

Herding Behaviour and Stock Market Volatility at the Nairobi Securities Exchange: An Exploratory Analysis.

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ABSTRACT

This paper investigates whether herding behaviour contributes to stock market volatility at the NSE. First, the study evaluates whether herding behaviour exists at the Nairobi Securities Exchanges (NSE) and the nature of such behaviour. Secondly, it explores its implication on the stock market indicators demonstrating volatility. The study has utilized monthly data from 57 different firms listed in the NSE from January 2007 to December 2013. Both cross sectional standard deviation (CSSD) and cross sectional absolute deviation (CSAD) were employed as testing methodologies. Given basic and dynamic specifications, the study used panel data. Panel data on individual variables was used to estimate the non-linear models of both binary and continuous dependent variables. Coefficients by the two models have statistical significant influence on the stock price movement. Thus both models confirm the presence of herding patterns at the NSE which influence the stock price movement. Further, the analysis establishes that herding influences final corporate announcement. However, final corporate announcement exhibits a unique bilateral characteristic. In order to have proper market stability which is appealing to retail and corporate investors, the findings suggest that stock market players should critically consider these stock market parameters. These parameters are considered significant indicators of economic activity. Herding behaviour may spur unnecessary price volatility which is likely to destabilise the market and increase the fragility of a financial system.

Keywords: Herding Behaviour, stock, share price, market volatility.

INTRODUCTION

Herding behaviour is defined as an obvious intent by investors to copy the behaviour of other investors. This is characterized by lack of individual decision-making or thoughtfulness, causing people to think and act in the same way as the majority of those around them. In finance, a herd instinct would relate to instances in which individuals gravitate to the same or similar investments, based almost solely on the fact that many others are investing in those stocks. The fear of regret of missing out on a good investment is often a driving force behind herd instinct. Therefore,

herding behaviour is a relevant phenomenon in stock markets.

Herding is a tendency of people to keep interest in what others are doing and at times following them by overlooking their own analytical skills. Herding in a stock market does not automatically involve irrational behaviour because there are many circumstances in which investors amend their behaviour in a rational way as a response to perceived social pressure [1]. An important investment implication of herding is that when investing in an economy where participants tend to herd around the market consensus, one needs a larger

number of securities to achieve the same degree of diversification than in an otherwise normal market where there is no herding. Furthermore, in a market where investors herd under certain, identifiable state of certain key market variables, stock prices would stop reflecting values of businesses which would lead to speculative trading and thus market volatility.

The stock markets in Africa and particularly in Kenya are still developing; herding behaviour seems very likely to exist in Kenya stock market from the experience of Initial Public Offering (IPO) oversubscriptions and the stock index turbulence during the political regime changeovers and other related political activities. Thus, for fund managers, institutional investors and other individual investors, it is crucial to recognize the potential risks which may arise from these market anomalies and imperfections, in order to determine the right investment strategy. Nonetheless, while there is vast research concerning herding behaviour in developed stock markets, there is limited research on herding behaviour in developing financial markets and in particular the African countries. Thus, this study attempts to fill the gap by investigating herding behaviour in Nairobi Securities Exchange by addressing the specific questions of; how does the presence of herding modify the distribution of returns and what are the implications of herding on the relationship between stock order flows and price variability.

Literature Review.

Herding behaviour in a stock market is more of an irrational investor response rather than rational decision-making, with investors imitating the actions of others rather than trusting their own evaluation of the situation. In other words, when investors follow herds they show a willingness to downplay the importance of their own information and evaluation in favour of the aggregate market consensus [3]. Herding behaviour may result in more optimistically biased earnings estimates and reduced perceptions of risk. Consequently, investors may

In recognition of this focus, this study's overall objective was to evaluate the existence of herding behaviour in the Nairobi Securities Exchanges (NSE) and how it contributes to market volatility. Consequently the study findings do provide the necessary information on what investment managers should look for in a volatile stock market when providing guidance to their clients in constructing optimal portfolios.

The Nairobi Securities Exchange (NSE) which is the subject of this study has 57 firms listed as at December 2013 and the NSE All Share Index (NASI) is used as an overall indicator of market performance. The Index incorporates all the traded shares of the day. It therefore reflects the overall market capitalization in the market rather than the price movements of select counters [2]. The market is indeed a full service securities exchange which supports trading, clearing and settlement of equities, debt, derivatives and other associated instruments.

Organization of the study

The study is organized in five sections. Section one is the introduction which gives the background, the overall objective and justification of the study. Section two deals with the literature review while section three provides the methodology used in the study. Empirical findings are provided in section four and section five gives the summary conclusions and recommendations of the study.

earn abnormally low stock returns because of this misperception and the associated increased uncertainty about earning streams.

If market participants follow past stock performance trends, then the volatility of returns might be aggravated and therefore a financial system might be destabilized especially during a crisis period [4; 5]. For instance, past information of the investment trend by other investors is fairly useful for a new investor to make a current investment decision [6]. This tendency is supposed to be

strongest during a period of high market uncertainty. Indeed in the process of asset pricing, herding may cause stock prices to deviate from their fundamental values forcing investors to trade at inefficient prices [7].

Empirical literature on institutional herding does illustrate a positive association between herding and returns at short horizons. In particular, [8] found that stocks that institutions herd into (and out of) exhibit positive (negative) abnormal returns at horizons of a few quarters. When examining the long-term impact of institutional herding, however, some studies do illustrate evidence of negative association between institutional trading and long-term returns. For example, [8] analysed the long-term future returns of stocks that have been persistently bought or sold by institutions over several quarters. They found that, in the long term, stocks persistently bought by institutions underperform stocks persistently sold by them.

Further, [9] in their study on institutional herding the stock price, found that institutional herding positively predicts short-term returns but negatively predicts long-term returns and that institutional herding is stabilizing in the short-term but destabilizing in the long-term. [10] carried out a study on short-term institutional herding and its impact on stock prices in the US. Using trading of 776 institutional investors from 1999 to 2004, the study examined the existence and impact of short-term institutional herding. The study reported robust evidence of herding at the weekly frequency. The study findings suggested that the weekly herds significantly affect the efficiency of stock prices.

