Day of the week effect on the Zimbabwe Stock Exchange: A non-linear GARCH analysis

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Day of the week, Zimbabwe Stock Exchange, GARCH, EGARCH.

Abstract
This study analysed the day of the week effect on the Zimbabwe Stock Exchange (ZSE) by taking into account volatility of returns. The purpose of the study was to establish whether daily mean returns across a trading week differ from each other. We employ a non-linear approach in modelling the day of the week effects. In particular, we used the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) and the Exponential GARCH (EGARCH) models. We used industrial and mining daily closing indices data from 19 February 2009 to 31 December 2013. The data was retrieved from the ZSE website. EViews 7 software was utilised for data analysis. In order to test the null hypothesis of equality of daily mean returns, a Wald test was carried out. The Wald F-statistic rejected the null hypothesis of equality of mean returns for the industrial index. We found the traditional negative Monday and positive Friday effect for the industrial index in GARCH (1,1) and EGARCH (1,1) models. The GARCH (1,1) detected a negative Friday effect and the EGARCH (1,1) detected negative Wednesday effect for the mining index. We found evidence of model dependency for the mining index results.

1. Introduction

The efficient market hypothesis (EMH) is a central issue of the literature of finance. This theory argues that if stock prices reflect all the information available and immediately incorporate all new information then the market can be considered efficient (Enowbi, Guidi & Mlambo 2009). The three forms of the EMH (namely the weak form, semi-strong form, and the strong form) define efficiency relative to the information set available to investors in the markets (Mazviona & Nyangara 2013).

Weak form market efficiency assumes that current stock prices fully reflect all security market information including the historical sequence of prices, rates of return, trading volume data, and other market generated information such as odd lot transactions, block trades and transactions by exchange specialists (Reilly & Brown 2006) and it implies that trend analysis is fruitless because price and volume movements follow a random walk such that price changes are independent of prior movements. The test for weak form efficiency is often conducted by testing for serial correlation or, at least, patterns which can be identified in share price movements.

The semi-strong form EMH asserts that security prices adjust rapidly to the release of all public information, that is current security prices fully reflect all public information, which includes, in addition to past prices, fundamental data on the firm's product line, quality of management, balance sheet composition, patents, accounting practices and earnings forecasts. The semi-strong form hypothesis encompasses the weak form hypothesis because all the market information considered by the weak form hypothesis such as stock prices, rates of return and trading volume is public (Smith, Jefferis & Ryoo 2002). This implies that excess risk-adjusted investment returns cannot be obtained using only publicly available information.

The strong-form EMH contends that stock prices fully reflect all information from public and private sources and this means that no group of investors has monopolistic access to information relevant to the formation of prices (Chikoko & Muparuri 2013). The strong form EMH encompasses both the weak form and the semi-strong form EMH. Tests for the strong form efficiency are concentrated mainly on finding whether any group of investors, especially those who can have access to information otherwise not publicly available, can consistently enjoy abnormal returns.

Most studies on the ZSE have found it to be weak form inefficient and these include Mazviona and Nyangara (2013); Chikoko and Muparuri (2013); Magnusson and Wydick (2002); Simons and Laryea (2005); Jefferis and Smith (2005); Smith (2008); Sunde and Zivanomoyo (2008). Some of the studies that conclude that the ZSE is consistent with a random walk include Appiah-Kusi and Menyah (2003); Mlambo and Biekpe (2007). The oversimplified assumptions of the EMH has stimulated a plethora of studies that looked at, among other things, the reaction of stock markets to information announcements, the predictability of stock returns, and stock market anomalies (Mbululu & Chipeta 2012). An anomaly can be defined as an incidence that cannot be explained by a current finance theory (Al-Loughani, Al-Saad & Ali 2005) and in the case of stock markets; anomalies are occurrences that dispute the EMH (Brooks & Persand 2001). Among the more well-known anomalies are the size effect, the January effect and the day of the week effect.

The study of market efficiency is quite crucial for investors, investment managers and policy makers. Individual and institutional investors' understanding of market efficiency can assist in improving their returns. If markets are weak form inefficient, this entails that there is a potential to utilise technical expertise to identify patterns and earn abnormal returns in the short run. Investment managers can profile capital markets based on their efficiencies, this aids in portfolio diversification. Policy makers who set rules and regulations governing operations of capital markets can monitor and track the impact of reforms. Tests of market efficiency on the ZSE have been mostly centred on testing the weak form market efficiency by determining whether the returns follow a random walk or not but no extensive work has been done on calendar anomalies like the day of the week effect. Hence, this study provide a platform for further research to be carried out on the day of the week effect on the ZSE and provides evidence for or against efficiency of the ZSE. The study contributes to the body of knowledge in the market efficiency arena.

