

SECTORAL ANALYSIS OF WEEK DAY ANOMALY IN INDIAN STOCK MARKET

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Abstract: Efficient market hypothesis decides the patterns of returns from the stock Market. Study will contribute in the area by re-examining the phenomena of calendar anomalies for stocks of eleven different sectors. The Analysis of stocks of eleven sectors provide us very interesting results in the area of calendar anomalies. It is clear from the above that the returns from the Monday and Friday are positive and significant for Auto, Banking, Energy and Metal Sector Indicating Strong Monday and Friday Anomaly in stock Market. Friday Anomaly is more widely spread in Stock Market as this anomaly is Present in all sectors except Media and PSU sector returns reason could be information flow. Wednesday is also found positive and significant at 5% level of significance for FMCG, IT and Pharma Sector returns. Tuesday is found positive only in FMCG sector. Media Sector follow random walk behavior as there is no day of the week effect. There is negative Wednesday and Friday for PSU Banks.

Key words: Stock Market Returns, Information and Market efficiency, Month of Year, GARCH Model

JEL Classification: G120, G1, G140, Y9

INTRODUCTION

An anomaly in general means abnormal or unfamiliar happening. Wachtel (1942) conjecture that the feeling of good fellowship and cheer associated with this festive occasion may spill into the security market. They are the unexpected or anomalous regularities in security rates of return. However In other words anomalies are observed outcomes different from already existing notions of asset pricing behavior. They designate either market inefficiency or shortfalls in underlying asset pricing model. Stock market anomalies are empirical conclusions that cannot stand described through extensively recognized financial theories. It becomes extremely important to study stock "market anomalies" because that can highly expand the Knowledge of financial markets. In contemporary world several challenges to market efficiency came to existence, few of them are size effect, the weekend effect and momentum effect. All these challenges are known as stock market anomalies and the shortfalls in model for testing market efficiency. "Anomalies" are taken as

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unfamiliar or unusual event among non-investing groups however for shareholder it is condition where “stock market” performs against the efficient market hypothesis. Every examination of “Market efficiency” is a twofold one one-hand it examines the market efficiency on other hand it also test the expected model of revenue generation. Specific persistence, regular and apparent market inefficiencies are termed as “Anomalies”. Notion of Market efficiency proposes that every security is valued efficiently to fully reflect all the information in security prices. However, calendar effect leads to greater or lesser earnings based on the time series. Conclusively when stock yields exhibits certain empirical regulations which are challenging to describe using already established asset evaluation theories, they are called stock market anomalies. Bonin and Moses (1974) studied the seasonality in US stock market using data of 30 individual stocks and found seasonality in 7 stocks out of total 30. Rozeff and Kinney (1976) presents evidence on the existence of seasonality in monthly rates of return on the New York Stock Exchange from 1901-1974. With the exception of the 1929-1940 period, there are statistically significant differences in mean returns among months due primarily to large January returns. Dispersion measures reveal no consistent seasonal patterns and the characteristic exponent seems invariant among months. Hansen et al., (2005) studied calendar effects in equity returns and contribute to the calendar effects literature by applying new approach to test for calendar effects. They implemented bonferroni bound test and bootstrapping methods to stock indices from 16 countries from three continents. Bootstrap p-values reveal that calendar effects was significant for returns in most of these equity markets, but end-of-the-year effects was predominant. They calendar effects had been diminishing except in small-cap stock indices. This study was one of the few studies on week-of-the-month, weekday-of-the-month, and week-of-the-month-of-the-year effect in stock market.

DAY OF THE WEEK EFFECT

Day of the week effect means the returns from particular day are higher than the normal. Information irregularity in the market are the cause for “day of week” effect. Recently there were the finding that weekend effect was either moving to other days, reversing or vanishing. Lakonishok and Maberly (1990) analyzed weekend effect in US stock market. They applied t-test and descriptive statistics to explain the phenomena. It was found that there was selling pressure in the stock market on Monday from individual investor side. They also found lowest trading volume on Monday. It was also established that selling trades on Monday were higher than buy trades on that particular day. Abraham and Ikenberry (1994) examined day of week effect in the stock market. Previous research in the area found that the activities of individual investor were the reason for the phenomena. However it found that there was positive relation between previous day returns and current day returns. They also raised doubt that information irregularity in