[11] conducted a study on institutional herding and future stock returns. The study was conducted in US between longer run stock returns and institutional herding from 1980 to 2005. The study results concluded that herding promotes price movements and facilitates price adjustments to their intrinsic levels. In other words, herding correctly predict

stock returns in the immediate future. However, an examination of two to three years after the herding indicates that stocks with buy herds realize negative abnormal returns while on the sell side, herding does not explain future abnormal returns. The longer run reversal in returns was found to be active across sub periods which then make it difficult to explain the idea that herding solely promotes stock price dynamism.

In a comprehensive study of trading activity using a Finnish data set, [12] confirm a disposition effect. They show in their study that there are reference price effects as individual investors tend to sell if the stock price attains a past month high. A particular case of disposition and reference price effect is provided by [13] in the Initial Public Offering (IPO) markets. Since the offer price is a common purchase price, the disposition effect is clearly identifiable. A study by [13] finds that volume is lower if the stock price is below the offer price and that there is a sharp upsurge in volume when the price surpasses the offer price for the first time. Equally, there is significant increase in volume if the stock achieves new maximum and minimum stock prices and this would, suggest evidence of reference price effects.

[14] investigated the role of behavioral finance and investor psychology in investment decision-making at the Nairobi Securities Exchange (NSE) with special reference to institutional investors. The population in the study was 40 institutional investors operating at the NSE as at 30 June 2004. The study established that behavioral factors such as representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion and mental accounting affected the decisions of the institutional investors operating at the NSE. Investors in this market also made reference to the trading activity of the other institutional investors and often exhibited an institutional-herding behavior in their investment decision-making.

The Nairobi securities exchange has had cyclical business periods over the

years. Such trading cycles significantly influenced the NSE stock index depending on the trading volumes. The reasons for such trading cycles need to be investigated in terms of these behavioural tendencies in the market. Herding behaviour in Nairobi Stock Exchange may be more pronounced going by the trading trends exhibiting unpredictable stock prices. The scenario may be due to a

number of reasons which include; less informed investors, institutional weaknesses in terms of corporate governance, weak financial reporting and low level of information disclosures among others. Such behaviour may lead to price instabilities away from their equilibrium level and high volatility in the market [3].

METHODOLOGY

Research Design

The study adopted both cross sectional design as well as correlational design. The cross sectional design was used because the scope involved various companies listed in the Nairobi Securities Exchange (NSE). It was also correlational because the study was designed to disclose the relationship between herding behaviour and various NSE stock indicators.

Study population and sample size

The unit of this study was the Nairobi Securities Exchange and data used covered a period of seven years ending December 2013. This was aimed at providing a clear view of the herding cycles that have occurred at the NSE over the period. Effectively a total of 57 listed firms at the NSE formed the study population with 4788 observations. The study therefore utilized secondary data to explore the study variables.

Model and model specification

Literature suggests two testing methodologies as employed in the study. These methodologies are based on cross sectional standard deviations (CSSD) and cross-sectional absolute standard deviations (CSAD) among individual firm returns within a particular group of securities. [15] used CSSD as a measure of the average proximity of individual asset returns to the realized market average in order to test herding behaviour. [3] used CSAD in a non-linear regression specification in order to examine the relation between the level of equity return dispersions and the overall market return. Cross-sectional standard deviation (CSSD) is used to measure return dispersion using the following econometric model;

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^N (r_{i,t} - r_{p,t})^2}{N-1}} \quad (1)$$

Where N is the number of firms in the aggregate market portfolio, $r_{i,t}$ is the observed stock return on firm i for

month t and $r_{p,t}$ is the cross-sectional average of the N returns in the market portfolio for month t. This measure can be regarded as a proxy to individual security return dispersion around the market average. Therefore, the presence of herding behaviour would lead security returns not to deviate far from the overall market return. The rationale behind this argument based on the methodology is the assumption that individuals suppress their own beliefs and make investment decisions based solely on the collective actions of the market.

On the other hand, rational asset pricing models offer conflicting prediction suggesting that dispersions will increase with the absolute value of market return since each asset differs in its sensitivity to the market return. Further, it is suggested that the presence of herd behaviour is most likely to occur during periods of extreme market movements, as they would most likely tend to go with the market consensus during such periods. Hence, cross sectional standard deviation is proposed to examine the behaviour of the dispersion measure in equation (1) during periods of market stress by estimating the following linear regression model:

$$CSSD_t = \alpha + \beta_D D_t^L + \beta_U D_t^U + \varepsilon_t \quad (2)$$

Where $D_t^L = 1$, if the return on the aggregate market portfolio on month t lies in the lower tail of the return distribution; 0 otherwise, and $D_t^U = 1$, if the return on the aggregate market portfolio on month t lies in the upper tail of the return distribution; 0 otherwise. Although somewhat arbitrary, in the literature, an extreme market return is defined as one that lies in the one (and five) per cent lower or upper tail of the return distribution. The dummies in equation (2) aim to capture differences in return dispersions during periods of extreme market movements. As herd formation indicates conformity with market consensus, the presence of negative and statistically significant β_D (for down markets) and β_U (for up markets) coefficients would indicate herd formation by market participants.

The second return dispersion methodology engaged as suggested by Chang (2000) and which uses the cross-sectional absolute deviation of returns (CSAD) as a measure of return dispersion is expressed as follows;

$$CSAD_t = \frac{1}{N} \sum_{i=1}^N |r_{i,t} - r_{m,t}| \quad (3)$$

Where, $r_{m,t}$ is the cross-sectional average of the N returns in the market portfolio for month t . [3] in utilizing non-linear regression model challenges the Capital Asset Pricing Model (CAPM) assumption¹. If there are significant non-linear effects, then the results based on the cross sectional standard deviations of returns would not be valid. The

authors suggest that during periods of market stress, one would expect the relation between return dispersion and market return to be non-linearly increasing or even decreasing. Therefore, they propose a testing methodology based on a general quadratic relationship between CSAD_t and $r_{m,t}$ of the form:

$$CSAD_t = \alpha + \gamma_1 |r_{m,t}| + \gamma_2 r_{m,t}^2 + \varepsilon_t \quad (4)$$

According to this methodology, herding would be evidenced by a lower or less than proportional increase in the cross-sectional absolute deviation (CSAD) during periods of extreme market movements. As a result, if herding is present, then the non-linear coefficient, γ_2 will be negative and statistically significant; otherwise a statistically positive γ_2 would indicate no evidence of herding. Against this background, this study used the specified CSSD and CSAD econometric models.

Descriptive Analysis.

