

Test of Predictive Ability of Underlying Firm Characteristics in the Nairobi Securities Exchange

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Abstract: This research set out to establish whether underlying firm characteristics in the NSE could be employed to accurately predict stock returns. The study period was year 2001 to year 2010 and the population of listed companies was 56. Purposive sampling was employed in selection of a sample of 32 listed firms. Companies that demonstrated consistent stock performance were only 6. Multi-regression analysis was employed to test which individual underlying characteristic had significant influence on the listed firms stock returns. The findings indicated that the regression model was not a good fit and this was attributed to the fact that NSE was at least weak form efficient and thus could not allow past information in the form of underlying characteristics to predict stock performance. Nevertheless the underlying firm characteristics that appeared to influence stock performance included: book value, dividend yield, market return and volume of stocks traded. The policy implications of these findings were that investors should trust stock prices in the NSE as opposed to using techniques like fundamental analysis that relied on past information in a bid to outperform the market.

Keywords: Consistent Stock Performance, Stock Returns and Underlying Firm Characteristics.

1. BACKGROUND OF THE STUDY

If stock markets are not efficient, future stock performance can be predicted by analysis of past trends in stock performance or by studying the underlying firm characteristics of stocks also referred to as fundamental analysis. The purpose of fundamental analysis is to identify the predicted stock return also referred to as normal or estimated stock return or required rate of return (Fama, 1991). Research has also shown that certain underlying firm variables complement or are even more important in explaining stock performance (Siqueira *et al.*, 2012). The normal stock returns are then compared with actual market returns in order to identify a mismatch which is an opportunity for investment if favorable or divestment if unfavorable (Cuthbertson, 2005).

An efficient market is one in which all known information is immediately reflected in stock prices which causes stock prices to occur in a random manner and instead of occurring in a predictable fashion (Fama, 1991). The large number of rational investors trying to outperform the market and each using new information possessed by each causes the new information to be immediately reflected in stock prices and this causes stock prices to fluctuate in a random manner which subsequently prevents any trends or patterns in stock prices from forming. Stock market participants are thus prevented from outperforming the market consistently and this prevention causes the market to be deemed as efficient in various forms whether weak form or in semi-strong form or strong form (Cuthbertson, 2005).

Stock market efficiency is categorized into informational, operational and allocation efficiency. Informational efficiency tests focus on the speed and extent to which stock prices fully reflect all available and relevant information (Khan, 2011). Operational efficiency is concerned with whether investors can purchase transactional services at the lowest prices

possible given the costs associated with their provision. Allocation efficiency is concerned with whether resources have been correctly allocated and requires both pricing and operational efficiencies (Samuels, 1990; Bauer, 2004).

Informational efficiency is further categorized into strong, semi-strong and weak forms. Efficiency in the strong form implies current stock prices fully reflect privately and publicly held information and an investor cannot outperform the market by possessing such information. Efficiency in the semi-strong form implies that current stock prices fully reflect all publicly released information. Efficiency in the weak form efficient postulates that past information and variables including underlying firm characteristics are fully reflected in current stock prices and should not aid in outperforming the market or predicting future prices (Fama, 1991).

The economic conditions that lead to market efficiency include: rationality of investors, independent deviations from rationality and unlimited arbitrage and for a market to be inefficient, the 3 conditions must be absent (Jordan and Miller, 2008). The main implication of efficient market hypothesis is that investors should trust market prices and that in efficient markets investors get value for money (Fama, 1991).

2. MOTIVATION OF THE STUDY

In order to determine whether an individual is a superior investment analyst, one should examine the performance of numerous securities that the analyst consistently recommends over time against the performance of a set of randomly selected stocks of the same risk class or average market index performance. The stock selections of a superior analyst should consistently outperform the randomly selected stocks or the average market index performance (Copeland, 2005).

Fundamental analysts focus on deriving the intrinsic value of the firms using information outside the stock including underlying firm characteristics (Siqueira *et al.*, 2012). This involves studying economic, industry and company data in an attempt to identify the intrinsic or fundamental value of stocks although such efforts are in vain if markets are weak form efficient (Fama, 1991).

