORUA	117.37	100	31.07	0.59	155	143
LIMURU TEA	446.51	305	234.40	1.99	1029	143
REA VIPINGO	17.27	20.5	4.63	0.00	20.6	118
SASINI	19.46	17.5	19.82	4.74	136.6	143
WILLIAMSON	172.84	200	90.02	0.56	368	143
CAR & GEN	35.69	50	12.73	-0.03	49.35	143
CMC	35.70	50	35.83	2.29	171.2	91
MARSHALLS	19.91	24	9.37	0.91	35	143
SAMEER	9.19	5.55	5.49	1.20	23.75	143
BARCLAYS	86.83	250	94.85	1.40	448.35	143
CFC	78.92	42	38.18	3.26	329.25	143
DTB	108.58	30	67.22	0.85	244.25	143
EQUITY	67.50	129	70.54	1.69	290.55	113
HOUSING FINANCE	23.84	13.95	10.85	0.70	47	143
I&M	117.55	127	14.63	-0.44	55	31
KCB	53.57	20.5	49.04	2.28	226	143
NBK	31.91	39	12.55	0.69	52.5	143
NIC	55.53	50	28.18	2.58	175.05	143
STANCHART	209.38	139	64.91	0.54	236	143
COOP	15.30	8.95	4.36	-0.27	16.65	84
ATLAS	8.13		4.23	-0.65	10.1	13
EXPRESS	10.70	9	7.11	0.99	25.85	143
KQ	37.85	45.75	32.83	1.17	126.5	143
LONGHORN	12.31	9	5.39	0.93	22.6	44
NATION	213.13	140	67.90	0.44	243	143
STD GRP	40.13	45	11.16	0.47	51	143
TPS SERENA	55.75	81	20.91	0.84	94.75	143
UCHUMI	14.63	10.05	4.40	0.04	17.35	84
SCAN GRP	40.32	25.5	15.13	0.40	56.7	113
ARM	92.20	90	52.91	0.67	217.5	143
BAMBURI	164.05	150	35.75	-0.59	141.5	143
CROWN PAINT	45.79	38	27.40	1.98	148.05	143
EA CABLES	44.09	10.55	69.55	4.75	584.9	143
PORTLAND	82.91	120	29.63	0.36	108	143
KENGEN	16.09	26	7.79	1.14	32	116
KOBIL	60.81	100	72.02	2.66	412	143
KPLC	97.80	97.5	81.86	0.43	263.1	143
TOTAL	28.60	29.75	8.81	0.18	44.9	143
UMEME	15.71	13	3.64	0.06	12	35
BRITAM	13.80	6.05	8.48	0.66	31.5	52
CIC	6.84	6.5	2.39	0.28	7.8	42
JUBILEE	208.01	113	132.39	1.25	522	143
KENYA RE	13.77	14.95	3.59	0.03	14.6	101
LIBERTY	14.43	7.7	6.13	0.21	18.45	57

Firm	Mean	Mode	Std Devn	Skewness	Range	Count
SANLAM	62.53	40	31.20	0.65	122.5	143
CENTUM	46.03	23	57.92	4.27	395.25	143
CITY TRUST	150.69	150	105.04	1.36	440	112
HOME AFRIKA	4.77	4.3	3.46	2.80	17.6	30
KURWITU	1500.00	1500	0.00		0	14
OLYMPIA	10.40	17	6.95	1.12	32.3	143
TRANSCENTURY	23.53	25	6.79	-0.25	30.7	53
NSE	21.16	20	1.79	1.37	5.4	15
A BAUMAN	14.84	8	7.43	1.07	25.1	52
BOC	127.95	135	17.70	-0.16	79	96
BAT	339.33	200	226.37	1.27	905	143
CARBACID	99.58	125	48.26	-0.63	197.75	96
EABL	215.46	140	95.12	1.34	428	143
EVEREADY	3.95	3.95	2.54	2.44	16.1	109
FLAME TREE	7.92	8.2	1.08	-0.24	3.1	14
KENYA ORCHARD	16.73	5	33.82	2.82	186.2	143
MUMIAS	13.86	10.8	15.05	1.76	60.5	143
UNGA	17.43	11	10.09	1.76	41.9	143
ACCESS	15.26	20.75	8.59	0.31	31.15	72
SAFCOM	7.22	5.8	4.42	0.90	14.85	91
STANLIB	20.88		0.88		1.25	2

From the analysis results of objective one, the researcher obtained that the mean value of the momentum factor which was measured by UMDT was -362.12 with a standard deviation of 364.15 while for NSE 20 Share Index was 4111.62 points with a standard deviation of 896.21 points. The maximum points were 5774.27 and 703.08, minimum points were 2474.75 and -1731.4 for NSE 20 Share Index and momentum factor respectively. These have been captured on Table 4.3.