The descriptive statistics under considerations are mean, standard deviation, minimum and maximum. The mean is the average value, standard deviation is a measure of dispersion that shows how the variables are scattered around their means, and the minimum is the least value while maximum is the highest value. From Table 1, the two standard deviations (Cross sectional standard deviation and Cross sectional absolute deviation) have 0.985 and 0.968 as their means respectively, and the mean value for corporate action is 0.05451 while the mean average price is 69.2608 among other stock market indicators as can be observed.

¹The assumption states that the return dispersions are an increasing function of the market return and that this relation is linear.

Table 1: Summary statistics.

VARIABLES	N	Mean	SD	Min	Max
NSE	N=4788	4191.1	789.9	2474.8	5774.3
	n=57		0	4191.1	4191.1
	T=84		789.9	2474.8	5774.3
AVP	N=4033	69.3	82.9	1.49	575.8
	n=57		75.7	4.0	371.5
	T=70.7		38.6	-71.2	375.2
P	N=4788	4.87e+09	3.93+07	0	1.77e+10
	n=57		0	4.87e+09	4.87e+09
	T=84		3.93e+07	0	1.77e+10
S	N=4788	4.11e+09	3.45e+09	0	1.61e+10
	n=57		0	4.11e+09	4.11e+09
	T=84		3.93e+09	-1.43e-06	1.61e+10
CSSD	N=4788	0.985	1.423182	-1.25	10.12
	n=57		1.196968	-0.567	4.74
	T=84		0.7858481	-2.946	6.36
CSAD	N=4788	0.968	0.227	-1.227	9.95
	n=57		0.041	-0.557	4.66
	T=84		0.223	-2.895	6.25
COP	N=4788	0.0545	0.227	0	1
	n=57		0.041	0	0.1548
	T=84		0.223	-0.1003	1.043

Where; NSE = Nairobi Securities exchange; AVP= Average price; P = Institutional investor purchases; S = Institutional investor sales; CSSD = cross-sectional standard deviation; CSAD = cross-sectional absolute standard deviation and COP = Corporate announcement.

Source: Author's calculations

Establishing Existence of Herding at the NSE

In establishing the presence and the nature of herding among firms the study adopted diverse graphical illustrations to demonstrate the trend of all the variables of interest over the entire time period of study. The study results reveals that the trends of NSE average price, corporate action, purchases and sales as well as CSSD and CSAD are constantly fluctuating. Indeed other researchers such as, [16] tend to indicate that herding or such fluctuations can be caused by a host of factors including information contained in news, financial performance of the organizations and investor behaviours. There are

however other suggestions that, herding is as a result of irrational investor decisions as suggested by [17], and that due to this irrationality behaviour and emotion based decisions, other stock market parameters like stock price movement are also affected.

Figures 1-6 below, illustrate the kind of herding characterised by changes in the stock market parameters that are as a result of unique circumstances of any such specific indicator as opposed to the overall market behaviour.

Figure 1 below does illustrate the existence of herding behaviour as evidenced by constant oscillations over the entire time period.

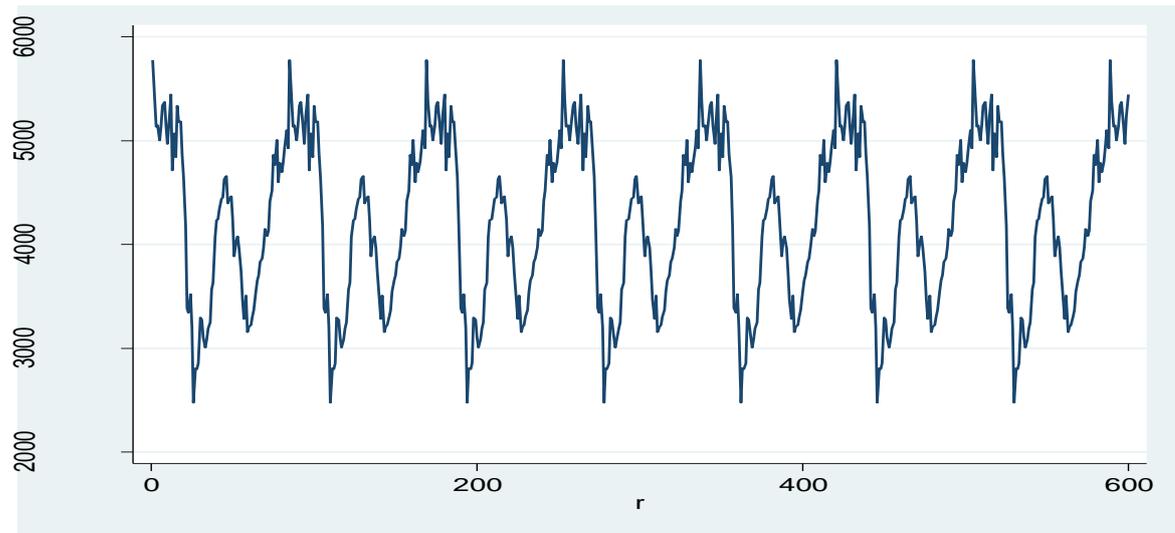


Figure 1: Graph of NSE share index against time period.

Figure 2 below shows that the average price which has been averaged monthly illustrates volatility over the entire time period and evidently there are systematic fluctuations. Average price as a stock market price indicator

shows how prices keeps changing or varying. Such fluctuations tend to discourage investors to the market. This would also lead to low confidence in stock market.