2. Literature review

The day of the week effect, also referred to as weekend effect or Monday effect is an important area of study and many researchers tried to find observable patterns by testing equality of returns across all days of the week. Literature has documented various methodologies in studying the day of the week effect, this range from simple ordinary least squares (OLS) techniques to the latest GARCH models. Some researchers have investigated the various influences on the day of the week effect. The day of the week effect literature is summarized and organized into three categories: studies that document the existence of the weekend effect, studies that seek to explain the source of the effect, and studies of the trading effectiveness of the effect (Pettengill 2003). The two most developed veins of research regarding the day of the week effect include investigations into the reversal or shift of the traditional weekend effect and order flow-based explanations for the weekend effect (Philphot & Peterson 2011).

Al-Loughani and Chappell (2001) examined the evidence of a day of the week effect by employing a non-linear GARCH (1,1) model in daily stock returns in the Kuwait Stock Exchange

(KSE) and there was presence of day of the week in the KSE, with returns for the first day in the trading week being higher than other trading days. Similarly, Al-Mutairi (2010) found evidence of presence of the day of the week effect in Kuwait Stock Exchange, and results showed positive and higher returns on Saturday compared to other days of the week except for Wednesday, hence suggesting inefficiency of the Kuwait stock market. Tonchev and Kim (2004) investigated the day of the week effects in the newly developing financial markets of three European countries Czech Republic (PX-50 and PX-D), Slovakia (SAX) and Slovenia (SBI-20 and SBI-20NT) using OLS for mean and GARCH for variance. No significant day of the week effect was found to be present except that the returns on Wednesday were significantly lower than on Monday in both Slovenian SBI-20 and SBI-20NT indices. Ulussever, Yumusak and Kar (2011) studied the Saudi stock exchange using the GARCH model and day of the week effects were found in the daily return of the Saudi stock market. Sutheebanjard and Premchaiswadi (2010) concluded that the stock exchange of Thailand (SET) showed significant evidence of the day of the week effect, and Monday and Friday had the highest and lowest per cent of prediction error respectively.

Agathee (2008) found that the stock exchange of Mauritius exhibited support of the day of the week phenomenon, with Friday having higher returns. However, the mean returns of the five week days were jointly insignificant and different from zero. Dicle and Hassan (2007) employed GARCH in mean (GARCH-M) models on the Istanbul market for a period of approximately twenty years and found significant day of the week patterns. Chukwuogor-Ndu (2007) obtained similar results where he found a presence of the day of the week effect in some East Asian financial markets. Hui (2005) compared various Asia Pacific markets with the US and applied non-parametric tests that demonstrated no significant day of the week effects except in the market of Singapore. Apolinario, Santana, Sales, and Caro (2006) examined 13 European stock markets using the GARCH and Threshold GARCH (TGARCH) models and their findings revealed the presence of a normal behaviour of returns in these markets.

Kiymaz and Berument (2003) tested the presence of the day of the week effect on stock market volatility by using the S&P 500 market index during the period of January 1973 and October 1997 and their findings indicate that the day of the week effect is present in both volatility and return equations. While the highest and lowest returns are observed on Wednesday and Monday, the highest and the lowest volatility are observed on Friday and Wednesday, respectively. Further investigation of sub-periods reinforced their findings that the volatility pattern across the days of the week is statistically different. Kamath and Chusanachoti (2002) tested the Korean stock market using the OLS and the GARCH model. They found conflicting results where a strong evidence of the day-of-the-week effect was found during the 1980's, after which it disappeared in the 1990's. On the other hand, Choudhry (2000) analysed this phenomenon on seven emerging Asian stock markets namely India, Indonesia, Malaysia, Philippine, South Korea, Taiwan, and Thailand and his findings provided evidence the day of the week effect on both returns and volatility.

