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RESEARCH ARTICLE

TEST FOR STOCK RETURN ANOMALIES AT THE NAIROBI SECURITIES EXCHANGE

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ABSTRACT

Prior empirical studies have identified the existence of various stock return anomalies in several countries stock markets. In Some stock markets, return anomalies are discovered and then they disappear once traders exploit them to earn excess returns. Further, some of the return anomalies are more pronounced in some stock markets than in other stock markets. The purpose of this study was to test the existence of size, value, momentum; profitability and investment stock return anomalies at the Nairobi securities exchange in Kenya. Explanatory research design was adopted in establishing the existence of stock return anomalies at the Nairobi securities exchange in Kenya. The target population was 45 companies that were listed at the Nairobi securities exchange by January 2009 (after excluding companies that were not trading consistently and those that were delisted). A census of 45 companies was used to construct stock portfolios between 2009 and 2014.The existence of stock return anomalies was explored using sorts of returns on anomaly variables and multivariate regressions. The results of the hypotheses tests lead to a conclusion that size stock return anomaly, value stock return anomaly and investment stock return anomaly existence is statistically significant while profitability stock return anomaly and momentum stock return anomaly have an insignificant existence at the Nairobi securities exchange. The developed six factors model incorporating market risk and the five stock return anomalies proxies has a high explanatory power and its F-statistic value indicates that it is an adequate model for explaining some of the stock portfolio return variations (not explained by CAPM) at the Nairobi Securities Exchange in Kenya. This study recommends a policy framework for enhancing factor investing strategies at the Nairobi securities exchange. Factor investing policy framework is based on stock return anomalies that have been proven empirically by researchers to earn a stock return premium in the long run. In adopting a factor investment strategy, investment advisors, retail investors and stock brokers at Nairobi securities exchange should allocate more investment resources to small cap stocks than in big cap stocks, invest more in value stocks than in growth stocks and invest more in stocks of firms with low growth in assets in the current period than firms with high growth in assets in the current period for stock return optimization.

INTRODUCTION

Capital assets pricing model (Sharpe, 1964) and efficient market hypothesis (Fama, 1970) have been the main finance theories in explaining stock return variations and efficiency of stock exchange markets respectively. However, later empirical studies by Banz (1981), Fama and French (1992), Jegadeesh and Titman (1993) among others have provided evidence that is contrary to Capital assets pricing model (CAPM) and efficient market hypothesis (EMH). The contradictions between the empirical results and the results predicted by CAPM and EMH are commonly referred to as return anomalies (Hoffman, 2012).

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Stock return anomalies (also known as effects) are therefore empirical results that are inconsistent with existing asset pricing models predicted results (Schwert, 2003). They are patterns in stock returns that are considered anomalous since they are not explained by an asset pricing model (Fama and French, 2008). Such anomalies indicate inadequacies in the underlying asset pricing model or inefficiencies in the stock market (Gharghori, Lee and Veeraraghavan, 2009). Emerging empirical literature debate on stock return anomalies pose a significant challenge to existing asset pricing models and has prompted researchers to focus on the development of alternative asset pricing models (Fama and French, 2008) which would capture the unexplained stock return variations. Banz (1981) empirical study found out that small cap firms in the US stock markets earned higher average stock returns than the stock returns predicted using the capital asset pricing model

(CAPM). Further, Stocks with high book value to market value ratios have higher average stock return than those with low book value to market value ratios (Fama and French, 1992) while more profitable firms have higher average stock returns than less profitable firms (Novy-Max, 2010). Stocks with high momentum have higher stock returns in the next twelve months (Jegadeesh and Titman, 1993) compared to the results predicted by CAPM. This could be explained by the fact that market risk alone does not fully explain stock return variations (Fama and French, 1992). Available independent empirical studies suggest that much of the variation in stock returns related to size effect (Hunstad, 2015), value effect (Ameer, 2013), momentum effect (Jegadeesh and Titman, 1993), profitability effect (Novy-Max, 2010) and investment effect (Aharoni, Grundy and Zeng, 2013) is unexplained by Capital asset pricing model. This means that research on the development of an elaborate asset pricing model by incorporating other documented significant effect factors apart from market risk factor remains a knowledge gap in finance (Goyal, 2011). This motivated the researcher to examine a model that adds the five return anomaly factors to Capital asset pricing model. As a result, a six factors model was developed and used to determine the ability of the combined six factors model in explaining the stock returns anomalies at the Nairobi Securities Exchange in Kenya. Prior empirical studies have identified the existence of various stock return anomalies in several countries stock markets (Gharghori, Lee and Veeraraghavan, 2009). In Some stock markets, return anomalies are discovered and then they disappear once traders exploit them to earn excess returns (Schwert, 2003). Further, some of the return anomalies are more pronounced in some stock markets than in other stock markets (Fama and French, 2008). While stock return anomalies have been widely researched in developed stock exchanges such as in the US, Britain, Japan and Germany, studies on stock return anomalies in developing stock exchanges has been scant. The purpose of this study was to test the existence of size, value, momentum; profitability and investment stock return anomalies at the Nairobi securities exchange in Kenya

This study is structured as follows: Chapter one provides the background of the study, statement of the problem and the purpose of the study. Chapter two presents' relevant empirical reviews and chapter three provides details on the research design, target population, empirical modeling and data analysis while Chapter four covers data analysis results, presentations and discussions. Finally, Chapter five provides a summary of findings, conclusion, recommendations and suggested areas of future studies.