Stock return prediction is the objective of many stock market investors and if there are underlying firm characteristics that can assist in correct prediction of stock returns in a consistent fashion then the challenges faced by the numerous stock market investors will have been solved. However the challenge is that in a stock market that is efficient, consistent abnormal returns should not be generated using historical data like that contained by underlying firm characteristics which is derived from historical financial statements of the listed firms unless there is an anomaly in the efficiency of the market (Magnusson and Wydick, 2005).

The motivation of this research was thus to examine whether stock market investors in the NSE which is at least weak form efficient (Mlambo and Biekpe, 2007) are able to generate significant stock returns consistently which would imply that there is an anomaly with respect to use of underlying firm characteristics to generate the significant and consistent stock returns.

Objective of the Study:

To examine whether underlying firm characteristics can be employed in predicting stock returns in the NSE

Theory on Consistent Stock Returns:

Consistent winner and loser stocks are defined as the repeated outstanding positive and negative stock returns for 2/3rds of the study period (Grinblatt and Moskowitz, 2004; Watkins, 2003). Alternatively consistent winner and loser stocks are defined as the repeated ranking of stocks at the top and bottom of a ranking that is based on stock returns periodically (Alwathainani, 2011). Consistent stock performance contradicts the theory of stock market efficiency in the weak form which postulates randomness in the occurrence of stock prices (Watkins, 2003). Possible causes of consistent stock performance include information diffusion theory which postulates that stock market investors under react to stock news due to delay in receiving the news and delay in synthesizing it on arrival. Randomness in the occurrence of stock prices is associated with rapid reaction to continuously occurring news by investors (Cuthbertson, 2005).

Lag or delays between the release of stock news and investor reaction leads to trends in stock price movement as the news is not immediately incorporated in stock prices hence consistent stock performance (Grinblatt and Moskowitz, 2004). Consistent stock performance can also be explained by investors who bought stocks at a basis below or above the current price who then experience capital gains in the form of price increases or capital losses in the form of price decreases which are persistent and cannot be undone by the effects of arbitrageurs or rational investors lead to consistent stock

performance. This causes reference price updates that revert back to fundamentals through some feedback or reverse mechanism between the equilibrium stock price and its fundamental value (Grinblatt and Moskowitz, 2004).

3. THEORETICAL LITERATURE REVIEW

Theory on Efficient Markets:

Efficient market hypothesis was developed by Eugene Fama, (1965) is closely linked to randomness of stock prices by Louis Bachelier, (1900). In weak form efficient markets the assumption is that stock prices occur in a random manner. The main implication of efficient market hypothesis is that investors should trust market prices and that in efficient markets investors get value for money (Fama, 1991). The economic conditions that lead to market efficiency include: rationality of investors, independent deviations from rationality and unlimited arbitrage and for a market to be inefficient, the 3 conditions must be absent (Jordan and Miller, 2008). Random walk is characterized by stock price series where future stock prices are independent of those of current and past periods (Fama, 1991). This makes the occurrence of stock prices to be unpredictable. The implication is that successive price changes have zero serial correlation and possess high but not excess volatility that is commensurate with the release of economic news items (Cuthberston, 2005). The logic behind random walk is that if the flow of information is unimpeded it should instantaneously be reflected in stock prices and hence future price changes will only reflect future news (Malkiel, 2003).

Conceptual Framework:

The independent or predictor variables drawn from the underlying features of the listed companies under study include: book value of firm's assets, dividend yield ratio, dividend payout ratio, debt to equity ratio, risk free rate, NSE stock market return, volume of the firm's shares (Albanis and Batchelor, (1999); Chiang and Chieh, (2006); Elleuch, (2009); Mohanrum, (2005) and Siqueira *et al.*, (2012). The dependent variable was log stock returns (Copeland, 2005).

4. METHODOLOGY

Research Design:

This research employs quantitative research design as it emphasizes on quantification in the collection and analysis of data. Features of quantitative research design include: application of a deductive approach in which theory guides research through testing of theories, incorporation of natural science norms and practices (Allan and Bell, 2007).