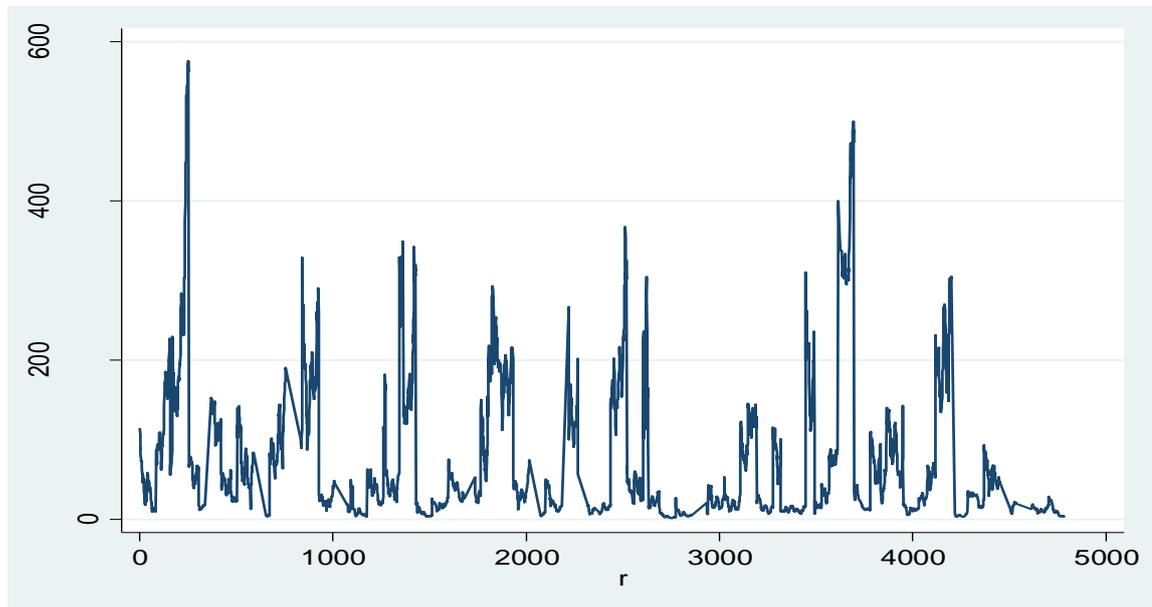


Figure 2: Graph of average price against time periods.

Figure 3 below illustrates a scenario in which there is significant volatility with respect to institutional purchases for all the firms under consideration. This is a clear evidence of existence of

herding behaviour in the stock market. Consequently, there is a systematic variation involving firm purchases over the entire time period.

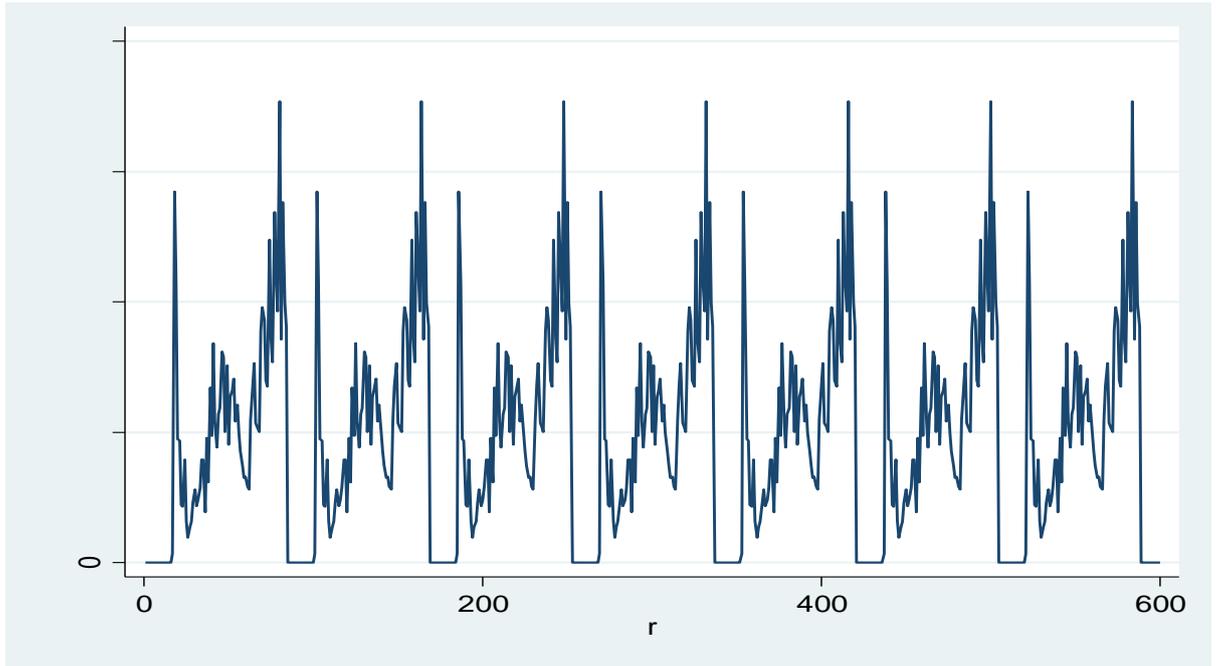


Figure 3: Graph of Purchases against time periods

The study also considered institutional sales to establish existence and pattern of herding behaviour. Figure 4 below does show that the institutional sales have been systematically changing over time, a

scenario which is similar to what was happening with the institutional purchases. This illustration is also a clear evidence of the existence of herding behaviour in the stock market.

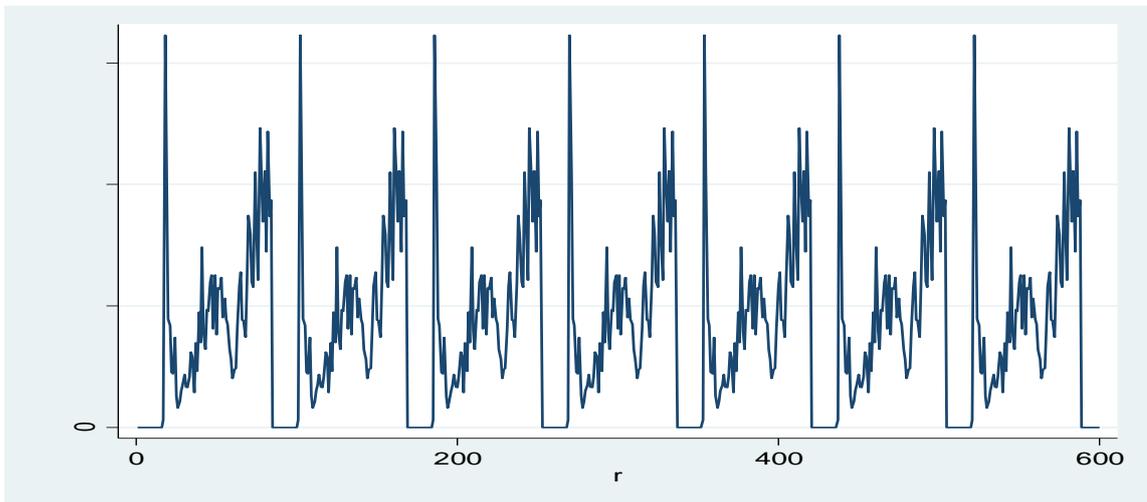


Figure 4: Graph of sales against time periods

Figure 5 below, which shows the fluctuations of CSSD against time, reveals significant herding throughout the entire time period for all the firms.