LITERATURE REVIEW

Size Return Anomaly

Size return anomaly refers to the negative relationship between stock returns and the firm size of companies (Schewert, 2002) which could not be explained by CAPM. The anomaly was first documented by Banz (1981) in his study on the relationship between stock return and firm size for companies listed at the New-York securities exchange in the United States of America. After analyzing data using a simple linear regression model, Banz (1981) discovered that small size firms have higher returns than large size firms. He attributed his discovery to the fact that small companies are perceived to be riskier than large companies and as such investors demand a higher rate of return. Another study by Reinganum (1983) on the anomalous stock behavior used United States of America stock market data and event study methodology to test on the January effect for small firms. He found out that small firms experienced large returns during the first few days of January than large firms. This is because Small firms are viewed as being more risky than big firms and the market rewards investors for bearing more risks. He also stated that there is an inverse relationship between stock return and firm size. This study aimed at establishing the existence of size return anomaly at the Nairobi securities exchange in Kenya. Ameer (2013) viewed size return anomaly as the difference between the return of small cap stocks and return of big cap stocks. This implies that size return anomaly is determined by the amount that is invested in small company stocks (Hunstad, 2015).

The greater the exposure a stock portfolio is to small company stocks, the higher the return in comparison to large company stocks (Hebner, 2014). According to Sharpe, Alexander and Bailey (2006), firm size is measured using stock market capitalization and we compute the stock market capitalization by multiplying the number of shares with their market price per share (Kristina, 2010). In the Fama and French three factor model, firm size was used to sort stock portfolios and the proxy for size anomalies factor was the simple average of the returns on the three small stock portfolios minus the average of the returns on the three big stock portfolios (Fama and French, 1993). Fama and French (1995) study on size and value factors using data from US stock markets and multivariate time series regression methodology concluded that firm size is a significant explanatory variable on stock portfolio return. They observed that small size company stocks have a higher expected return relative to large size company stocks. Another study by Ameer (2013) on augmented three factor model using data from the Pakistan stock exchange market and time series regression analysis concluded that firms with small market capitalization exhibited higher returns than firms with large market capitalization. In Kenya, Riro and Wambugu (2015) tests of asset pricing models at Nairobi securities exchange sought to test whether capital asset pricing model, Fama and French three factors model could explain the return of stocks traded at NSE. They used a sample of 48 companies listed at NSE during the period 2009 to 2013. After analyzing data using time series regression analysis they found out that size factor was a significant predictor of stock return at Nairobi securities exchange in Kenya. This study adopted Fama and French (1993) proxy for size return anomaly at the Nairobi securities exchange in Kenya. This study aimed at establishing whether there is a significant size return anomaly at the Nairobi securities exchange in Kenya.

Value Return Anomaly

Value return anomaly refers to a positive relationship between stock returns and book value to market value ratio of a stock (Hebner, 2014) which cannot be explained by CAPM or EMH. Further, the value factor captures the positive link between stocks with low prices relative to their intrinsic value and stock return (Hunstad, 2015). An earlier study by Ameer (2013) concluded that value return anomaly resulted from the difference between the return of value stocks and the return of

growth stocks. Value factor was the third factor in the Fama and French (1993) three factor model and it is the amount of exposure to low priced stocks or value stocks. Value stocks are those stocks that are undervalued by the market and can be purchased at a lower price than their intrinsic value (Hebner, 2014). According to Chandra (2010), book value to Market value ratio is used to measure the value ratio of a company. Additionally, Sharpe, Alexander and Bailey (2006) stated that book value is the net worth of a company which is given by the difference between Assets and liabilities while market value is the market capitalization given by the product of price per share and outstanding number of shares. Basu (1997) study tested on the notion that book to market value ratios could explain the violations of the capital asset pricing model. He found out that there was a significant positive relationship between book to market value ratios and stock returns for US stocks which could not be explained by CAPM. Further, Kristina (2010) study observed that value stocks have higher book to market value ratios while stocks with low book to market ratios are termed as growth stocks (representing successful companies with high potential for future growth). The greater the exposure to value risk factor, the higher the return in comparison to low book to market ratio stocks (Hebner, 2014). In the Fama and French (1993) three factor model the proxy for value return anomaly is the simple average of the returns on two high value stock portfolios minus the simple average of the returns on the two low growth stock portfolios. This study adopted Fama and French (1993) proxy for value return anomaly.

Fama and French (1992) study on cross-section of expected stock returns using United States of America stock market data and time series regression analysis found out that there is a strong relationship between book to market ratio and the return of a stock portfolio. They concluded that firms with high book to market ratio outperform those with low book to market ratio. This is because firms with high book to market value ratio are perceived to be riskier and should therefore compensate investors with higher returns (Fama and French, 1992). Another study by Ameer (2013) sought to test whether the Fama and French three factors apply in Pakistan equity market. After analyzing Pakistan stock market data using time series regression analysis, he observed that Pakistan firms with higher book-to-market ratios have higher stock returns. His study concluded that value factor was a significant determinant of Pakistan stock return and value return anomaly was international in character. Value effect has been researched by numerous researchers for many different sample periods and for most major securities markets (Hawawini and Kiem, 2000). However, this has not been the case for developing and in particular, African stock exchanges such as Kenya. This study aimed at establishing whether there is a significant value return anomaly at the Nairobi securities exchange in Kenya.

Profitability Return Anomaly

Profitability return anomaly refers to the positive relationship between stock returns and gross profit ratio (Novy-Marx, 2010) which cannot be explained by CAPM or EMH. According to Fama and French (2006) study, more profitable firms have higher expected stock returns than less profitable firms. This is because more profitable firms engage in risky financing and investors are rewarded with higher stock returns. They also found out that profitability and stock returns are positively related. In their study Fama and French (2006) used the difference between returns of portfolios of stocks with robust and weak profitability as the profitability factor proxy. While searching on profitability premium, Novy-Marx (2010) investigated the power of the gross profit-to-Assets ratio to predict stock returns using annual firm characteristics and stock price data from United States of American companies. He used time series regression analysis and found out that sorting stocks on gross profit to assets ratio creates abnormal stock returns with more profitable firms having higher returns than less profitable firms. This study adopted the Novy-Marx (2010) profitability return anomaly proxy. In confirming Novy-Marx's finding, Kisser (2014) study on gross profitability premium made use of data from United States of America companies and concluded that a long-short strategy based on sorting stocks on gross profitability generates substantial excess returns relative to the Fama and French factors. He attributed the anomaly to the fact that high profitability firms have large fixed costs than low profitability firms.

