THE "MONDAY EFFECT" IN NIGERIAN STOCK MARKET: EVIDENCE AND IMPLICATION

[1]Osazevbaru, H.O. and [2]Oboreh, J.

[1]Department of Accounting & Finance, Delta State University, Abraka, Delta State, Nigeria
[2]Department of Business Administration, Delta State University, Abraka, Delta State, Nigeria
E-mail: henryosas@yahoo.com

Abstract: *The tendency for financial asset returns to display systematic patterns at certain times of the calendar year has not been well discussed in the empirical of African markets. This study addressed the Monday effect in the Nigerian stock market using price data from January, 1995 to December, 2009. The methodological approach involves using OLS regression with dummies. To overcome the misspecification effect that could result from assuming homoscedasticity in OLS, the GARCH model was implemented. It was found that the anomaly exists in the Nigerian stock market. This implies returns predictability which an astute investor can exploit without assuming a commensurate level of risk and capable of accentuating high cost of capital in the market. It is recommended that aggressive trading on different types of securities be encouraged so as to increase the depth of the market.*

Keywords: Calendar Anomalies, Garch Models, Asset Pricing Model, Emerging Stock Markets.

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INTRODUCTION

The existence of savings gap as well as the divergence in pattern of desired savings and investment among economic units has necessitated the need for efficient financial markets. Such markets set prices on financial assets and so enable investors to compare the prices against their perceived risk and expected returns on the basis of which decisions are made (Anyanwu, 1998; Hirt and Block, 1999). The recognition in the literature that financial market variables are important in asset pricing, portfolio allocation and market risk measure has accentuated growing interest in financial markets and the possibilities to forecast their course (Frimpong and Oteng-Abayie, 2006). As a result, modeling behaviour of share returns and volatility of the market can shed further light on the data generating process of the returns.

The issue of regularities in stock returns also known as calendar anomalies have occupied empirical research for over five decades now. This line of research is a challenge to the efficient market hypothesis especially the weak form of the hypothesis as articulated by Fama (1970; 1991). The weak form efficient market hypothesis states that stock returns are time invariants and have no identifiable short-term time based pattern (Boudreaux, 1995).

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The existence of anomalies therefore is capable of casting doubt on the validity of asset pricing models which have provided useful description of the way assets are priced. Implicitly, investors could buy stocks on days or months with abnormally low returns and sell on days or months with abnormally high returns.

Undoubtedly, there are avalanche of evidence on calendar anomalies in developed and other emerging markets outside Africa. But, there have been little evidence in Africa markets. Empirical evidence outside the African market include those of Officer (1975), Rozeff and Kinney (1976), French (1980), Gibbons and Hess (1981), Lakonishok and Levi(1982), Keim and Stambaugh (1984) Rogalski (1984), Keim (1986), Ariel (1987), Lewis (1989), Aggarwal, Rao and Hiraki (1990), Poterba and Weistbenner (2001) Gao and Kling (2005), Starts, Yong and Sheng (2006), Apolinario *et al.,* (2006) and Shiok and Ricky (2010). In the African markets, very few studies have been done on calendar anomalies. Alagidede (2008), which is one of such few studies alluded to this fact when he observed that the available published research on African markets are those of Classens *et al.,* (1995) for Nigeria and Zimbabwe and Coutts and Sheikh (2002) for South Africa All Gold index. This study also found Alagidede and Panagiotidis (2006) for Ghana stock market as another study in this area.

Against this backdrop of dearth of literatures on emerging markets of Africa, the objective of this study is to examine the Nigerian stock market with a view to ascertaining whether it exhibits calendar anomaly of 'Monday effect' wherein the average return on Monday is significantly lower than the average returns of other days of the week. . It is hoped that this will contribute to the scanty empirical literatures on calendar anomalies in emerging African markets in general and Nigerian market in particular.

RESEARCH MATERIALS AND METHODS

This study employed the daily closing share prices of listed firms on the Nigerian Stock Exchange (NSE) over the longitudinal scope January 1995 to December, 2009. The data were sourced from NSE and Central Securities Clearing System (CSCS) Ltd daily official list. Returns data were generated from the price data using the expression:

$$Rt \quad = \quad ln\left(\frac{P_t}{P_{t-1}}\right) \quad X \quad 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where R_t is the return at time t, P_t is the price at time t, P_{t-1} is the lagged price and *ln* is the natural logarithm.