Ndako (2013) examined the day of the week effect for the Nigerian and South African equity markets over pre-liberalisation and post-liberalisation periods, using EGARCH model to estimate the day of the week effect both in the mean and variance equations. The post-liberalisation period for the Nigerian equity market exhibited day of the week effect on Fridays only in the mean equation. While in the variance equation, there is evidence of day of the week effect on Tuesdays and Thursdays respectively. In South Africa, there is significant evidence of the day of the week effect on Mondays and Fridays during the pre-liberalization period. During the post-liberalisation period, there is evidence of day of the week effect on Thursdays in the mean equation and Fridays only in the variance equation.

Enowbi, Guidi and Mlambo (2009) investigated the day of the week effect on stock returns and volatility in four emerging African stock markets namely Egypt, Morocco, Tunisia and South Africa, by employing a GARCH framework. The sample covered the period from January 2000 to March 2009. They found the existence of various significant days of the week effects, including the typical negative Monday and Friday positive effects in several stock markets. Even after making adjustments for the equity risks, these effects seemed to be present also in multivariate EGARCH (M-EGARCH) models estimated.

Rahman (2009) examined the presence of day of the week effect anomaly in the Dhaka Stock Exchange (DSE), using dummy variable regression and the GARCH (1, 1) model. The findings show significant negative Sunday and Monday returns and significant positive returns on Thursdays. Furhermore, the mean daily returns between two consecutive days differ significantly for the pairs Monday-Tuesday, Wednesday-Thursday and Thursday-Sunday and statistically different average daily return of every trading day of the week. Dummy variable regression results shows that only Thursdays have positive and statistically significant coefficients and results of the GARCH (1, 1) model show statistically significant negative coefficients for Sunday and Monday and statistically significant positive coefficient for Thursday dummies. The day of the week effect was found to be present in DSE. Al-Jafari (2012) investigated the day of the week effect on the Muscat securities market by employing a non-linear symmetric GARCH (1, 1) and EGARCH (1, 1) models. The results showed no evidence of presence of day of the week effect and hence the Muscat securities market was found to be weak form efficient.

During the last three decades numerous studies examining the returns at index level have found evidence of day of the week effect, for both well developed and emerging countries. Existing literature for emerging countries have been investigated using numerous techniques. Mixed results were found, some reported day of the week effect and others show no evidence of the phenomenon. Most of the studies regarding day of the week effect are mostly for developed markets, and even though studies on emerging markets are being considered, they have not received much attention to date. This study examined the day of the week effect on the industrial and mining indices, an arena which has not been researched much in Zimbabwe. There is limited literature regarding day of the week effect on the ZSE. We believe that this is the first study to be carried on the ZSE after introduction of the multi-currency system in Zimbabwe. This study contributes to the body of knowledge on the efficiency of the ZSE. It also opens up some areas of further study to better understand the weak form efficiency and complement existing literature.

3. Methodology

We used daily closing industrial and mining indices from the ZSE over the period February 2009 – December 2013 period. Data for the period before 2009 was not included because that period has significant problems like thin and infrequent trading and the effects of hyperinflation. The industrial index is the main index as it constitutes at least 90% of the stocks on the ZSE. In order to analyse the day of the week effect, daily returns were grouped separately into different days of the week. EViews 7 software was used to carry out data analysis. Daily closing indices were converted into natural logarithms returns as follows:

$$R_t = ln\left(\frac{P_t}{P_{t-1}}\right) \times 100$$

Where:

R_t is the daily returns,

P_t and P_{t-1} are the closing indices at time t and time t-1respectively.
For non-trading periods shorter than five days, the return for those days was taken as zero.

3.1 GARCH models for the day of the week effect on return

The Generalised Autoregressive Conditional Heteroscedasticity (GARCH) framework, which was introduced by Bollerslev (1986), provides a framework in order to capture various dynamic structures of the conditional framework in order to capture various dynamic structures of conditional variance and it allows simultaneous estimation of several parameters of interest and hypothesis (Enowbi, Guidi & Mlambo 2009). Deyshappriya (2014) explains that OLS regression may be affected by ARCH effect due to the highly volatile daily data therefore there is a higher possibility to change variance of the error term with time and as a result of this, it is crucial to introduce an Autoregressive Heteroskedastic model in order to capture the ARCH effect of the OLS regression otherwise the results drawn from the OLS method may not be valid.
The following GARCH (1,1) model was estimated:

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \beta_5 D_{5t} + \sum_{i=1}^{k} \alpha_i R_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (1)$$