Thus, the high operating leverage affects expected stock returns by increasing the risk of profitable companies. This study evaluated the existence of profitability return anomaly at the Nairobi securities exchange in Kenya. Asness (2014) empirical study using data from United States of American companies found out that profitability and investment factors are relevant in explaining cross section of stock returns. She further noted that the two factors have been widely documented and explained in terms of economic mechanism underlying the associated premia. Balvers, Gu and Huang (2013) study had arrived at the same findings as Asness's while Berk, Green and Naik (1999) observed that a positive effect of profitability on stock returns stems from profitable companies rewards for having chosen riskier financing options than less profitable companies. However, Wang and Yu (2013) study which was on risk and behavioral explanations of profitability premium observed that profitability premium exists among firms with high arbitrage costs and much of the profit premium is from the negative alpha values. This study presented an explanation behind the gross profit risk premium at the Nairobi securities exchange in Kenya. Another study on profitability premium by Lam, Wang and Wei (2015) used monthly stock data for stocks traded on NYSE, Amex and NASDAQ between 1963 and 2010. After analyzing data using time series regression analysis, they found out that macroeconomic risks could explain a third of the profitability premium while the other portion of profitability premium could be explained by misevaluation factors, based on investor sentiments. They posited that gross profitability premium mostly exists in companies whose stock market valuations are inconsistent with their profitability and therefore subject to ex-ante expectation errors. Thus, firms with high profitability but low market valuation were found to have higher stock returns. This suggests that both overvaluation and undervaluation of stocks could contribute to the gross profitability premium at the Nairobi securities exchange in Kenya.

Momentum Return Anomaly

Momentum return anomaly refers to a positive relationship between stock returns and the momentum of stock returns (Jegadeesh and Titman, 1993) which could not be explained by

existing asset pricing models such as CAPM. Momentum return anomaly reflects the future excess return of stocks with stronger past stock return performance (Bender, Briand, Melas and Subramanian, 2013). The phenomenon was first discovered by Jegadeesh and Titman (1993) in their study on momentum using US stock market data. They demonstrated that buying stocks that had performed well in the past and selling stocks that had performed poorly in the past generated significant positive stock returns over 3 to 12 months holding periods. They attributed this phenomenon to delayed stock price reactions to common factors. However, Sharpe, Alexander and Bailey (2006) attributed momentum risk to a market anomaly where stocks which outperform peer during the last 12 months tend to perform well also in future. Pure momentum portfolios at the Nairobi securities exchange can be created using stocks with the strongest momentum and selling stocks with the lowest momentum (stambaugh, Yu and Yuan, 2012). Further, Jegadeesh and Titman (1993) noted that momentum return anomaly was the difference between returns of portfolios of stocks with robust and weak momentum. Sapp and Tiwari (2004) replicated Jegadeesh and Titman (1993) Momentum effect study using US mutual funds data. After analyzing the data using regression model, they demonstrated that investors do not follow a deliberate strategy of selectively investing in momentum funds but they instead appear to naively chase funds that are recent winners and in doing so they end up benefiting from the momentum effect in the short term.

On the other hand, Carhart (1997) empirical study concluded that a four-factor model which includes momentum as a factor is superior to CAPM in explaining the cross-sectional variation in stock returns. Given the persistence of the momentum anomaly in various stock markets, it is important for stock investors to understand its causes (Jegadeesh and Titman, 2001). Barberis, Shleifer and Vishny (1998) behavioral model suggest that momentum profits arise from inherent biases in the way investors interpret information while Conrad and Kaul (1998) argue that profitability of momentum strategies is due to cross section variation in expected returns rather than the predictable time series variations in stock returns. Riro and Wambugu (2015) tests of asset pricing models at Nairobi securities exchange sought to test whether capital asset pricing model, Fama and French three factors model and Carhart four factor models could explain the return of stocks traded at NSE. They used a sample of 48 companies listed at NSE during the period 2009 to 2013. After analyzing data using time series regression analysis they found out that momentum risk was a significant predictor of stock return at NSE. This study tested the existence of momentum return anomaly at NSE in Kenya using the Jegadeesh and Titman (1993) momentum stock return anomaly proxy.

Investment Return Anomaly

Investment return anomaly refers to the negative relationship between asset growth and stock return (Titman, Wei and Xie, 2004) which could not be explained by existing asset pricing models such as CAPM. Investment return anomaly is attributed to the difference between return on portfolios of firms with low investment and return on portfolios of firms with high investment (Sharpe, Alexander and Bailey, 2006). Titman, Wei and Xie (2004) study on Capital investments and stock returns using US stock market data finds that large increases in capital expenditures leads to negative stock returns. They argue that total assets growth is a strong determinant of future negative stock returns. They used the investment growth proxy, $TA\ growth_t = \frac{TA_t - TA_{t-1}}{TA_{t-1}}$ in their study. In their conclusion, they noted that low- investment firms (firms with low total asset growth rates) generate about 8% annual outperformance of stock returns over high investment firms (firms with high total asset growth rates). The observed investment effect motivated the researchers to incorporate investment factor in the six factors model. Four years later after Titman, Wei and Xie (2004) study, Cooper, Gulen and schill (2008) carried a similar study which sought to test whether asset investments influenced United States of America stock returns. They used data from non-finance listed firms between 1963 and 2003. Their regression analysis results indicated a substantial asset growth effect on stock returns. This is because firms with low investment in the current period measured by Asset growth tend to have higher returns in the next period than firms with higher asset growth. The ability of asset growth to predict stock return was also attributed to asset growth ability to capture common stock return effects across components of a firm's total investments and these components vary from one firm to another. In their conclusion, they stated that there is a negative relationship between asset growth and stock return. This study established whether the investment growth is a significant predictor of portfolio stock return at NSE in Kenya. Li, Vassalou and Xing (2006) study on the relationship between Sector investment growth rates and the cross section of equity returns observed that various sectors of the economy may receive different productivity shocks that will in turn result in different returns on capital for the firms of these sectors. Studies by Li, Vassalou and Xing (2006) Cooper, Gulen and schill (2008), Lyandres, Sun and Zeng (2013) concur that investment risk is a significant risk factors in the pricing of stock returns. This study established the extent to which the variation in investment growth explains the variation in stock portfolio return at NSE in Kenya.