the market might be the cause for “day of week” effect. They also found that this pattern was more acute in small and medium size firms. Amanulla and Thiripalraju (2001) analyzed Friday effect in an Indian stock market. They applied ordinary least square regression on seven portfolio's out of which three were Index portfolio and four were beta portfolio. They also divided the whole period into five parts depending on carry forward transaction law. It was found that the during ban on carry forward transactions Friday effect was present but this effect shifted to Wednesday during modified period and revised carry forward transaction period. Further this research also documented the reversal of Friday effect being positive return on Monday whereas negative on Friday. He and Tang (2010) examined day of the week and weekend effect in Shanghai Stock Exchange. He used Mann-Whitney U-Test, Kruskal-Wallis and descriptive statistics to explain the phenomena. It was found that the mean returns of Monday were significantly higher than other days of week. However there was no weekend effect found in China. They also reported that the bear and bull market could be the reason of change in day of the week effect. Silva (2010) analyzed the calendar anomalies in stock market of Portugal. He used ordinary least square regression, Kruskal-Wallis test and descriptive statistics. It was found that there was no Monday or weekday effect in stock market. January anomaly was found absent but monthly anomaly was identified in Portuguese stock market. He also found evidence for significant holiday effect in stock Market. Philpot and Peterson (2011) examined the past research on the weekend effect to develop new theoretical foundations. He found that the earlier research on weekend effect was consistent where they document positive returns on Friday and Negative return on Monday. However finding of recent research had challenged the phenomena of weekend effect because recent research reported that the weekend effect was either moving to other days, reversing or vanishing. Nageshwari et al., (2011) examined the calendar effect in stock market using Monday effect as proxy for calendar effect. She used descriptive statistics, Kruskal - Wallis and ordinary least regression. It was found returns were higher on Friday whereas lower on Monday. However these returns were not statistically significant. It was also reported that stock returns were not significant on any day week. Therefore it could be concluded that there was no seasonality in market. Guidi et al., (2011) examined efficient market hypothesis for central and Eastern Europe. They used GARCH model, Autocorrelation, Runs Test. Variance Ratio test. It was found that day of the week effect was not present in most of countries of central and Eastern Europe except few. It means European stock Markets were efficient. However investor can make the profits based on past prices. Deepak and Viswanath (2012) analyzed the movement of stock prices in India. It was found that Day-of-the-week effect was present in the NSE NIFTY returns where Wednesday, Thursday and Friday were found statistically significant. Chia (2014) examined the day-of-the-week effect on the Australian and New Zealand stock exchange index. Period of the study is 2002 to 2014. He

used TAR-GARCH model and found asymmetrical market reaction in both New Zealand and Australian stock market for positive and negative information. However, no day of the week effect was found in the both the markets in the study. Cinko et. al (2015) examined the day of the week effect in selected thirty three stock indices of developed economies to test the efficient market hypothesis. Data has been taken for the period of 1999 to 2013. They used regression and found negative Monday in three stock markets. Friday returns are positive for six Indices. Only two markets shows negative Wednesday returns. None of the market provides significant Tuesday returns. Thursday's returns are positive and significant only for two stock markets. As the anomalies are diversified in different economies therefore systematic pattern was identified. Xiao (2016) examined the calendar anomalies US stock market in period of 2000-2015 for Russel 3000 Index. The study was divided in expansion and recession period to test the behavior of day of the week and month of year effect in favorable and unfavorable times. He used UCM and ARCH model and Confirms monthly effect in US stock market. However no day of the week effect was found. Derbali and Hallara (2016) examined the day-of-the-week effect on the Tunisian stock exchange index. They used three variants of GARCH model which includes GARCH (1,1) , TGARCH(1,1) and EGARCH(1,1) to examine the weekday anomaly in both returns and volatility for the period of 1997 to 2014. It was found that the returns are positive and significant for Thursday whereas the returns for Tuesday are negative. They also reported the persistence of volatility in Tunisian stock market index.

DATA COLLECTION AND ESTIMATION OF EMPIRICAL MODEL

Data has been taken for the period of 2004 to 2014 from Bombay Stock Exchange. Eleven stock indices are used to represent eleven different sectors. These sectors include Auto, Bank, Energy, Finance, FMCG, IT, Media, Metal, Pharma, PSU banks and Reality Sector.

Empirical Model

Numerous researcher has tested daily anomaly using dummy variable ordinary least square regression but this technique gives specious results and contains shortcoming of error term being not regular over the long period of time. To overcome this shortcoming variance is modeled to deal with problem of heteroskedasticity. In 1982 Eagle developed the model to deal with the problem heteroskedasticity which is written as following equation.

$$H_t = c + \alpha \varepsilon^2 t - 1$$

Later on Bollerslev (1986) comes out with generalized Model of ARCH known as GARCH. In this study we have used GARCH model with mean equation written as following.

$$h^2t = c + \alpha\varepsilon^2t-1 + \gamma h^2t-1$$

Modeling Day of the Week Effect

Day of the week effect is examined using dummy variables in the model $D_{mon}, D_{tue}, D_{wed}, D_{thu}, D_{fri}$, represents Monday, Tuesday, Wednesday, Thursday, Friday without Constant term. It is done to deal with problem of Dummy trap or multicollinearity. The presence of day of week effect will confirmed when coefficient of at least one of the dummy variable is statistically significant.