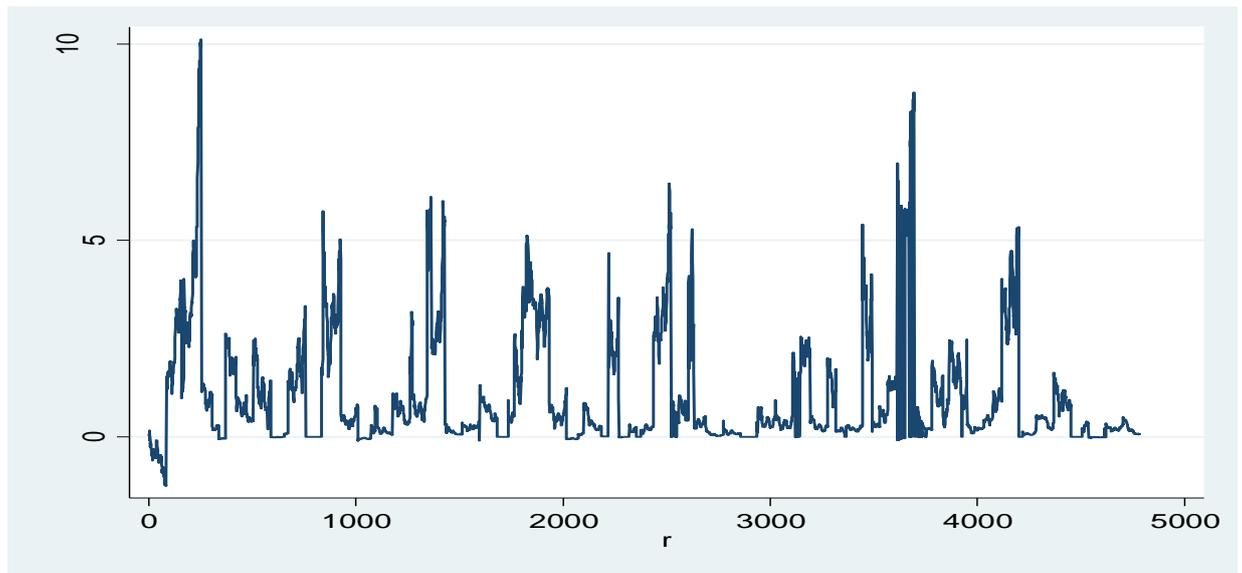


Figure 5: Graph of Cross sectional Standard Deviation against time periods
 Just like scenario on CSSD, the fluctuations of CSAD over time does show the presence of herding behaviour in the stock market as shown in figure 6 below.

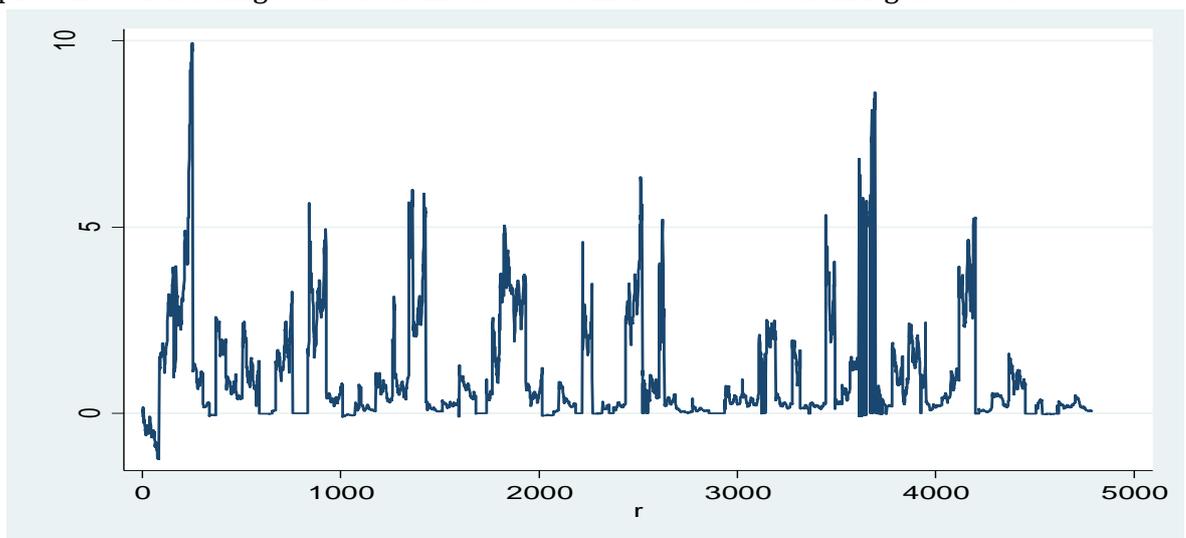


Figure 6: Graph of Cross sectional Absolute Deviation against time periods.

In conclusion, the existence of herding has implications on asset pricing models as such behaviour has a behavioural effect on stock price movements with a corresponding impact on the return and risk of the stock [18; 19].

Demonstrating implication of Herding on stock market parameters Stock Price Movement at the NSE The Cross Sectional Standard Deviation Model.

The cross sectional standard deviation as used in the literature by [20] and

[5] demonstrates the existence of herding and its implication on stock price movement. The specified model in equation 2 was estimated by Ordinary Least Squares (OLS). Diagnostic tests were undertaken so as to validate the OLS estimates. The estimated model which was a transformed log linear yielded the following;

$$\log CSSD^2 = -4.21 + 1.675D^U + 2.587(D^L)^2 + \varepsilon \tag{5}$$

Where $D_t^L = 1$, if the return on the aggregate market portfolio on month t lies in the *lower* tail of the return distribution; 0 otherwise, and $D_t^U = 1$, if the return on the aggregate market portfolio on month t lies in the *upper* tail of the return distribution; 0 otherwise.

ε = random error term.
Thus, for every unit increase in the D^U term, the outcome is $(e^{1.675})5.338$ times higher and for every unit increase in the $(D^L)^2$ term, the outcome is $(e^{2.587}) 13.290$ times higher. When both D^U and $(D^L)^2$ are assumed to be equal to zero, the outcome reduces by 4.21 units.