MATERIALS AND METHODS

This study adopted the positivism research philosophy which employs empirical methods and makes use of quantitative analysis to develop an explanatory theory on stock return anomalies. Explanatory research design was adopted in establishing the existence of stock return anomalies at the Nairobi securities exchange in Kenya. The target population was 45 companies that were listed at the Nairobi securities exchange by January 2009 (after excluding companies that were not trading consistently and those that were delisted). A census of 45 companies was used to construct stock portfolios between 2009 and 2014. Secondary data on listed companies, listed companies' monthly closing stock prices, number of shares traded, market capitalization, Book value, market value, Treasury bills rate and Nairobi Securities Exchange index (NSE20-share index) values were extracted from the Nairobi Securities Exchange (NSE) data Bank and Central bank of Kenya (CBK) data banks for six years (2009-2014). NSE 20-share index return was used as the proxy for market return while Kenya' 91-day Treasury bill rate was used as the proxy for the risk-free rate. The data collected was then used to measure stock returns and stock return anomalies proxies for

stock portfolios at the Nairobi Securities Exchange between 2009 and 2014. A modified Fama and French (1996) procedure was used to construct 24 portfolios of stocks as follows: 6- size and Value portfolios were constructed based on the intersection of the two market capitalization and three Book/market ratio sorts, 6- size and momentum portfolios based on the intersection of the two market capitalization and three last twelve months average return sorts, 6- size and profitability portfolios based on the intersection of the two market capitalization and three Gross profit ratio sorts, 6- size and Investment portfolios based on the intersection of the two market capitalization and three growth in total assets sorts. This is presented in appendix I. After the stock portfolios were formed, return of a stock portfolio was given by the weighted average of the expected returns on the stocks which comprise the portfolio. That is: $R_p = \sum_{i=1}^{n} w_i R_i$ Where R_p is the expected return on a stock portfolio, n is the number of stocks in the portfolio, w_i is the proportion of the amount invested in stock i (market capitalization of stock i) and R_i is the expected return on stock i.

The proxies for the five proposed stock return anomalies were derived as follows: In determining size stock return proxy, first, Market capitalization of the stocks was computed and then used to rank the stocks according to size from smallest to biggest. Stocks whose market capitalization was below the median market capitalization formed the small caps stock portfolio while stocks whose market capitalization was above the median formed the big caps stock portfolio. The size stock return anomaly proxy was then given by the difference between average return of small cap stocks' portfolio and average return of big cap stocks' portfolio.

That is, Size stock return anomaly proxy =

$$[\frac{S/H + S/M + S/L}{3}] - [\frac{B/H + B/M + B/L}{3}]$$

where S/H were the returns of small size stocks with high Book/market ratios, S/M were the returns of small size stocks with medium book/market ratios while S/L were the returns of small size stocks with low Book/market ratios. On the other hand, B/H were the returns of big size stocks with high Book/market ratios, B/M were the returns of big size stocks with medium book/market ratios while B/L were the returns of big size stocks with low Book/market ratios.

To determine the value stock return proxy, stocks were ranked according to their book value to market value (BtM) ratios and three portfolios formed. These are low BtM portfolio consisting of the bottom 30 % (growth stocks), Medium BtM portfolio consisting of the middle 40% and the high BtM portfolio consisting of the top 30% (value stocks) of the ranked stocks. The value stock return proxy was then given by the difference between average return of value stocks' portfolio and average return of growth stocks' portfolio.

Thus, Value stock return proxy=

$$[\frac{B/H + S/H}{2}] - [\frac{B/L + S/L}{2}]$$

where B/H is the returns of big stocks with high book/market ratios and S/H are the returns of small stocks with high book/market ratios. B/L is the returns of big stocks with low book/market ratios and S/L are the returns of small stocks with low book/market ratios.

Momentum stock return anomaly on the other hand was determined after ranking the stocks according to their 12 months' past returns and then grouping them into three categories from the lowest to the highest where the bottom 30% are categorized as Losers' portfolio, the middle 40% as Neutral portfolio and the top 30% of the ranked stocks as winners' portfolio. Momentum stock return anomaly proxy was given by the difference between average return of winners' portfolio and average return of losers' portfolio.

That is, Momentum stock return anomaly proxy=

$$[\frac{B/W + S/W}{2}] - [\frac{B/L + S/L}{2}]$$

where B/W are the returns of big winners' stocks and S/W are the returns of small winners' stocks. B/L is the returns of big losers' stocks and S/L are the returns of small losers' stocks.

Profitability stock return proxy was determined after ranking the stocks according to their gross profit to assets ratio and then grouping them into three categories from the lowest to the highest where the bottom 30% were categorized as weak profitability portfolio, the middle 40% as Medium profitability portfolio and the top 30% as Robust profitability portfolio. Profitability stock return anomaly proxy was given by the difference between average return of robust profitability portfolios and average return of weak profitability portfolios.

Profitability stock return anomaly proxy =

$$[\frac{B/R + S/R}{2}] - [\frac{B/W + S/W}{2}]$$

where B/R are the returns of big robust stocks and S/R are the returns of small robust stocks. B/W is the returns of big weak profitability stocks and S/W are the returns of small weak profitability stocks.

Finally, Investment stock return proxy was determined after ranking stocks according to their total assets growth rates and then grouping them into three categories from the lowest to the highest where the bottom 30% were categorized as Low investment portfolio, the middle 40% as Medium investment portfolio and the top 30% as High investment portfolio. Investment stock return proxy was given by the difference between average return of low investments' portfolio and average return of high investments' portfolio.