Population of Study:

During the study period between years 2001 to 2010, the NSE had 60 listed companies that formed its population. During the study period there were various events that may have affected the NSE including 2 general elections in Kenya in years 2002 and 2007. There was also the phasing out of the open outcry trading system in favor of the automated trading system (ATS). The ATS made enforcement of regulations easier to through detection of offences faster than before during the manual system.

Sample of Study:

In this research the purposive sampling method is employed to avoid the problem of thin or infrequent trading that is common in emerging markets and which is characterized by numerous zero and large non-zero returns that are unrealistic and that lead to non-normal distributions (Cowan and Sergeant, 1996). The study sample focused on company stocks that are actively and continuously traded in the NSE for at least 80% of the study period from January 2001 to December 2010. Inactively traded stocks are affected by the problem of thin or infrequent trading and are omitted from the research which is consistent with the case deletion solution to thin or infrequent trading problem. Companies on suspension from trading in the NSE during the study period or the companies listed for less than 80% of the study period are also omitted from the study to avoid disruption when studying the consistent stock performance (Scheffer, 2002). Out of the population of 60 NSE listed companies, only 32 fitted the sample selection criteria and hence became the study sample as per Appendix 1.

Data Collection:

This research involves secondary data that is collected from published annual reports of companies listed in the NSE. More secondary data is in the form of daily closing average stock prices of listed companies that is drawn from the NSE offices for the study period.

Data Analysis:**Derivation of Stock Returns:**

The financial performance of an investment can be measured by rate of logarithmic stock return (Copeland, 2005):

$$\text{LnR}_t = \text{Ln} (P_t / P_{t-1}) - 1 \quad (1)$$

Where: Ln = natural logarithm

LnR_t = stock log return for current period

P_t = closing price for the current day

P_{t-1} = closing price if the previous day

This research has employed the logarithmic returns instead of arithmetic returns since logarithmic returns are known to be analytically more tractable when linking together the sub-period returns to form longer intervals (Mobarek and Keasey, 2000). There is also no perfect asset pricing model that is able to precisely describe normal returns (Fama, 1998). Once the abnormal returns are generated other tests are performed including significance tests and consistency of abnormal stock returns (Watkins, 2003; Grinblatt and Moskowitz, 2004).

Test on Underlying Firm Characteristics:

In order to establish the underlying firm characteristics that significantly influence consistent stock performance in the NSE. Multi-regression technique is employed for the purpose of establishing the underlying firm characteristics with significant influence on consistently performing stocks. This is due to its ability to test the significance of relationship between a dependent variable and numerous independent variables simultaneously while at the same time is able to test the goodness of fit of the whole model through the R² statistics follows (Sweeney, 2006):

$$\text{Ln Rt} = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \dots + B_nX_n + U_t \quad (2)$$

Where: Ln Rt = Stock log returns of consistently performing stocks

B₀ = Constant

B_n = Weights or coefficients

X_n = Independent or predictor variables

U_t = Error term

The stock log returns of consistently performing stocks, constitutes the dependent variable in the multi-regression model. The independent or predictor variables drawn from the underlying features of the listed companies under study include: book value of firm's assets, dividend yield ratio, dividend payout ratio, debt to equity ratio, risk free rate, NSE stock market return, volume of the firm's shares, traded all which are drawn from relevant past studies (Albanis and Batchelor, (1999); Chiang and Chieh, (2006); Elleuch, (2009); Mohanrum, (2005) and Siqueira *et al.*, (2012).

5. ANALYSIS AND INTERPRETATION OF RESULTS**General Description of the Data Analyzed:**

The stock return data is tested for normality of distribution after eliminating outliers to ensure that inferences could be drawn from the sample of 32 companies to the population of 60 companies and to ensure that parametric tests are suitable for application on the sample data (Bai and Serena, 2005). Based on the stock log returns data the normality test results for all the 6 consistent best performers, 4 worst performers and 5 inconsistent performers reveal that they are normally distributed (Ndegwa and Mboya, 2015).