Table 2: Regression results for cross sectional standard deviation

Random-effects GLS regression	Number of obs	=	4788
Group variable: Companycode	Number of groups	=	57
R-sq: within = 0.2753	Obs per group: min =		84
between = 0.4957	avg =		84.0
overall = 0.4197	max =		84
	Wald chi2(2)	=	20718.78
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0000

(Std. Err. adjusted for 57 clusters in Companycode)

LCSSDsqr	Robust					
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
DU	1.675171	.3195993	5.24	0.000	1.048768	2.301574
DLsq	2.587671	.0226046	114.48	0.000	2.543367	2.631976
_cons	-4.215275	.5224912	-8.07	0.000	-5.239339	-3.191211
sigma_u	2.6760835					
sigma_e	2.1412909					
rho	.60966182	(fraction of variance due to u_i)				

Source: Author’s calculations

All the coefficients are statistically significant since their p-values are 0.000 and none of their confidence intervals includes zero. The overall regression fit is significant. This is because Prob> chi2 is less than 0.05. The standard deviation of residuals within groups is 2.676 (sigma_u) and the standard deviation of residuals between groups is 2.141 (sigma_e). 60.97% of the variance is attributable to the differences across the panels. The positive signs of the regressors and their statistical significance

indicate that there is significant herding in the market which is also consistent with studies such as those by [15] among other studies.

The Cross Sectional Absolute Deviation Model.

The functional form in equation 4 and has been estimated using the OLS just like the case of CSSD. The results are as shown in table 3 below. The sigma_u and rho of zero, shows that there is no standard deviation within groups and no variance attributed the differences within panels.

*

Also illustrate by nos. The existence of herding using this model (CSAD)

Table 3: Regression results for Cross Sectional Absolute Deviation

Random-effects GLS regression		Number of obs	=	725
Group variable: Companycode		Number of groups	=	19
R-sq: within	= 0.9744	Obs per group: min	=	1
between	= 0.9845	avg	=	38.2
overall	= 0.9810	max	=	81
corr(u_i, X) = 0 (assumed)		Wald chi2(2)	=	37222.78
		Prob > chi2	=	0.0000

L2_CSAD	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
L2_rlsq	-2.482075	.025736	-96.44	0.000	-2.532517 -2.431633
L2_rl3	-1.41731	.0239653	-59.14	0.000	-1.464281 -1.370339
_cons	-.0214424	.0010748	-19.95	0.000	-.0235489 -.0193359
sigma_u	0				
sigma_e	.01098286				
rho	0	(fraction of variance due to u_i)			

Source: Author's calculation

The results for both CSSD and CSAD regressions indicate that there is herding in the market and as illustrated in Figures 1-6.

Corporate Announcements

The corporate actions in our study are tabulated in the table 4 below. There were 261 time periods with corporate announcements out of 4788 time periods.

Table 4: Corporate Actions

CORPORATE ACTION	Freq.	Percent	Cum.
2f	1	0.38	0.38
b	14	5.36	5.75
d	10	3.83	9.58
f	82	31.42	41.00
ff	80	30.65	71.65
i	66	25.29	96.93
ri	7	2.68	99.62
ss	1	0.38	100.00
Total	261	100.00	

Source: Author's calculation

Where 2f= second and final, b= bonus, d= dividend, f= final, ff= first and final, i=interim, ri= rights issue, ss= share split.

In order to determine whether corporate actions have herding effect at the NSE, two types of regressions were used; Univariate regressions and general multivariate regression. The univariate regressions have the NSE share index as the dependent variables and the various corporate actions as

the explanatory variables. The multivariate regression has the NSE share as the dependent variable and all the independent variables modelled together. The results from the univariate regressions are as tabulated below:

Table 5: Coefficients of the respective Corporate Action

DEPENDENT VARIABLE	COEFFICIENTS	P-VALUES
2f	1180.852	0.135
b	-502.7844	0.017
d	-146.1425	0.559
f	99.85661	0.256
ff	62.56406	0.482
i	227.5526	0.020
ri	461.4947	0.122
ss	-540.3771	0.494

Source: Author’s computation

From the above (Table 5), it is noted that all coefficients are positively related to the NSE share index except those of bonus, dividend and share split. This indicates that there is herding movement with respect to corporate actions with positive coefficients i.e. second and final, final, first and final, interim and rights issue. However, only two coefficients are found to be statistically significant at 95% confidence interval i.e. bonus and interim (p-values 0.017 and 0.020) respectively. The multivariate equation is estimated by OLS and is expressed as follows;

$$\begin{aligned}
 \text{NSE Share Index} &= \beta_0 + \beta_1 2f + \beta_2 b + \beta_3 d \\
 &+ \beta_4 f + \beta_5 ff + \beta_6 i +
 \end{aligned}$$

$\beta_7 ri + \beta_8 ss + \varepsilon$ 6
 Where; NSE Share index is the dependent variable, 2f= second and final, b= bonus, d= dividend, f= final, ff= first and final, i=interim, ri= rights issue, ss= share split. The model in equation 6 is transformed into log- linear functional form as expressed below;

$$\begin{aligned}
 \ln \text{NSE Share Index} = \beta_0 + \beta_1 2f - \beta_2 b - \\
 \beta_3 d + \beta_4 L2_f + \beta_5 L2_{ff} + \beta_6 i + \beta_7 ri - \beta_8 ss + \\
 \varepsilon
 \end{aligned}$$

Where; lnNSE share index is the natural log of NSE Share index, 2f= second and final, b= bonus, d= dividend, L2_f= is final lagged twice, L2_ff= is first and final lagged twice, i=interim, ri= rights issue, ss= share split
 Therefore, from Table 6 below, we observe that for every unit increase second and final (Corporate announcement) this means that herding increases by 31.8%. Secondly, for a unit increase in bonus (Corporate announcement) herding reduces by 11.4%. Thirdly, for a unit increase in dividend (Corporate announcement) herding reduces by 2.7%. Fourthly, a unit increase in final (Corporate announcement) herding increases by 5.4%. From the fifth observation, a unit increase in the first and final (Corporate announcement) herding increases by 4.9%. The sixth observation shows that, for every unit increase in interim (Corporate announcement) herding increases by 4%. Seventh, for every unit increase in the rights issue (Corporate

announcement) herding increases by 12.9%. Lastly, we observe that for every unit increase in share split

(Corporate announcement) herding reduces by 12.8%.