Where:

$$\varepsilon_t = \sigma_t z_t$$

$$\sigma_t^2 = \omega + \alpha \varepsilon_t^2 + \beta \sigma_{t-1}^2$$

$$\frac{r_t}{\sigma_t} \approx N(0,1)$$

D_{it} is a dummy variable that is equal to zero prior to the chosen event date and one thereafter.
Thus:

D_{1t} = 1 if day t is a Monday = 0 otherwise
D_{2t} = 1 if day t is a Tuesday = 0 otherwise
D_{3t} = 1 if day t is a Wednesday = 0 otherwise
D_{4t} = 1 if day t is a Thursday = 0 otherwise
D_{5t} = 1 if day t is a Friday = 0 otherwise
ε_t = error term
β_1 , β_2, β_3, β_4 , β_5 are coefficients to be estimated.

If the *p*-value of the F-statistic is found to be greater than 5%, the null hypothesis is accepted otherwise if it is less than 5%, this will indicate differences in mean daily returns. Angelovska (2013) explains that GARCH models assume symmetrical behaviour of market reactions to positive and negative news, whereas in actual fact, the most commonly seen is that the negative returns are followed by higher volatility than positive. Anomalies of the day of the week effect was further analysed using the EGARCH model, which can hit possible asymmetry in the behaviour of the stock market.
An EGARCH model was specified as follows:

$$\log(\sigma_t^2) = \delta_0 + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} \right| + \sum_{k=1}^{r} \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}} \quad \ldots\ldots\ldots\ldots (2)$$

The, EGARCH was estimated for the industrial index and mining index data. A Student's *t*-test was employed to determine whether the results obtained for each test were significant or not. A t statistic of 2 is equivalent to a p-value of 0.05. A *p*-value of less than 0.05 is considered significant which entail rejection of the null hypothesis indicating that there is no effect or there are differences in mean returns across different days of the week.

1. Results and discussion

Table 1 highlights the descriptive statistics for industrial index. The lowest and highest average returns were observed on Monday and Friday respectively. We note that the conventional phenomenon of negative Monday returns and positive Friday returns seem to be present in the industrial index. The greatest risk as measured by the standard deviation is observed on Friday. This explains why Friday has the highest return since investors would require compensation for taking on increased risk. Wednesday has the lowest risk. There is generally a negative skewness across trading days, with exception of Tuesday. The distribution of the trading days' returns is more peaked than the normal distribution as reported by a positive kurtosis in all trading days.

Table 1: Descriptive statistics for industrial index

	Mean	Standard deviation	Skewness	Kurtosis
Monday	-0.0010	0.0161	-2.4415	22.5298
Tuesday	0.0005	0.0150	0.0026	20.5053
Wednesday	0.0002	0.0135	-0.7709	15.2594
Thursday	0.0014	0.0145	-0.4688	21.2336
Friday	0.0017	0.0171	-5.2219	68.1521
All	0.0006	0.0153	-2.1895	35.5306

The descriptive statistics for mining index reported in Table 2 show completely opposite results from Table 1. Firstly, we observe a negative trend of average returns across trading days. The only day with positive return is Tuesday. Although Tuesday has a positive return, it is less risk than Thursday with negative return. Secondly, we note that the standard deviations shown in Table 2 are higher than those in Table 1, indicating that the mining sector is more risky than the industrial sector. The mining index has a positive skewness unlike the industrial index with negative skewness. The findings in Table 2 agree with those in Table 1 on the kurtosis. We therefore conclude that the daily returns for mining and industrial indices are not symmetrically distributed. This indicates that returns distribution cannot be modelled by a normal distribution.

Table 2: Descriptive statistics for mining index

	Mean	Standard deviation	Skewness	Kurtosis
Monday	-0.0010	0.0275	-1.3629	16.1284
Tuesday	0.0007	0.0379	4.6973	56.3187
Wednesday	-0.0003	0.0295	1.4800	13.8393
Thursday	-0.0007	0.0413	-0.4241	15.5890
Friday	-0.0018	0.0283	-0.1086	8.6544
All	-0.0006	0.0334	1.2598	30.1755

Models 1 and 2 highlighted in section 3.1 were employed. Before estimating the parameters, we checked the Ljung-Box (LB (Q)) statistics for up to 16 lags for each series, which were statistically significant, indicating that the models suffer from the problem of serial correlations. One way to determine the lag specification of the models is to use the partial autocorrelation function (PAC) in which we choose the lag order which has the highest absolute PAC (Xun 2012). The PAC and Q-stat for the industrial and mining indices are given in Table 3 below.