Table 4.3: Descriptive Statistics on the Influence of momentum effect and performance of NSE 20 Share Index

	Min	Max	Mean	Std. Dev	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Stat	Std. Error	Stat	Std. Error
MOMENTUM EFFECT	-1731.40	703.08	-362.12	364.15	-.301	.202	1.28	.4
NSE_20	2474.75	5774.27	4111.62	896.21	-.155	.202	-1.26	.4

The behaviour of investors over the period under the study was also presented using graphs. The Influence of momentum effect and performance of the NSE, Influence of financial contagion and performance of NSE, Influence of white noise effect and performance of NSE, and that of the Influence of Herding Effect and performance of NSE was captured in the figures below. Figure4.1 captures the Influence of the momentum factor (it has been explained above how this factor was obtained according to the approach of Famas four Factor model as explained by (Zhang, 2006)) and the performance of the NSE 20 Share Index from January 2004 to December 2015. .

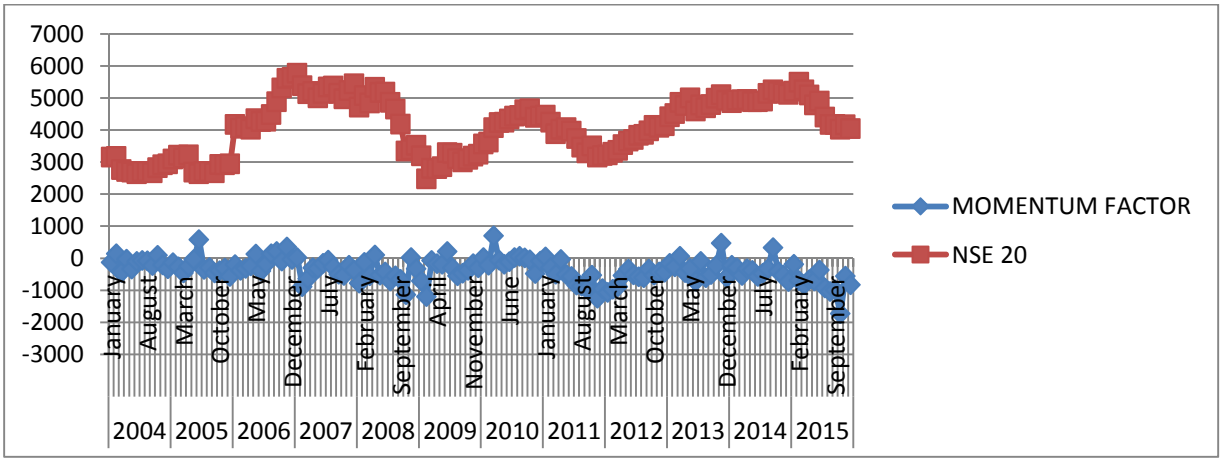

Figure 4.1: Influence of momentum effect and performance of NSE 20 Share index

Research was conducted on 67 listed firms for the period of January 2004 to December 2015, translating to 144 monthly observations. After data was input and the momentum factor computed as explained in section 4.3.2 above, data was subjected to hypothesis test as shown in Table 4.17 below. The results of the Influence of the Momentum effect and the performance of NSE 20 share index was that the Z test results .mean for Momentum effect was -363.763 while that of the NSE 20 Share Index was 4118.29 points. The z statistical value was -55.41, z critical was 1.972 and the P value was 2.1 E-118. The above showed that the z statistical was in the critical region.