Table 6: Regression Results for corporate announcements

Random-effects GLS regression	Number of obs	=	4674
Group variable: Companycode	Number of groups	=	57
R-sq: within = 0.0000	Obs per group: min	=	82
between = 0.0000	avg	=	82.0
overall = 0.0051	max	=	82
corr(u_i, X) = 0 (assumed)	Wald chi2(8)	=	23.87
	Prob > chi2	=	0.0024

LNseSharei~x	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
d	-.0274158	.0608444	-0.45	0.652	-.1466687	.091837
b	-.1208074	.0514461	-2.35	0.019	-.22164	-.0199749
two_f	.2763239	.1922114	1.44	0.151	-.1004034	.6530513
i	.0398098	.0249794	1.59	0.111	-.0091489	.0887686
ri	.1213298	.0726984	1.67	0.095	-.0211564	.2638159
ss	-.1574362	.1934022	-0.81	0.416	-.5364976	.2216251
L2_f	.0522375	.0214198	2.44	0.015	.0102555	.0942195
L2_ff	.0475716	.0218154	2.18	0.029	.0048142	.0903291
_cons	8.312579	.0028908	2875.52	0.000	8.306914	8.318245
sigma_u	0					
sigma_e	.19334329					
rho	0	(fraction of variance due to u_i)				

Source: Author's calculation.

All the coefficients are statistically significant except for the dividends, second and final, rights issue, interim and share split announcements. The sigma_u and rho of zero, shows that there is no standard deviation within groups and no variance attributed the differences within panels.

The Granger test is applied to determine causality. It reveals that the corporate actions; first and final and final are responsible for causing herding. This is because their p-values are greater than 0.05 leading to the inference of causality. The causality (that final corporate announcement causes herding and herding causes final corporate announcement) is bilateral since the lagged coefficients in both the restricted and unrestricted models are statistically different from zero. This means that in as much as final corporate action causes herding,

there is statistical evidence to infer that herding may also cause final corporate action. The tested causality of first and final corporate announcements to herding implies independence in causality since the lagged coefficients in both the restricted models are not statistically different from each other.

Herding on institutional investor decisions

The variables eliciting institutional investors are purchases and sales. These two variables are represented as dummy binary variables with 1 in months where there were purchases and sales and 0 otherwise. The findings indicate that there are 3870 months with institutional investor purchases and sales. This represents 80.95% of the entire time period. See table below for actual purchases and sales.

Table 7: Summary statistics for the institutional investor decisions

Variable	Obs	Mean	Std. Dev.	Min	Max
pur	4788	.8095238	.3927177	0	1
sale	4788	.8095238	.3927177	0	1
Purchases	4788	4.87e+09	3.93e+09	0	1.77e+10
Sales	4788	4.11e+09	3.45e+09	0	1.61e+10

Source: Author's calculation

In order to demonstrate the relationship between institutional investments and herding movement, the following model is used.

$$NSE\ Share\ Index = \beta_0 + \beta_1 pur + \beta_2 sales + \varepsilon \tag{8}$$

Where; pur is a binary variable for institutional investor purchases; sales is a binary variable for institutional investor sales

$$NSE\ Share\ Index = \beta_0 + \beta_1 Purchases + \beta_2 Sales + \varepsilon \tag{9}$$

Where; Purchases are the actual number of purchases for each relevant month

;Sales are the actual number of sales for each relevant month
 ε is the error term

The various assumptions made by OLS are considered for each of the two models and appropriate remedies are

recommended in the event that they are violated. The final models take the following forms;

$$LNSE\ Share\ Index = 8.553 - 0.286pur + \varepsilon \tag{10}$$

$$LNSE\ Share\ Index = 4.52 - 0.168LPurchases + \varepsilon \tag{11}$$

Where; pur is a binary variable for institutional investor purchases

;L.Purchases is the log of the actual number of purchases for each relevant month

ε is the error term

We observe that the presence of an institutional investor purchase leads to a decrease in herding by 24.87%. Whereas during the time periods when there was institutional investment, a unit increase purchases led to a decline in herding 15.46%.

Table 8: Regression results for model 10

Random-effects GLS regression	Number of obs = 4788
Group variable: Companycode	Number of groups = 57
R-sq: within = 0.0000	Obs per group: min = 84
between = 0.0000	avg = 84.0
overall = 0.3282	max = 84
corr(u_i, X) = 0 (assumed)	Wald chi2(1) = 2338.29
	Prob > chi2 = 0.0000

LNseSharei~x	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
pur	-.2861251	.0059171	-48.36	0.000	-.2977223 - .2745278
sale	0	(omitted)			
_cons	8.553658	.0053238	1606.68	0.000	8.543224 8.564093
sigma_u	0				
sigma_e	.16172423				
rho	0	(fraction of variance due to u_i)			

Source: Author's calculation

Table 9: Regression results for model 11

LNseSharein~x	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
log_purchases	.1680473	.0031266	53.75	0.000	.1619194	.1741753
_cons	4.516369	.0698246	64.68	0.000	4.379515	4.653223
sigma_u	0					
sigma_e	.13510254					
rho	0	(fraction of variance due to u_i)				

Source: Author's calculation

All the coefficients are statistically significant. The sigma_u and rho of zero, shows that there is no standard deviation within groups and no variance attributed the differences

within panels. The sigma_e on the other hand indicate that the standard deviation between groups is 0.1617 for model 10 and 0.135 for model 11.

CONCLUSION

The fluctuations as demonstrated by Figures 1-6; are evident that herding is prevalent at the NSE. Studies by [20] and [3] do suggest that the cross sectional standard deviation (CSSD) and cross sectional absolute deviation (CSAD) demonstrates the presence of herding. This study therefore concludes that herding pattern is evident amongst 57 listed firms at the NSE as illustrated from the results. Apart from the average monthly NSE share index, institutional investor purchases and sales, which exhibits balanced herding patterns over their respective overall means, other variables exhibits biased unbalance herding patterns in relation to their respective means. However, all of them confirm the prevalence of herding within their specific trading boundaries.

