International Journal of
Finance
(IJF)

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Abstract

Purpose: Volatility can be a risk if it results to investors generating negative returns. On the other hand, it can be an opportunity if it results in investors generating positive returns. Whether volatility generates positive returns or negative returns for investors may depend on the general volatility dynamics of a stock market. The concern is that the volatility levels of BSE stocks may not be enhancing the returns of investors. Therefore, the study investigated whether the volatility dynamics of BSE are good or bad for investors.

Methodology: Using market data from 2011 to 2013, we employ a GARCH-M (1,1) model to find out if BSE volatility dynamics are enhancing the returns of stocks listed on the stock exchange.

Findings: The results showed that the risk coefficient in the mean returns is significant but negative. This implied that the returns of stocks listed on the BSE are significantly, but negatively related to market volatility. Therefore, we concluded that the current market volatility dynamics of the BSE are not enhancing the returns of investors and are bad for investors in the short-term.

Unique contribution to theory, practice and policy: We recommend that investors use a buy and hold strategy in order to realize positive returns.

Key words: *Botswana Stock Exchange, volatility, returns, investors, GARCH*

1.0. Introduction

Volatility is one of the most studied subject financial literature. From the perspective of an investor, volatility is viewed as a risk measure which reflects uncertainty in financial markets (Laakkonen & Lanne, 2008). Investors generally dislike uncertainty, and as a assets that display high levels of volatility are generally viewed as being risky. Volatility increases the uncertainty and risk of the stock market and is detrimental to the normal operation of the stock market (Bhowmik & Wang, 2020). As a result, volatility is often seen in the negative context. The 2008 global financial crisis in which many investors lost their money essentially accentuated this view that volatility is a bad phenomenon that can potentially wipe away invested capital.

However, it is important to note that volatility is not always a bad phenomenon. Volatility can actually provide opportunities for investors to increase returns. Whilst investors consider volatility to be risky, they are aware that it is the same volatility that enable them to generate returns (Orabi & Alqurran, 2015). It is necessary that stocks display some level of volatility. This is because volatility enables investors to generate returns (Parasuraman & Janaki, 2011). When volatility is too low, it essentially means that there is little movement or fluctuations in stock prices (Banumathy & Azhagaiah,2015). In that situation investors, have less opportunity to make a capital gain. Whilst some may argue that investors would still make a gain from dividends, capital gains emanating from stock price movements enhance returns of investors. Dividend gains are highly dependent on the firm's dividend policy. With many firms favoring a stable constant dividend policy, returns emanating from dividend gains are limited by the firm's dividend policy. Thus, due to the firm's dividend policy there is a limit to which an investor can earn from dividend gains.

On the other hand, capital gains are dependent upon the markets. Markets do not place a cap on the value of a firm. As long as the market is efficient, the prices of the stock will constantly change reflecting the value of stock at each point in time. The stock price has the potential to appreciate as high as possible. As a result, unlike dividends, capital gains emanating from stock price movement have the potential to provide unlimited returns to investors. Capital gains emanating from a relatively high volatility stock market, coupled with dividend gains can significantly enhance the returns of investors. Thus, the volatility dynamics of a stock market greatly influences the returns to investors.

Moreover, most investors are looking to maximize their returns through active management of their portfolios. Investors do not only want to buy and hold securities, but they would like to buy when the market is low and sell when the market is high. The frequent buying and selling of stocks, taking advantage of changes in market prices allow them to increase returns on their investments. As a result, market should offer structural opportunities for active portfolio managers to produce higher returns, while employing a disciplined buy and sell strategy (Rochon and Belley,2014). Enhancing returns through active portfolio management is possible in volatile markets where stock prices move up and down. Therefore, volatility is an essential element of investor's quest to generate returns.

The relationship between the returns and volatility has been of interest to researchers for a long time. Most asset pricing model suggest that there is a positive relationship between returns and expected volatility (Dimitriou & Simos,2011). This means that stocks with higher risk are expected to earn higher returns (N'dri, 2007). The assumption is that investors are risk averse and as such they would want to be compensated for any additional risk from holding a risky asset. If we assume an investor holds the whole market portfolio, the volatility of the stock market should signify the overall risk of the whole market portfolio. Based on the traditional financial theory, a market with general levels of higher volatility would therefore be expected to earn higher returns. Conversely, a low volatility stock market, essentially should not promise higher returns to investors.