Therefore, investment stock return anomaly proxy =

$$[\frac{B/L + S/L}{2}] - [\frac{B/H + S/H}{2}]$$

where B/L are the returns of big stocks with low investments and S/L are the returns of small stocks with low investments.

B/H are big stocks with high investments and S/H are small stocks with high investments.

Excess returns (R_{it}-R_{ft}) of the 24 stock portfolios constructed were regressed against six factors (market risk and the five stock return anomalies proxies) using the following multivariate time series regression model:

$$R_{i_t} - R_{f_t} = \alpha_i + \beta_{1i} MF_t + \beta_{2i} SP_t + \beta_{3i} VP_t + \beta_{4i} PP_t + \beta_{5i} MP_t + \beta_{6i} IP_t + \ell_{i,t}$$

Where : R_{i_t} = Return on stock portfolio i at time t, R_{ft} = Risk free rate at time t, $R_{it} - R_{ft}$ = Excess Return on stock portfolio i at time t, α_i = Intercept, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = Coefficients of the factors, MF_t = Market Factor at time t, SP_t = Size stock return anomaly proxy at time t, VP_t = Value stock return anomaly proxy at time t, PP_t = Profitability stock return anomaly proxy at time t, MP_t = Momentum stock return anomaly proxy at time t, IP_t = Investment stock return anomaly proxy at time t, $\ell_{i,t}$ = The error term, i = 1,..., 24 = Number of portfolios, t = 1,..., 72 = Time period in months

The study utilized two approaches to establish the existence of stock return anomalies: i) Sorts of stock portfolio returns on anomalies proxies to identify the stock return patterns and ii) The above specified multivariate regression model to explain the nature and the statistical significance of the stock return anomalies at the Nairobi securities exchange in Kenya.

RESULTS AND DISCUSSION

The existence of return anomalies was explored using sorts of returns on anomaly variables and multivariate regressions. Using a modified Fama and French (1996) procedure twenty four portfolios of stocks were constructed as follows: Six size and Value portfolios were constructed based on the intersection of the two market capitalization and three Book/market sorts, Six size and momentum portfolios based on the intersection of the two market capitalization and three last 12 months average return sorts, Six size and profitability portfolios based on the intersection of the two market capitalization and three Gross profit ratio sorts, Six size and Investment portfolios based on the intersection of the two market capitalization and three growth in total assets sorts. Portfolio returns and excess portfolio returns were then computed with the aid of Microsoft excel for each category of portfolios.

Sorts of Returns on Anomaly variables and Multivariate regressions

The tables below show the averages of the excess portfolio returns from January 2009 to December 2014 (72 months) for each category of return anomaly.

Table 1. Size-Book/Market Portfolios Average Excess Returns

		Book/Market ratio (value)		
		Low (L)	Medium (M)	High (H)
Market Capitalization (Size)	Small (S)	.00770	.00872	.01239
	Big (B)	.00701	.00168	.0114

Author (2017)

Size Stock Return Anomaly

Table 1 shows that average excess returns of the stock portfolios formed using market capitalization (size) and Book/market ratio (value) sorts at the Nairobi securities exchange are higher for small size stocks than that of the big size stocks. This is an indication that stocks of small companies (small cap stocks) perform better than stocks of big companies (big cap stocks) at the Nairobi securities exchange. This suggests that there is an inverse relationship between stock return and firm size of companies listed at NSE. These findings are a pointer to the fact that size effect is present at the Nairobi securities exchange. After testing the null hypothesis that size stock return anomaly is not statistically significant, it was observed that majority of the size stock return anomaly absolute t-values of the multivariate regression analysis were greater than the table critical t-statistic value of 1.96. This implies that size stock return anomaly is statistically significant at the Nairobi securities exchange. Further, majority of the coefficients of size stock return anomaly are negative, an indication that there is a significant inverse relationship between company size and the return of a stocks portfolio at the Nairobi securities exchange.

The higher the exposure of a stock portfolio to small company size stocks, the higher the return of the stock portfolio. The results of the computed t-statistics are presented in appendix II. Size effect was first discovered by Banz (1981) in his study on the relationship between stock returns and firm size for companies listed at New York securities exchange. Banz (1981) found out that small size firms have higher returns than large firms at the United States of America stock markets. Another study by Ameer (2013) on augmented Fama-French three factor model using data from the Pakistan stock exchange market found out that firms with small market capitalization exhibited higher returns than firms with large market capitalization. Thus, there is a concurrence on the findings on size effect in developing as well as developed stock exchanges. This is attributed to the fact that small size firms in all stock markets are riskier than stocks of big companies and as such investors are compensated with higher returns for investing in small size stocks than in big size stocks.

Value Stock Return Anomaly

Table 1 also shows that small size stock portfolios with high book value/market value ratios generate higher average returns than small size stock portfolios with low book value/market value ratios. Additionally, big size stock portfolios with high book value/market value ratios generate higher average returns than big size stock portfolios with low book value/market value ratios. In the two size rows, average return increases with increase in book to market ratio.

Results of the null hypothesis test (that value stock return anomaly is not statistically significant) show that majority of the value stock return anomaly absolute t-values were greater than the table critical t-statistic value of 1.96. This implies that value stock return anomaly is statistically significant at Nairobi securities exchange in Kenya. It also confirms that there is a positive relationship between book value/market (value) ratio and stock return of companies listed at NSE. Firms with high book value to market value ratios seem to outperform those with low book value to market value ratios at the Nairobi securities exchange. This is because firms with high book to market value ratio are perceived to be riskier and should therefore compensate investors with higher returns. These findings show the existence of a statistically significant value stock return anomaly at the Nairobi securities exchange. These findings on value effect concur with Fama and French (1992)

study that concluded that firms with high book value to market value ratios outperform those with low book value to market value in the United States of America but differs with Dichev (1998) findings that firms with high bankruptcy risk earn lower stock returns.