Table 3: PACF and Q-stats for the industrial and mining indices

Lag	PACF INDUSTRIAL			PACF MINING		
	PAC	Q-Stat	*p*-value	PAC	Q-Stat	*p*-value
1	**0.467**	266.17	0	0.105	13.573	0
2	0.098	372.41	0	0.037	16.313	0
3	0.017	413.59	0	0.097	29.638	0
4	-0.091	415.67	0	**-0.107**	38.077	0
5	0.012	416.1	0	0.084	43.933	0
6	-0.108	424.76	0	0.015	45.483	0
7	0.112	424.79	0	-0.041	48.442	0
8	0.124	437.37	0	0.045	52.884	0
9	0.029	450.62	0	0.035	54.225	0
10	-0.006	464.56	0	0.027	55.203	0
11	0.008	474.57	0	0.012	57.59	0
12	0.077	495.58	0	-0.019	58.101	0
13	-0.005	504.54	0	0.003	58.125	0
14	0.069	514.63	0	0.052	62.374	0
15	0.092	538.37	0	-0.031	63.19	0
16	-0.013	550.77	0	0.012	63.587	0

Hence, a lag of four is specified for the mining index since this is where it has the highest absolute PAC and a lag of one was used for the industrial index.

Table 4: GARCH (1,1) model results

Coefficient	Mining	Industrial
$\mathbf{R_{t-1}}$	0.144	0.435
	(0.000)	(0.000)
$\mathbf{R_{t-2}}$	0.027	
	(0.474)	
$\mathbf{R_{t-3}}$	0.040	
	(0.317)	
$\mathbf{R_{t-4}}$	0.026	
	(0.437)	
$\boldsymbol{\beta_1}$	0.001	-0.001
	(0.619)	(0.014)*
$\boldsymbol{\beta_2}$	-0.002	-0.001
	(0.095)	(0.190)
$\boldsymbol{\beta_3}$	-0.002	0.000
	(0.261)	(0.848)
$\boldsymbol{\beta_4}$	0.001	0.001
	(0.234)	(0.002)*

β_5	-0.003	0.002
	(0.049)*	(0.000)*
Variance Equation		
ω	0.000	0.000
	(0.000)	(0.000)
α	0.140	0.576
	(0.000)	(0.000)
β	0.825	0.476
	(0.000)	(0.000)
R^2	0.012	0.217
Wald test	8.851	13.073
	(0.065)	(0.011)*

*significant at 5% level

Table 4 reports the GARCH (1,1) modelling results. We observed a negative Monday effect, and a positive Thursday and Friday effects for the industrial index. The industrial results confirm the phenomenon we noted in Table 1 of negative Monday returns and positive returns on other days. We found that the average returns for industrial index differ significantly (Wald test is significant) across trading days indicating a weak form inefficient ZSE. The results from the industrial index are consistent with those of (Enowbi, Guidi & Mlambo 2009; Angelovska 2013). A significant negative Friday effect was found for mining index, this is not suprising since the average daily returns reported in Table 1 for mining index are generally negative. The Wald test was found to be insignificant entailing that the daily mean returns for mining index do not vary from each other.

Table 5: EGARCH (1,1) model results

Estimated Coefficients	Mining	Industrial
R_{t-1}	0.135	0.441
	(0.000)	(0.000)
R_{t-2}	0.027	
	(0.439)	
R_{t-3}	0.059	
	(0.116)	
R_{t-4}	0.015	
	(0.601)	
β_1	0.000	-0.001
	(0.917)	(0.001)*
β_2	-0.002	-0.001
	(0.225)	(0.161)
β_3	-0.003	-0.001
	(0.014)*	(0.142)
β_4	0.000	0.001

	(0.767)	(0.113)
β_5	-0.003	0.002
	(0.063)	(0.000)*
Variance equation		
δ_0	-0.636	-2.057
	(0.000)	(0.000)
α_1	0.301	0.848
	(0.000)	(0.000)
γ_1	-0.005	-0.110
	(0.617)	(0.000)
β_1	0.940	0.847
	(0.000)	(0.000)
R^2	0.018	0.217
Wald test	1.536	15.383
	(0.189)	(0.000)*