Several studies provide evidence of the positive relationship between returns and volatility. A study by Godwin Olasehinde – Williams (2018) examined the relationship between stock return and volatility in the Wet African Economic and Monetary Union regional stock market. The study found a positive but insignificant relationship between expected stock returns and volatility. Tabak & Guerra (2007), using a sample of 25 Brazilian stocks rather found the relationship between stocks and volatilities to be significantly positively correlated. In a study by Ahmad et al (2016), KPSE with the lowest volatility coefficient was found to have the lowest returns implying that returns are positively related to volatility. After controlling for US consumption wealth ratio, Guo (2006) also found a positive and significant risk-return relationship in most international markets.

However, a significant number of studies have found the relationship between returns and volatility to be negative in some markets. A study by Dimitriou & Simos (2011) of European stock markets found the relationship to be negative and statistically insignificant for most countries except for Belgium, Austria and Luxemburg. Another study undertaken by Emna & Mryriam (2017) in Euro zone, France, Germany, Switzerland and the United Kingdom also found a strong and negative relationship between volatility and stock market returns. Whist a study by Tah (2013) found no significant relationship between returns and volatility in the Kenyan stock market, a significant negative relationship was found in the Zambian stock market. Similarly, a study undertaken by Li et al (2005) in twelve countries found the relationship between expected returns and volatility to be negative in six of the markets.

These findings are surprising considering that returns are expected to be positively related to volatility. The negative relationship between returns and volatility is normally attributed to the leverage effect. The leverage effect occurs when the value of equity relative to debt decrease when stock prices or returns are falling, resulting in higher future return volatility (Wu, 2001; Aydemir et al, 2007). However, it seems the relationship between returns and volatility can be affected by other intermittent factors other than the leverage effect. Chung & Chuwonganant (2018) argued that the negative relationship between volatility and returns does not only arise due to the greater risk premiums but also due to illiquidity premium. A study by Gencay and Selcuk (2004) found the negative relationship between stock returns and volatility to be short-lived. When the timescale become longer than one trading day, future returns and current volatility become positively correlated implying that timescale influence the relationship between returns and volatility. Another study by Motameni & Abounoori (2009) of the Tehran stock market in Iran found the relationship between returns and volatility to be negative before a crisis and positive after a crisis. This meant that crisis can also influence the nature of the relationship between volatility and returns.

Considering the theoretical and empirical literature, it seems the relationship between returns and volatility is not straightforward. An increase in volatility can result in either positive returns or negative returns. This may be because volatility is a consequence of information flow (Laakkonen & Lanne, 2008; Emenike & Opara , 2014).A market can receive bad or good news. Good news causes stock prices to rise whilst bad news cause stock prices to fall. As a result, volatility caused by arrival of good news should increase returns whilst bad news should decrease returns. This essentially means that volatility accompanied by good news should have a positive impact on returns in comparison to bad news (Suleman, 2012).

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 7, Issue No. 3, pp 25 - 33, 2022 www.carijournals.org

Over a period, a market receives both good and bad news. As a result, stock price and consequently returns will fluctuate on a daily basis in response to the market volatility dynamics. We can therefore argue that a market which mostly receives good news should provide positive returns to investors in comparison to a market in which bad news dominates. What is the consequence of this assertion on the relationship between volatility and returns? When an increase in volatility is generally accompanied by an increase in stock prices, daily returns will increase and the relationship between volatility of a stock and returns will be positive. Conversely, when an increase in volatility is accompanied by a decrease in stock prices, daily returns will decrease and the relationship between returns and volatility will be negative. Therefore, whether the volatility will enhance returns of stocks will depend on how the volatility dynamics are influencing the general stock price movements. The relationship between volatility and returns is summarized in the table below.