The standard methodology employed in investigating anomalies entails estimating an Ordinary Least Square (OLS) regression with dummies to capture the day-of-the-week and month-of-the year effects (Gao and Kling, 2005; Dimitrios and Hall, 2007; Alagidede, 2008). To test for Monday effect, the study estimated the model below.

$$R_t = C + \alpha_2 D_2 t + \alpha_3 D_3 t + \alpha_4 D_4 t + \alpha_5 D_5 t + U_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where; R_t is the return at time t, C represents the mean return for Monday. The coefficients α_2 to α_5 represent the difference between the return of Monday and Tuesday through Friday and U_t is the stochastic term.

The null hypothesis of no Monday effect to be tested in this case is that all dummy variable coefficients are equal to zero. A positive value for a dummy coefficient would be a proof of a Monday effect. The estimates of the coefficients will specify which days have higher returns than those obtained on Monday

However, the use of OLS without paying attention to the time varying properties of the data and residuals could at times yield misleading results due to the misspecification effect of the model. This is because the OLS technique assumes homoscedasticity. To avoid this likely misjudgment, the study investigates the time varying properties of the residuals by applying the Generalised Autoregressive Conditional Heterocsedasticity (GARCH) model. In which case, the following models are estimated.

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + U_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3a)$$

$$u_t \cong \text{iid } N(0, ht)$$

$$h_t = \gamma_0 + \gamma_1 U^2_{t-1} + \delta h_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3b)$$

Equation (3a) is the mean equation with R_{t-1} as a vector of exogenous variable and equation (3b) is the variance equation. U^2_{t-1} is the lag of the squared residual from the mean equation and h_{t-1} the conditional variance, is the last period forecast variance and must be non-negative.

RESULTS AND DISCUSSION

The descriptive statistics of the daily returns is as shown in table 1.

Table 1: Descriptive Statistics for Daily Returns from January 1995 to December 2009

Mean	0.019544	Kurtosis	99.94970
Maximum	16.76577	Jarque-Bera	1532884
Minimum	-16.17565	Probability	0.000000
Standard deviation	1.067594		
Skewness	-0.190524		

Source: Output Estimates from Eviews 7.0

The distributional properties of daily stock returns are far from being normal as evidenced by the skewness, Kurtosis and Jarque-Bera statistics. Again, the Augmented Dickey-Fuller

(ADF) unit root test shows that the series has a unit at level but at first difference became stationary. These features provide impetus for GARCH modeling.

Notwithstanding, the result of the implementation of equation (1) is shown in table 2.

Table 2: OLS Test Results for Monday Effect

Variable	Coefficient	t-statistic	Probability
C	-0.045594	-1.195654	0.2319
D Tue	0.108602	2.013806	0.0441**
D Wed	0.024647	0.457026	0.6477
D Thur	0.126819	2.351599	0.0187**
D Fri	0.065624	1.216469	0.2239

** 5% level.
Ljung-Box Q (2): 131.72 (0.0000). ARCH LM Test: 768.0079 (0.0000)
BG LM Test: 92.23816 (0.0000)
Source: Output estimates from Eviews 7.0

From the results, apart from the coefficient of C, that is, Monday, all other coefficients are positive. The positive values for the dummy variables show that returns in those days are higher than that of Monday. More also, the t-values for Tuesday and Thursday are statistically significant implying that returns in the days of the week are not equal. The decision criterion here is that a negative value of a dummy coefficient would be evidence against Monday effect. Since there is no such negative dummy coefficient value, then the Nigerian stock market shows evidence of mean return on Monday being on the average lower than other days of the week.

From the OLS result, certain diagnostic tests confirm that the variance of the residuals is time varying. First, the heteroscedasticity LM test shows that the variance is time varying as the t-value of the lagged squared residual is significant at 1%, levels. Secondly, the Breusch-Godfrey serial correlation LM test shows that there is autocorrelation as evidenced by the probability value and finally, the Ljung-Box Q statistic shows significant correlation coefficient as the probability value of the Q statistic is zero. There is need therefore to run a model that corrects for autocorrelation and Arch effects. The study implements a GARCH (1 1), GARCH (1 4) and GARCH (4 4) models. These results are shown alongside the OLS result in the table3

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Table 3: Results of GARCH Models for Test of Monday Effect