*significant at 5% level

We took into account the asymmetry of market reaction on the ZSE and used the EGARCH (1, 1) model. The results in Table 5 show only two statistically significant days effects for industrial index. A negative Monday effect and positive Friday effect which is similar to the findings from the GARCH (1, 1) model presented in Table 4. However, the Thursday effect disappears when using an EGARCH (1, 1) model. The evidence reported in Table 5 is consistent to findings obtained in (Enowbi, Guidi & Mlambo 2009; Ndako 2013). The F-statistic from the Wald test is statistically significant for the industrial index indicating differences in mean returns across different days of the week. We found the presence of Wednesday effect for the mining index using the EGARCH (1, 1) model which is in contrast to the negative Friday effect obtained in the GARCH (1, 1) model. The mining index results are model dependent as we have noticed that the negative Friday effect vanished when using the EGARCH (1, 1) and the negative Wednesday effect surfaced. Similarly to what was found in (Nghiem et al 2012), we could not rule out model dependency in modelling day of the week effect for the mining index. The average daily returns for mining index were not significantly different from each other using the EGARCH (1, 1) model.

The implication of the day of the week effect is that it provides evidence of the weak form inefficiency of the ZSE and it adds to the existing body of knowledge on the ZSE (including Mazviona & Nyangara 2013; Chikoko & Muparuri 2013; Magnusson & Wydick 2002; Simons & Laryea 2005; Jefferis &Smith 2005; Smith 2008; Sunde & Zivanomoyo 2008) by providing further explanation on the nature of efficiency on the ZSE. Theoretically, the day of the week effect implies violation of the efficient market hypothesis in the weak form and benefits of a well-functioning stock market are not being realised in the economy during the multiple currency exchange rate regime (Chikoko & Muparuri 2013). The inefficiency follows from the violation of conditions necessary for an efficient market and also implies financial and institutional imperfections. These informational inefficiencies can lead to investors adopting strategies designed to reap abnormal profits by exploiting the informational inefficiencies.

4. Conclusions

The aim of the study was to test the day of the week effect on the ZSE using a non-linear approach. We used econometric models from the GARCH family namely GARCH (1, 1) and EGARCH (1, 1). Data used in this study spanned from 19 February 2009 to 31 December 2013. We utilised daily closing indices for industrial and mining sector from the ZSE. The GARCH (1,1) and EGARCH (1,1) models show consistent negative Monday effect and positive Friday effect for the industrial index whereas for the mining index, a negative Wednesday effect was detected by the EGARCH model and a negative Friday effect was detected by the GARCH model. The results from these models are supported by Kiymaz and Berument (2001), Enowbi, Guidi and Mlambo (2009), Angelovska (2013), Ndako (2013), Paul and Theodore (2006), Basher and Sadorsky (2004), Bayar and Kan (2002), Abdalla 2012, Deyshappriya (2014) and Aly, Mehdian and Perry (2011). We found the industrial index of the ZSE to be weak form inefficient though we would need to carry further studies to supplement these findings. We could not conclude the weak form efficiency for the mining index as we found evidence of model dependency. We would therefore recommend some studies on the mining index using different models.

One major implication of weak form inefficient for the industrial index of ZSE is that investors may consider buying shares on days with negative significant returns and selling them on days with significant positive returns in order to generate higher profits. The interest of financial theorists and practitioners to detect some market anomaly stems from the fact that they find this information on market inefficiency useful for creating profitable market strategies or for use in forecasting and the predictable movements in asset prices can also provide investors with opportunities to generate abnormal returns and in addition, many psychologists believe that investor's psychology can play an important role in causing this anomaly (Angelovska 2013). We acknowledge that our results may be limited by the fact that we did not take into account transaction costs and dividends.

Islam and Gomes (1999) highlights positive weekend effect emanates from combinations of factors which include inadequate financial information, thin and discontinuous trading, reliance on price momentum as a basis for trading and manipulation by the market makers. Therefore regulators should take appropriate steps to remove such anomaly to bring efficiency of the market. We recommend for further study the use of other GARCH models to analyse the day of the week effect. Furthermore, it will also be interesting to investigate the holiday effect and the January effect on stock market returns using linear and non-linear models.

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