Table 1: Volatility and returns

Volatility	**Stock Price**	**Daily returns**	**Relationship between volatility and returns**
Increase	Increase	Increase	Positive
Increase	Decrease	Decrease	Negative

The levels of market volatility across stock markets differ from stock market to stock market over time. Some markets generally display low levels of volatility whilst some display higher levels of volatility over time. In other words, the volatility dynamics of stock markets vary from stock market to stock market. In this study, we are concerned that the BSE volatility dynamics may not be enhancing the returns of investors. We are therefore interested in investigating how the volatility dynamics of the BSE are influencing returns of the listed stocks. The ultimate aim is to find out if the prevailing volatility dynamics are good or bad for investors. We apply a GARCH in Mean (1,1) on stock market from 2013-2017 to find out if current volatility dynamics on the BSE are good or bad for investors. The rest of the study is organized as follows: Section 2 presents the Data and Methodology, Section 3 presents the results and discussion and Section 4 concludes the paper.

2.0. Data and Methodology

We computed BSE daily market returns data using daily Domestic Company Indices from the period January 2013 to June 2017. We then employed a GARCH in Mean (1,1) to find out how market volatility of the BSE influences the returns of listed stocks. The GARCH model was used because over time volatility is not constant and is dynamic in nature. Therefore, a GARCH model would capture the effect of volatility dynamics in returns of stocks.

We assume that returns of stocks depend on volatility. We therefore apply the GARCH in Mean (1,1) by regressing returns data against the volatility of the stock market as follows:

$$R_t = \omega + \delta\sigma + \mu \ (1)$$

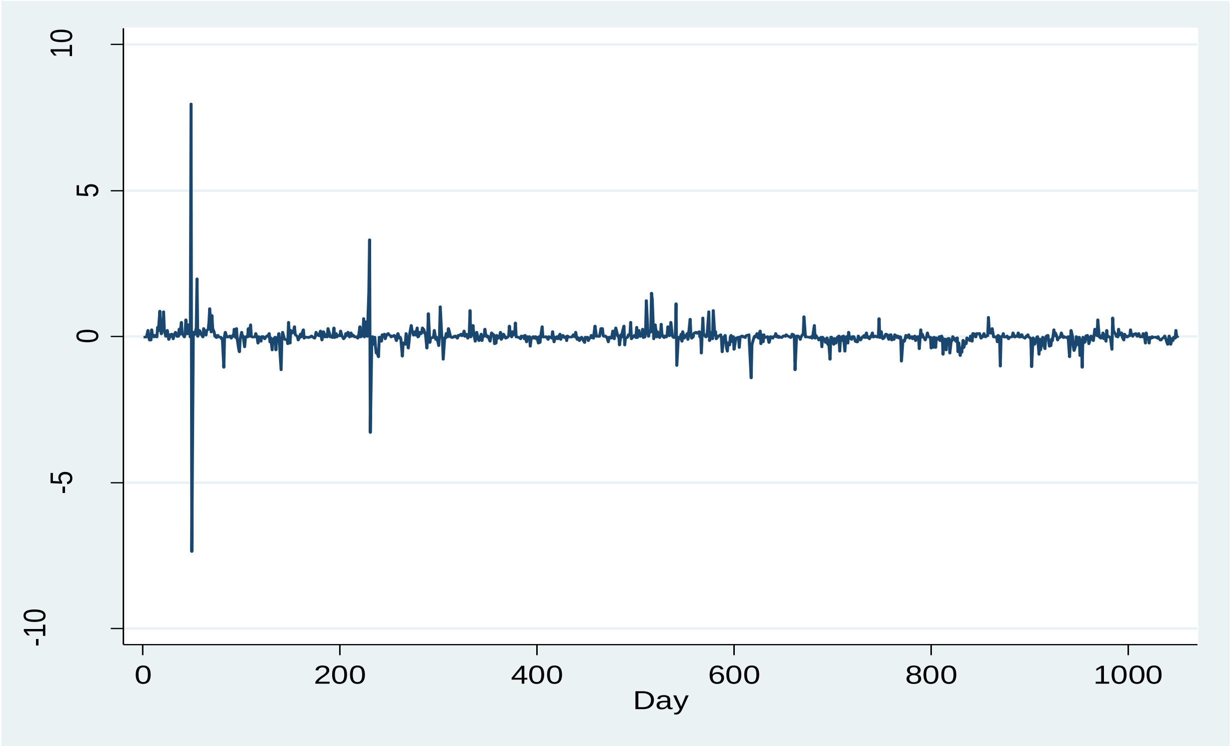
$$\sigma_t^2 = \alpha_0 + \alpha_1\mu_{t-1}^2 + \beta\sigma_{t-1}^2 \ (2)$$