Table 4.4: Z Test Results on Momentum Effect

Z test: Two-Sample Assuming Unequal Variances		
	-126.918	*3157.88*
Mean	-363.763	4118.291
Variance	133148.9	802401
Observations	143	143
Z stat	-55.413	
P(T<=t) one-tail	1.1E-118	
Z Critical one-tail	1.652999	
P(T<=t) two-tail	2.1E-118	
Z Critical two-tail	1.972663	

The above results imply that there is a statistically significant Influence of the momentum factor and the performance of the NSE 20 Share Index. The researcher sought to establish the correlation, regression and analysis of variance Influence of the momentum factor and the performance of NSE 20 Share Index. These are captured on Tables 4.19, 4.20 and 4.21 shown below. R square was 0.03 implying that momentum factor influences the NSE 20 Share Index to the extent of 3%. F value of this observation is 0.487 with a significance value of 0.486 and a standard error estimate of 897.82. The researcher ran a simple regression equation on the Influence of momentum factor and performance of the NSE 20 Share Index. This equation was as follows

$$y = 4163.73 + 0.144x$$

Where Y represents the performance of NSE 20 Share Index and X represents the momentum factor of the listed stocks in the NSE. The standard error term of the above model was 105.69 points

Table 4.19: Model Summary on the Influence of momentum factor and performance of NSE 20 Share Index

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.058[a]	.003	-.004	897.82299	.003	.487	1	142	.486

Predictors: (Constant), MOMENTUM EFFECT

Table 4.20: Analysis of Variance on the Influence of Momentum factor and the performance of NSE 20 Share Index

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	392701.227	1	392701.227	.487	.486[b]
	Residual	114464229.904	142	806086.126		
	Total	114856931.132	143			

a. Dependent Variable: NSE_20_SHARE
b. Predictors: (Constant), MOMENTUM EFFECT

Table 4.21: Standardized coefficients on the Influence of momentum factor and performance of NSE 20 Share Index

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	4163.732	105.698		39.393	.000	3954.788	4372.676		
MOMENTUM EFFECT	.144	.206	.058	.698	.486	-.264	.551	1.000	1.000

a. Dependent Variable: NSE_20_SHARE

Hypothesis Testing

It was found that the correlation between Momentum Effect on the performance of NSE 20 Share index was

primary data to positive at 0.525 and statistically significant with a P value of 0.022. The correlation in respect to primary data between Momentum Effect and NASI, 0.26. This showed a weak positive correlation on Momentum Effect that was not statistically significant at 0.05 level of significance since the P value was 0.175. Third item to be studied on the primary data was the Influence of momentum effect on the performance of FTSE NSE 15 index. It was established that the correlation was a weak positive of 0.384 with a P value of 0.079. These results were statistically insignificant at 0.05 level of significance. On the Influence of Momentum Effect on the Performance of FTSE NSE 25 index, the market informants were of the view that the correlation between the two was a weak with a factor of -0.395 and a P value of 0.073 indicating that it was not statistically significant at 95% degree of confidence.

The secondary data correlation results of the Influence of the Momentum Effect on the Performance of NSE 20 share index was that the z statistical value was -55.41, z critical was 1.972 and the P value was 2.1 E-118 meaning that there was a statistically significant Influence of Momentum Effect on the performance of NSE . The researcher obtained an R square was 0.03 implying that momentum factor influences the NSE 20 Share Index to the extent of 3%. F value of this observation is 0.487 with a P value of 0.486, which meant that the relationship was not statistically significant. From the above observations, it can be observed that there were mixed observations in respect to the hypothesis of momentum effect but as the researcher had highlighted, whenever conflicts would arise, the secondary data observations would carry the day. Therefore, the hypothesis that momentum effect does not significantly affect the performance of NSE indices was not rejected at 0.05 level of significance.

5.0 Conclusions

It was concluded that NSE stocks over the span of 12 years studied demonstrated momentum effect. Though the results were statistically significant, the influence of momentum effect was found not to be very strong on its own as one variable observation.

6.0 Recommendations

Future researchers would be advised to study the momentum effect on a shorter span like 12 months where they are working with weekly prices. The researcher would also recommend future scholars to do a regional comparative study. To the policy holders Nairobi Securities Exchange and Capital Markets Authority, the researcher would recommend for them to ensure that they provide average monthly data (as opposed to the last day of the trading) and even average weekly data to enhance robustness in the future researches.

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