The null hypothesis of non-normal distribution is rejected for all the 15 stocks consisting of 6 consistent best performers, 4 consistent worst performers and 5 inconsistent performers whose p-value is 0.00 which is significantly lower than 0.05 level of confidence as per Table 1. This implies that parametric tests can be employed and that the results can be generalized to the population (Mugenda and Mugenda, 2003).

Table 1: Normality Test Results

S/N	Consistent best performers	N	Mean	Std. Deviation	Absolute	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)
1	CO.17	118	0.03	0.12	0.22	2.37	0.00
2	CO.9	118	0.02	0.13	0.24	2.65	0.00
3	CO.28	118	-0.01	0.26	0.27	2.97	0.00
4	CO.22	118	0.01	0.18	0.23	2.53	0.00
5	CO.5	118	0.01	0.20	0.31	3.37	0.00
6	CO.16	118	0.01	0.11	0.26	2.82	0.00
S/N	Inconsistent Performers						
1	CO.1	118	0.00	0.20	0.21	2.28	0.00
2	CO.8	118	0.01	0.17	0.24	2.57	0.00
3	CO.14	118	0.02	0.25	0.22	2.37	0.00
4	CO.24	118	-0.02	0.26	0.31	3.32	0.00
5	CO.31	118	0.02	0.16	0.27	2.91	0.00

Test of Goodness of Fit and Regression Analysis Results:**Goodness of Fit Results:**

The results of test of goodness of fit of the consistently performing stocks multi-regression model indicate that it is a very poor fit with R^2 of 0.131 and adjusted R^2 of 0.126 as per Table 2.

Table 2 Goodness of Fit Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.362	.131	.126	.16336

This implies is that the underlying company features are not related to the returns of consistently performing stocks since the overall multi-regression model was not a good fit and could not accurately predict stock market performance using the underlying firm characteristics. The failure of the model to accurately predict stock performance could be attributed to the fact that the NSE was at least weak form efficient (Magnusson and Wydick, 2005; Mlambo and Biekpe, 2007; Ndegwa and Mboya, 2015).

Regression Analysis Results:

The multi-regression analysis results were as indicated in Table 3. The test of significance of the individual underlying firm characteristics indicated that book value, dividend yield, market return and volume of stocks traded could have contributed significantly to consistent stock returns in the NSE. However these results are mitigated by the poor predictive power of the regression model as indicated in Table 2.

Table 3 Underlying Firm Characteristics of Consistently Performing Stocks

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.012	.011		1.050	.294
	Book value	.000	.000	.088	2.339	.020
	Dividend yield	-.277	.134	-.061	-2.060	.040
	Dividend payout	.013	.010	.041	1.365	.172
	Debt to equity	.000	.000	.024	.832	.406
	Risk free rate	-.035	.046	-.021	-.760	.448
	Market return	.846	.069	.336	12.286	.000
	Volume of shares traded	-.001	.000	-.135	-3.600	.000

Policy Recommendation:

Stock market investors should not waste time carrying out fundamental analysis and should trust market prices in the NSE since it is at least weak form efficient as the market offers opportunities for the investors that yield value for money. NSE regulators should consider educating the public on investing strategies that can be applied to make profits. This is with intention to attract more individual local and foreign investors.

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APPENDIX - A

Appendix 1: List of Companies forming the Study Sample

S/N	Companies
1	Kakuzi
2	Rea Vipingo
3	Sasini
4	CMC
5	Kenya Airways Ltd
6	Nation Media Group
7	TPS Serena
8	Barclays Bank
9	Centum
10	CFC Bank
11	Diamond Trust Bank
12	Housing Finance
13	Jubilee Insurance
14	Kenya Commercial Bank
15	National Bank of Kenya
16	NIC Bank
17	Pan Africa Insurance
18	Standard Chartered Bank
19	Athi River Mining
20	Bamburi Portland Cement
21	British American Tobacco
22	Crown Paints
23	Olympia
24	EA Cables
25	E A Portland Cement
26	EA Breweries
27	Kenya Oil
28	Mumias
29	Kenya Power
30	Sameer Group
31	Total Kenya
32	Unga Ltd