Models	OLS	GARCH (1 1)	GARCH (1 4)	GARCH (4 4)
Mean Equation				
C	-0.0455 (-1.195)	-0.0810(-5.037)***	-0.0538(-3.105)***	-0.0731(-4.348)***
D Tue	0.1086(2.013)**	0.0619(2.376)**	0.0031(0.146)	0.0407(1.665)*
D Wed	0.0246(0.457)	0.0837(2.775)***	0.0604(2.478)**	0.0699(2.327)**
D Thur	0.1268(2.351)**	0.1255(4.991)***	0.1111(3.905)***	0.1162(4.293)***
D Fri	0.0656(1.216)	0.0688(2.837)**	0.0636(2.680)***	0.0673(2.649)***
AR (1)	-	0.1539(12.59)***	0.2283(18.60)***	-
AR (4)	-	-	-	0.0416(3.875)***
Variance Equation				
C	-	0.0073(48.85)***	0.058(39.95)***	0.0182(33.10)***
RESID(-1)^2	-	0.0675(46.50)***	0.2420(38.80)***	0.1433(30.62)***
GARCH(-1)	-	0.9357(1136.03)***	0.4914(17.41)***	0.5469(11.72)***
GARCH(-2)	-	-	-0.2623(-9.156)***	-0.2828(-5.109)***
GARCH(-3)	-	-	0.1287(5.750)***	0.1184(2.549)***
GARCH(-4)	-	-	0.3678(21.06)***	0.4695(13.66)***
DW	2.3070	2.6099	2.7358	2.3176
ARCH-LM Test	768.007(0.000)***	16.8472(0.000)***	0.6931(0.405)	2.0964(0.1476)
Ljung-Box, Q(5)	19.291(0.000)***	17.291(0.002)**	1.1857(0.880)	2.7862(0.594)

Source: Output Estimates from Eviews 7.0

Note: z-stat It-stat for OLS) in brackets. ***, **, * denotes 1%, 5% and 10% significance respectively.

The results in table 3 report three diagnostic statistics namely Durbin Watson, Arch-LM test and Ljung-Box Q statistic. In the OLS model, the DW shows no first order autocorrelation, but the other two tests show otherwise. Furthermore, in the (GARCH (1 1) model, all the statistics show evidence of autocorrelation. Certainty, this result is not a reliable one. The GARCH (1 4) model shows that the Arch-effect is successfully corrected as the estimates are not statistically significant. But the DW still shows evidence of negative autocorrelation. The GARCH (4 4) model shows that autocorrelation is successfully corrected. The DW shows no autocorrelation and the Arch-LM test and Q statistics are statistically insignificant implying that the null hypothesis of no Arch-effect is accepted. Of course, this is an optimal result on which judgment can be based.

A further analysis of the results of the GARCH (4 4) model shows that in the mean equation, the coefficient of the Monday dummy, C, is negative. The coefficients of other days of the week are positive; meaning that returns in those days are higher than Monday. Again, these positive coefficients are statistically significant. Also, in the variance equation, all variables are statistically significant. On these bases therefore, there is evidence of Monday effect in the Nigerian Stock Market. Though this conclusion is not different from that obtained in the OLS model, but it has helped in avoiding error of

Misjudgment. This result agrees with empirical studies of Keim and Stambaugh (1984), Lakonishok and Maberly (1990), Hui (2005), Apolinario *et al.,* (2006) and Shiok and Ricky (2010) done for developed and emerging markets. This evidence of Monday effect proves also the day-of-the-week effect. Again, since the coefficient for Friday is positive, it proves in-part the weekend effect.

The implication of this result is that investors could earn abnormal rates of return without assuming the commensurate level of risk by predicting the stock market movement on given days. It is therefore possible for an investor to buy stocks on days with abnormally low returns and sell on days with abnormally high returns. Though this is not peculiar to Nigeria, as it exists in other developed and emerging markets, but its effects could be more on emerging markets where the financial system is fragile and not insulated from perturbations of global economies. On the positive side however, knowledge of calendar anomalies can help issuing houses on the appropriate timing and pricing of initial public offerings.

CONCLUSION

This study has examined the Monday effect in the Nigerian stock market using data for the period January, 1995 to December, 2009. On the basis of OLS test, the study found a Monday effect. When the time varying variance and other distributional properties of returns were recognized and modeled with GARCH model, a Monday effect was still found. This result is of interest to investors who seek to find whether opportunities of making excess returns exist in the Nigerian stock market. Again this evidence suggests that the market is one where technical trading systems can be profitably employed. It also implies that the market is inefficient with respect to pricing of shares; in which case, the market cannot efficiently allocate scarce resources among competing uses. There is therefore need to encourage aggressive trading on different types of securities and maintain corporate governance practices among capital market operators.

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