In any market, current and potential investors including any other stakeholders are interested in its performance over better and appreciative returns on investments. This study considers herding as the most sensitive behaviour especially in situations where diversification of trading mechanisms are prevalent and there is ease of access to information

by majority of potential, current and future investors. Model one and two (CSSD and CSAD respectively) has validated estimates and demonstrate the implication of herding in the stock price movement. The significant herding which influences the stock price movement is indicated by the positive signs of the regressors. Model two as suggested by [3] also attests the notion of herding on stock price movement where the OLS regression results show that 98.1% of the variations have been explained by the independent variables. The negative statistical significant relationship between the CSAD and the independent variables concurs with the propositions by [3] that if herding behaviour exists then the non-linear coefficients will be negative implying they are both statistically significant. Thus both models confirm the presence of herding patterns at the NSE which influence the stock price movement. Failure by Kenya to register an increase through NSE in the market capitalization in the year 2009 could be attributed to herding and thus being ranked fifth in the African stock exchange.

Corporate actions refers to the actions or strategies employed by a firm(s) to improve its performance potential or to counter a particular issue related to the day to day operations and targets of the firm(s). This study analyses the corporate announcements of the 57 firms listed at NSE from January 2007 to December 2013. These actions are characterised by the specific announcement with its beginning and closure dates, the payment dates as well as the respective rates. However, we have considered the specific dates when specific corporate announcement is made by that particular firm under consideration. Therefore, the corporate announcements made and considered include: final, first and final, second and final, interim, bonus, dividend, rights issue and share split. Modelling NSE share index (univariate analysis), we find that only bonus and interim corporate announcements are statistically significant factors that influence herding. However, bonus, dividend and share split corporate announcements are negatively related to herding while others have a positive relationship.

The study further explores the combined influence of all corporate actions on herding after conducting multivariate analysis. From the OLS estimates of the multivariate equation which considers the relevant diagnostic tests, it is revealed that dividends, second and final, rights issue, interim and share split corporate announcements are not statistically significant in influencing herding behaviour while final, first and final and bonus corporate actions are statistically significant in determining the pattern of herding behaviour.

In addition to verifying that herding is influenced by corporate actions, this study goes a step ahead to establish whether herding patterns causes

corporate actions or vice versa. After performing Granger causality test of each corporate announcement, we establish that final and the first and final corporate announcement actually causes herding. However, final corporate announcement exhibits a unique bilateral characteristic such that it can be caused by herding as well as herding can be caused by final corporate announcement. The rest of the corporate announcements are independent and unidirectional.

On the other hand, institutional investors are considered (Purchases and Sales). Months with institutional investor purchases and sales are identified. From the findings, the variations explained by institutional investors are 32.82%². However, when we consider the actual number of purchases for each relevant month, we find that they are statistically significant as they influence herding patterns with about 42.72% of the variations being explained by purchases. All the coefficients are statistically significant for institutional events implying that herding pattern is prevalent among institutional investors.

Based on the above discussions of the findings, we conclude that herding behaviour exists at the NSE as suggested by the literature and confirmed by the two models used by the study. Due to the number of trading firms, the low volume of transactions among others, we expect this behaviour of herding patterns since it is sensitive to these factors. This study, with the aid of the regression models, it is discovered that herding pattern exists as shown by NSE 20 share index, average monthly price, average monthly institutional investor purchases and sales. These findings support the suggestions by [21] who argues that when these factors influence market participants to exhibit the herding

² Note that this is capturing the periods with presence of institutional purchases and not actual purchases.

patterns with the expansive and positive fluctuations, it leads up to a non-linear relationship between the estimating model and the average market returns. As was established in

our study, the presence of institutional investor purchases reduces or discourages herding behaviour.

RECOMMENDATIONS

Herding is an important issue at the NSE especially to institutional investors, fund managers individual investors. This study focussed mainly on the influence of herding behaviour at the NSE and from the findings, it is suggested that the market participants (57 targeted firms) and those not yet listed to be aware and sensitive to the influence of herding as this contributes to market inefficiencies in terms of stock market volatilities. Stock market parameters are of major concern to the policymakers as they are considered as the leading indicators of economic activity. The study results suggests that herding pattern experienced at NSE is linked to particular periods which results to speculations in the market. Therefore, in order to ensure market efficiency, stock market regulators should consider these sensitive implications while developing policies. For example, merging of trading policies at will or without any intense considerations in emerging markets may have dire implications for the stock market in relation to efficiency as herding might systematically lead to mispricing of the financial assets and stimulation of asset instabilities. Therefore, the government and policy makers should take herding into consideration as this behaviour may spur unnecessary volatility which is likely to destabilise the market and increase the fragility of the financial system. Volatility and abnormal information flows impede the reliability and accuracy of investment prediction.

Despite inconsistent and scarcity of daily returns of data at the NSE, the study utilises average monthly data on stock price returns that had a positive influence on stock price movement. Herding behaviour leads to immense reactions to stock price movement. We found that as stock price increases, herding reduces by a certain amount.

However, this might not always be the case and thus to unlock this challenge, the number of listed firms should be increased to avoid paucity of daily or monthly trading by firms and subsequent lack of liquidity within Nairobi securities exchange. A good number of firms analysed experience monthly trading with herding characteristics. It is suggested that a number of enterprises including government owned enterprises should be encouraged to trade in the NSE enhance public participation in an effort to stabilise stock prices. Alliances with other exchange securities from other countries like Uganda, Tanzania and others in a union referred to as Cross Border Exchange Coalitions (CROBEC) should be encouraged. This would be through the use of information technology in exchanging and sharing information. The findings further indicate that only final corporate announcements have bilateral effects in causation. The other seven considered corporate announcements are unilateral. Final corporate announcements seem to be sensitive to the investors as they tend to suppress their private information regarding the kind of investment they wish to make and follow the herd. They may not be at a position to have a clear flow of events in case of simultaneous herd. The government and the relevant sector should develop policy regarding timings of corporate announcements as this would restore confidence among the investors.

On the other hand, institutional investor purchases are found to be significant. Considering the investor purchases and herding, market forces fails to operate as expected. This can be attributed to lack of propagation of knowledge due to communication failures in the stock market. Also it can be attributed to the lack of confidence in Nairobi Securities Exchange. Without continuous support from

public participation aggravated by inadequate public confidence, firms will keep reducing or moving out and general status of securities exchange within the country will be collapsing and this can lead to dis-inclusion in the African stock market. Therefore, investors and policy makers should consider providing clear information

prior to critical purchases. This maintains market conditions so as to avoid negative returns due to possible irrational behaviour on speculative purchasing patterns. This will promote continuous and systematic transactions; a fundamental factor to the stability of the NSE.

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