In the above model R_t refers to returns, whilst σ and σ_t^2 refers to the standard deviation and variance of returns respectively, which are measures of volatility. Before we employed the GARCH model, we examined the appropriateness of the GARCH model in modeling relationship between volatility and returns. For a GARCH model to be appropriate there should be evidence of volatility clustering and ARCH effects in returns. We therefore checked for volatility by graphically plotting the residuals and also checked for ARCH effects by using Engle's Lagrange multiplier test. Finally, we identified the nature of the relationship between returns and market volatility using the sign of the coefficient of market volatility. A positive coefficient indicates that market volatility is having a positive impact on returns whilst a negative coefficient indicates that volatility is having a negative impact on returns.

3.0. Findings and Presentations

Volatility clustering in stock returns was analysed by generating a plot of residuals of the returns. The plot is shown below.

Figure 1: Residuals of the returns



International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 7, Issue No. 3, pp 25 - 33, 2022 www.carijournals.org

As we can observe in figure 1 above , periods of low volatility are mostly followed by periods of low volatility and periods of high volatility are followed by periods of high volatility. This shows evidence of volatility clustering which justifies the use of GARCH model .

To reconfirm the use of the of the GARCH model we further tested for the ARCH effects using Engle's Lagrange multiplier test. The results are shown in the table below.

Table 2: Test for autoregressive conditional heteroskedasticity (ARCH)

lags(p)	chi2	Df	Prob>chi2
5	412.395	5	0.0000

H0: no ARCH effects vs. H1: ARCH(p) disturbance

The results showed that there are significant ARCH effects in mean returns. This implied that the volatility of the returns is heteroskedastic. The results further justifies the use of the GARCH model in modelling the relationship between returns and volatility.

Having confirmed the use of the GARCH model to model the relationship between returns and volatility, a GARCH in Mean (1,1) was estimated. The results of the estimation are shown in the table below.

Table 3: GARCH-M Model Estimation Returns

	Coef.	**OPG Std. Err.**	**Z**	**P>z**	**[95% Conf.**	**Interval]**
returns						
_cons	-0.0182348	0.0071648	-2.55	0.011	-0.0322776	-0.004192
ARCHM						
sigma2	-0.066557	0.0332824	-2	0.046	-0.1317892	-0.001325
ARCH						
arch						
L1.	0.7658379	0.0529897	14.45	0.0000	0.6619799	0.8696958
garch						
L1.	0.6098456	0.0198809	30.67	0.0000	0.5708797	0.6488114
_cons	0.009848	0.0008616	11.43	0.0000	0.0081592	0.0115368

Of much interest in the results is the coefficient of the ARCH-M sigma2. The results showed that the risk coefficient in the mean returns is significant but negative. This means that returns on the BSE are significantly negatively related to volatility. Though volatility dynamics of the BSE significantly influences market returns, the impact of the volatility is negative implying that the volatility dynamics are not enhancing the returns of investors. This means that stock market volatility dynamics of the BSE are mostly characterized by large decreases in stock prices rather than increases in stock prices. In other words, an increase in volatility at the BSE is mostly likely to result in the investor realising negative returns than positive returns. The implication of these findings is that a typical BSE investor should view volatility as more of a threat rather than an opportunity to earn more returns. Thus, the findings show that the current volatility dynamics at the BSE are bad for investors.

4.0. Conclusions and Recommendations

Volatility is not essentially a bad phenomenon as some perceive it to be. If volatility which is accompanied by a general upward movement of stock prices, it will have a positive impact on the returns of investors. It is therefore important to view volatility not only as a threat but also as an opportunity to generate returns. This would however, depend on whether the volatility dynamics of a particular stock market are positively or negatively related to returns. In this study, we investigated whether volatility dynamics of the BSE are enhancing returns of investors or not. Unfortunately, we found volatility of the BSE to be significantly and negatively related to returns. Since investors at BSE earn less returns when volatility increase, we concluded that the current BSE volatility dynamics are bad for investors. As a result, investors holding BSE stocks may have to rely on dividend income rather than short-term capital gains to generate returns. We therefore recommend that investors to buy and hold for the long-term. Further studies should investigate the extent to which dividend income or capital gains influence stock returns.

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