The divergence in the findings could be attributed to the fact that that bankruptcy risk does not account for size and value effects. As an investment strategy, investors at NSE should allocate more investment resources to value stocks than on growth stocks for return optimization. Value stocks are those stocks that are undervalued by the market and can be purchased at a lower price than their intrinsic value.

Table 2. Size-Momentum Portfolios Average Excess Returns

		Last 12 months average return (Momentum)		
		Winners (W)	Neutral (N)	Losers (L)
Market Capitalization(Size)	Small(S)	.01505	.00806	.00543
	Big (B)	.00448	.00721	.00103

Author (2017)

Momentum Stock Return Anomaly

Table 2 shows that small size stock portfolios with the highest momentum (winners) generate higher average returns than small size stock portfolios with the lowest momentum (losers). On the other hand, big size stock portfolios with the highest momentum (winners) generate higher average returns than big size stock portfolios with the lowest momentum (losers).

For every size row, extreme winners are associated with higher average portfolio stock returns than extreme losers. These findings indicate that momentum stock return anomaly is evident at the Nairobi securities Exchange. After testing the null hypothesis (that momentum stock return anomaly is not statistically significant at NSE), it was observed that four (4) of the momentum stock return anomaly absolute t-values were greater than the table critical t-statistic value of 1.96. On the other hand, twenty (20) of the momentum risk absolute t-values were less than the table critical t-statistic value of 1.96. This implies that momentum has an insignificant positive effect on the return of a stocks portfolio at the Nairobi securities exchange.

However, since some of momentum stock return anomalies values were statistically significant, we can conclude that momentum has a weak positive effect on the return of stock portfolios at the Nairobi securities exchange. Momentum effect was first discovered by Jegadeesh and Titman (1993) in their study on momentum using US stock market data. They attributed this phenomenon to delayed stock price reactions to common factors. These findings concur with Sharpe, Alexander and Bailey (2006) attribution of momentum effect as a market anomaly where stocks which outperform peer during the last 12 months tend to perform well also in future. As an investment strategy, pure momentum portfolios are created using stocks with the strongest momentum and selling stocks with the lowest momentum (Stambaugh, Yu & Yuan, 2012). In order to optimize on their stock returns, investors at the Nairobi securities Exchange should buy stocks that had performed well and sell stocks that had performed poorly in the past 12 months holding periods.

Table 3. Size-Profitability Portfolios Average Excess Returns

		Gross profit ratio (Profitability)		
		Robust(R)	Medium(M)	Weak(W)
Market Capitalization(Size)	Small(S)	.01348	.00705	.00486
	Big (B)	.01276	-.00510	.00586

Author (2017)

Profitability Stock Return Anomaly

In Table 3, small size stock portfolios with robust profitability generate higher average returns than small size stock portfolios with weak profitability. Additionally, big size stock portfolios with robust profitability generate higher average returns than big size stock portfolios with weak profitability. For every size row, extreme robust profitability is associated with higher average portfolio stock returns than extreme weak profitability. A close analysis of the coefficients of profitability stock return anomaly shows that majority (13) of them had a positive sign. This is an indication that there is a positive relationship between profitability and stock return at the Nairobi securities exchange. After testing the null hypothesis, it was observed that six (6) of the profitability stock return anomaly proxy absolute t-values were greater than the table critical t-statistic value of 1.96. On the other hand, eighteen (18) of the profitability stock return anomaly proxy absolute t-values were less than the table critical t-statistic value of 1.96. This implies that profitability has an insignificant positive effect on the return of a stocks portfolio at the Nairobi securities exchange. Since some of the profitability stock return anomaly values were statistically significant, we can conclude that profitability has a weak positive effect on the return of stock portfolios at the Nairobi securities exchange. Some of the studies that have found a strong and statistically significant relationship between profitability and stock return include Novy-Marx (2013) study which found out that profitability has a significant power of predicting stock returns of companies listed in the United States of America stock markets while Kisser (2014) empirical study concluded that an investment strategy based on sorting stocks on gross profitability generates substantial excess stock returns. As an investment advice, Kisser (2014) study concluded that an investment strategy based on sorting stocks on gross profitability generates substantial excess returns. Concurrence of a positive profitability effect in different stock exchanges is attributed to the fact that profitability shocks are positively correlated with stock return.

Table 4. Size-Investment Portfolios Average Excess Returns

		Total asset growth (Investment)		
		High (H)	Medium (M)	Low (L)
Market Capitalization(Size)	Small (S)	.00405	.00720	.01338
	Big (B)	.00813	.00606	.00862

Author (2017)

Investment Stock Return Anomaly

Table 4 shows that small size stock portfolios with low investment in assets generate higher average returns than small size stock portfolios with high investment in assets. On the other hand, big size stock portfolios with low investment in assets generate higher average returns than big size stock portfolios with high investment in assets. For every size row, extreme low investment is associated with higher average portfolio stock returns than extreme high investment. An

analysis of the coefficients of investment risk shows that majority (16) of them had a negative sign. This is an indication that there is a negative relationship between investment risk and stock return at the Nairobi securities exchange. After testing the null hypothesis, it was observed that ten (10) of the investment absolute t-values were greater than the table critical t-statistic value of 1.96. This implies that investment has a significant negative effect on the return of a stocks portfolio at the Nairobi securities exchange. This leads us to a conclusion that investment stock return anomaly is statistically significant at the Nairobi securities exchange. At NSE, firms with low investments in assets in the current period measured by asset growth tend to have higher returns in the next period than firms with higher asset growth. These results are in concurrence with those of Cooper, Gulen and schill (2008) study that concluded that US firms with low investment in the current period measured by asset growth tend to have higher returns in the next period than firms with higher asset growth while Titman and Xie (2004) found out that financing choices for US firms that are associated with increase in capital investments results in negative stock returns. The concurrence in the negative relationship between investment risk and stock returns is attributed to the fact that asset growth has a forecasting power on stock returns.

Summary of Findings, Conclusion and recommendation

This study examined whether return anomalies exist at NSE in Kenya. The study also investigated the ability of the derived six factors model in explaining the return anomalies. After analyzing the data, it was found out that there exist value, size, momentum, profitability and investment anomalies at the Nairobi securities exchange.

Findings on Size Stock Return Anomaly

The findings of this study have shown that company size has a significant negative effect on the return of stock portfolios at the Nairobi securities exchange. The higher the exposure of a stock portfolio to small size company stocks, the higher the stock portfolio return. Since this is not explained by CAPM, we conclude that there exists a significant size stock return anomaly at the Nairobi securities exchange in Kenya. The findings show a concurrence on the existence of size stock return anomaly in developing as well as developed stock exchanges. This is attributed to the fact that small size companies in all stock exchange markets are riskier than stocks of big size companies and as such investors are compensated with higher returns for investing in small size company stocks. Thus, small cap stocks perform better than big cap stocks at the Nairobi securities exchange. As an investment strategy, investors at Nairobi Securities Exchange should allocate more investment resources to small cap company stocks than on big cap company stocks for return optimization.

Findings on Value Stock Return Anomaly

Book to Market value ratio has a significant positive effect on the return of stock portfolios at the Nairobi securities exchange in Kenya. Companies with high book to market value ratios (value stocks) seem to outperform those with low book to market value ratios (growth stocks) at the Nairobi securities exchange in Kenya. The greater the exposure to value stocks the higher the stock portfolio return. Since this is not explained by CAPM, we conclude that there exists a significant value stock return anomaly at the Nairobi securities exchange in Kenya. This is attributed to the fact that firms with high book to market value ratio are perceived to be riskier and should therefore compensate investors with higher returns. Based on this finding, the study recommends a value strategy of investment that involves buying stocks with high book to market value ratios and selling stocks with low book to market value ratios to maximize the return of a stock portfolio at the Nairobi securities exchange in Kenya.

Findings on Profitability Stock Return Anomaly

Company gross profit ratio has a weak positive effect on the return of stock portfolios at the Nairobi securities exchange in Kenya. The findings indicated that some stocks portfolios with robust profitability were associated with higher average stock returns than stocks portfolios with weak profitability. Since this is not explained by CAPM, we conclude that there exists an insignificant profitability stock return anomaly at the Nairobi securities exchange in Kenya. Positive effect of profitability on stock portfolio returns stems from profitable companies rewards for having chosen riskier financing options than less profitable companies. Thus, an investment strategy based on sorting stocks on gross profitability could generate some excess stock portfolio returns in the long run at Nairobi Securities Exchange in Kenya.

Findings on Momentum Stock Return Anomaly

Stock return momentum has a weak positive effect on the return of stock portfolios at the Nairobi securities exchange in Kenya. This is attributed to a market anomaly where stocks which outperform peers during the last 12 months tend to continue performing better in the next 12 months. Since this is not explained by CAPM, we conclude that there exists an insignificant momentum stock return anomaly at the Nairobi securities exchange in Kenya. As an investment strategy, buying stocks that had performed well in the past and selling stocks that had performed poorly in the past at the Nairobi securities exchange in Kenya can generate some positive stock portfolio returns over the next 12 month holding period.

Findings on Investment Stock Return Anomaly

Companies with low investment in assets generate higher average returns than small size stock portfolios with high investment in assets. Asset growth rate has a strong negative effect on the return of stock portfolios at the Nairobi securities exchange. Investment stock return anomaly captures the exposure of a stock portfolio to stocks of companies with low asset growth rates at NSE. At NSE, firms with low investments in assets in the current period measured by asset growth tend to have higher returns in the next period than firms with higher asset growth. This is due to the fact that much of the available cash flows are used in ordinary operations that would generate higher returns. The ability of asset growth rate to predict stock return is also attributed to the fact that asset growth rate can capture common return effects across components of a firm's total investments and these components vary from one firm to another. As an investment strategy, investors at NSE should invest in firms whose financing choices are associated with

asset contraction (such as share repurchases, debt repayments, dividend payments and so on) since such choices are followed by periods of high stock returns.

Conclusion

Capital asset pricing model has been the most applied model in portfolio and investment analysis. However, its inadequacy in explaining the return of stocks has given rise to the popularity of multifactor models that aims at capturing the unexplained stock return variations. In this study, a six factors model was developed using independently and empirically tested stock return anomalies proxies to explain the stock portfolio return variations at NSE. The results of the hypotheses tests lead to a conclusion that market risk, size stock return anomaly, value stock return anomaly and investment stock return anomaly are statistically significant while profitability stock return anomaly and momentum stock return anomaly have a weak existence at the Nairobi securities exchange. The six factors models have a high explanatory power and their F-statistics indicates that it is an adequate model for explaining stock portfolio return variations at the Nairobi Securities Exchange in Kenya.

Recommendations of the Study

This study recommends a policy framework for enhancing factor investing strategies at the Nairobi securities exchange. Factor investing policy framework is based on stock return anomalies that have been proven empirically by researchers to earn a stock return premium in the long run. In adopting a factor investment strategy, retail investors, stock brokers and investment advisors at NSE should allocate more investment resources to small cap stocks than in big cap stocks, invest more in value stocks than in growth stocks and invest more in stocks of firms with low growth in assets in the current period than firms with high growth in assets in the current period for stock return optimization. The results of the study can also be used to develop a policy on the concept of exchange traded funds (ETFs) investments at the Nairobi securities exchange. ETFs attempt to replicate the performance of a specific index such as stocks, bonds, currencies and commodity indices. Specifically, the results of this study can be used in structuring a stock ETFs consisting of small cap stocks, value stocks, and growth stocks. Introduction of ETFs investments at the Nairobi securities exchange could help managers of the mutual funds, trust funds, and pension funds to optimize their investment in stocks at the Nairobi securities exchange in Kenya.

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APPENDICES

Appendix I. *Portfolio Formation*

		Value (Book/Market ratio)			Momentum (Last 12 months average return)		
		High (H)	Medium(M)	Low(L)	Winners (W)	Neutral (N)	Losers (L)
Size	Big (B)	(1) B/H	(2) B/M	(3) B/L	(7) B/W	(8) B/N	(9) B/L
	Small(S)	(4) S/H	(5) S/M	(6) S/L	(10) S/W	(11) S/N	(12) S/L
		Profitability (Gross profit ratio)			Investment (Growth in total assets)		
		Robust (R)	Medium(M)	Weak(W)	High (H_I)	Medium(M_I)	Low(L_I)
Size	Big (B)	(13) B/R	(14) B/M	(15) B/W	(19) B/H_I	(20) B/M_I	(21) B/L_I
(Market capitalization)	Small(S)	(16) S/R	(17) S/M	(18) S/W	(22) S/H_I	(23) S/M_I	(24) S/L_I

Author (2017)

Appendix II: Multivariate Time Series Regressions Results (Six Factors Model Results)

Fist row	α_i	β_{1i}	β_{2i}	β_{3i}	β_{4i}	β_{5i}	β_{6i}	R^2	F- Stat
Second row	t α_i	t β_{1i}	t β_{2i}	t β_{3i}	t β_{4i}	t β_{5i}	t β_{6i}	Adj. R^2	P-value
1- B/H	-.009	1.200	-.209	.293	-.073	.103	.029	.754	33.249
	-1.76	12.127	-1.685	2.982	-.743	.758	.256	.732	.000[a]
2-B/M	.017	.994	-.120	-.084	-.006	-.061	-.245	.709	26.351
	3.688	11.754	-1.128	-1.00	-.067	-.528	-2.51	.682	.000[a]
3-B/L	.006	.896	-.254	-.167	-.065	.066	-.130	.780	38.416
	1.861	13.792	-3.118	-2.59	-1.01	.746	-1.74	.760	.000[a]
4-S/H	.011	.944	.947	.687	-.101	.052	-.258	.843	58.102
	2.729	12.983	10.381	9.516	-1.41	.528	-3.07	.828	.000[a]
5-S/M	.008	.898	.477	.209	.067	-.033	.010	.631	18.536
	1.632	9.349	3.961	2.187	.711	-.255	.094	.597	.000[a]
6-S/L	-.008	1.111	.941	-.835	.026	.018	-.195	.754	33.236
	-1.35	10.336	6.977	-7.82	.248	.125	-1.57	.731	.000[a]
7-B/W	.004	1.015	-.209	-.242	.171	.031	-.144	.748	32.128
	.848	12.688	-2.086	-3.04	2.171	.285	-1.56	.725	.000[a]
8-B/N	.007	.969	-.303	-.210	.079	.024	-.142	.751	32.737
	1.687	12.569	-3.130	-2.74	1.036	.226	-1.60	.728	.000[a]
9-B/L	.009	.897	-.061	.104	-.552	.079	-.409	.661	21.166
	1.666	8.901	-.481	1.040	-5.55	.577	-3.51	.630	.000[a]
10-S/W	.013	.982	.927	.550	.741	.116	.017	.787	39.940
	2.182	8.556	6.434	4.823	6.536	.740	.130	.767	.000[a]
11-S/N	.006	.915	.617	.236	.035	.009	-.310	.585	15.254
	.956	8.432	4.536	2.190	.328	.060	-2.48	.546	.000[a]
12-S/L	.005	.929	.714	.227	-.366	-.021	.162	.573	14.529
	.723	7.477	4.584	1.845	-2.98	-.121	1.126	.533	.000[a]

Continue……

12-S/L	.005	.929	.714	.227	-.366	-.021	.162	.573	14.529
	.723	7.477	4.584	1.845	-2.98	-.121	1.126	.533	.000[a]
13-B/R	.011	.878	-.336	-.175	-.144	.317	.019	.702	25.538
	2.603	10.888	-3.318	-2.19	-1.81	2.877	.203	.675	.000[a]
14-B/M	-.006	.804	-.202	-.004	.088	-.008	-.375	.370	6.363
	-.692	5.308	-1.064	-.028	.587	-.038	-2.14	.312	.000[a]
15-B/W	.007	1.009	-.098	-.123	.034	-.207	-.138	.857	64.666
	1.382	18.343	-1.414	-2.26	.621	-2.76	-2.17	.843	.000[a]
16-S/R	.006	1.064	.793	.229	-.150	.594	-.314	.673	22.251
	.933	9.302	5.530	2.015	-1.33	3.802	-2.38	.642	.000[a]
17-S/M	.006	.850	.581	.338	.137	.065	-.001	.702	25.546
	1.297	9.688	5.272	3.886	1.580	.539	-.010	.675	.000[a]
18-S/W	.010	.932	.555	.177	-.327	-.882	-.157	.698	25.022
	1.736	8.724	4.143	1.667	-3.10	-6.05	-1.27	.670	.000[a]
19-B/H	.006	.851	-.210	-.083	.208	-.047	-.725	.594	15.850
	.955	7.203	-1.418	-.708	1.780	-.289	-5.32	.557	.000[a]
20-B/M	.006	.934	-.178	-.007	-.156	.063	-.089	.824	50.878
	1.986	16.005	-2.431	-.127	-2.71	.793	-1.33	.808	.000[a]
21-B/L	.010	.962	-.262	-.215	.076	.032	.187	.701	25.394
	2.050	11.031	-2.391	-2.48	-.886	.271	1.859	.673	.000[a]
22-S/H	.009	1.128	.762	.285	-.118	.025	-.672	.697	24.891
	1.570	10.691	5.750	2.722	-1.13	.176	-5.51	.669	.000[a]
23-S/M	.005	.859	.473	.204	.024	.100	-.063	.726	28.754
	1.389	11.643	5.111	2.785	.325	.997	-.735	.701	.000[a]
24-S/L	.005	1.017	.813	.417	.166	-.054	.415	.748	32.078
	.945	9.644	6.148	3.982	1.596	-.372	3.408	.724	.000[a]

Author (2017)