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \dots + \beta_5 D_{5t} + \varepsilon_t \quad (1)$$

R_t is the daily logarithmic return of the index

$D_i = 1$ for the i th day of the week (where $i =$ Monday, Tuesday, Wednesday.....Friday)

$D_i = 0$; otherwise

D_1 - D_5 are daily dummy variable, e is the error term in regression equation it is normally distributed with mean zero.

Above equation tells the statistically significant day of the week. However to access whether the returns are statistically different from other days of the week. Following equation will be used.

$$h^2t = c + \alpha\varepsilon^2t-1 + \gamma h^2t-1 \quad (2)$$

Calculation of Stock returns

1. For Calculation of returns following formulae will be used: $R_t = (P_t/P_{t-1}) * 100$

Where R_t will be the return on respective index

$P_t =$ Closing value of Index for day

$P_{t-1} =$ Closing value of Index for Previous day.

ANALYSIS AND INTERPRETATION

Table 1 exhibits the results of equation (1) equation (2) for day of the week effect in eleven sectors. Returns from auto sector on Friday (0.17) are found positive and statistically significant at 1 percent level of Significance which means Indian stock market does not follow random walk. There exist day of the week effect. When we have increased the level of significance to 5%. Returns of Wednesday and Monday became significant. Therefore the day of the week effect is available in in Auto sector. ARCH (0.09) and GARCH (0.88) are positive with probability value zero and summation of both is less than one indicating the absence of negative or explosive implied variances for the specification test. On the other hand, since the summation of these two coefficients is close to one, it indicates the volatility persistence in Auto sector.

Table 1
Analysis of day of week Effect using Equation (1) and (2)

		Monday	Tuesday	Wednesday	Thursday	Friday	C	ARCH	GARCH
Auto	Co-eff	0.116	0.082	0.114	0.114	0.179	0.058	0.091	0.885
Sector	Prob	0.029	0.152	0.042	0.052	0.001	0.000	0.000	0.000
Banking	Co-eff	0.164	0.094	0.103	0.090	0.165	0.061	0.081	0.904
Sector	Prob	0.017	0.197	0.181	0.209	0.009	0.000	0.000	0.000
Energy	Co-eff	0.101	0.000	0.043	0.002	0.103	0.045	0.102	0.884
Sector	Prob	0.045	0.987	0.482	0.967	0.042	0.000	0.000	0.000
Financial	Co-eff	0.269	0.112	-0.080	-0.127	0.197	0.516	0.096	0.845
Sector	Prob	0.023	0.450	0.588	0.367	0.139	0.000	0.000	0.000
FMCG	Co-eff	0.080	0.148	0.120	0.066	0.080	0.106	0.130	0.812
Sector	Prob	0.067	0.002	0.017	0.158	0.090	0.000	0.000	0.000
IT Sector	Co-eff	0.110	0.063	0.345	0.091	0.118	-0.042	0.389	0.838
	Prob	0.053	0.339	0.000	0.058	0.036	0.000	0.000	0.000
Media	Co-eff	0.010	0.000	-0.001	-0.000	0.000	0.001	0.164	0.863
Sector	Prob	0.801	0.999	0.982	0.991	0.998	0.000	0.000	0.000
Metal	Co-eff	0.213	0.052	0.119	0.052	0.166	0.318	0.154	0.800
Sector	Prob	0.002	0.555	0.163	0.558	0.046	0.000	0.000	0.000
Pharma	Co-eff	0.082	0.071	0.173	0.007	0.110	0.073	0.115	0.839
Sector	Prob	0.054	0.117	0.000	0.866	0.006	0.000	0.000	0.000
PSU	Co-eff	-0.058	0.172	-0.927	-4.749	0.218	2.541	1.295	0.551
Banking	Prob	0.862	0.636	0.004	0.000	0.561	0.000	0.000	0.000
Reality	Co-eff	-0.006	0.007	0.002	0.000	0.012	0.001	0.535	0.659
Sector	Prob	0.922	0.828	0.976	0.988	0.638	0.000	0.000	0.000

Returns from banking sector on Monday (0.16) and Friday (0.16) are found positive and statistically significant at 1 percent level of Significance which means banking sector does not follow random walk. There exist day of the week effect. Returns from no other day is found significant at even 5% level of significance. Therefore the day of the week effect is available in an Indian stock Market. ARCH (0.08) and GARCH (0.90) are positive with probability value zero and summation of both is less than one indicating the absence of negative or explosive implied variances for the specification test. However, the summation of these two coefficients is close to one, indicates the volatility is persistence in the banking sector.

Daily Returns from Energy sector is not found positive and statistically significant at 1 percent level of Significance. However at 5% level of significance Monday (0.10) and Friday (0.10) are positive and statistically significant which means energy sector does not follow random walk. There exist day of the week effect. Returns from no other day is found significant at even 5% level of significance. ARCH (0.08) and GARCH (0.90) are positive with probability value zero and summation of both is less than one indicating the absence of negative or explosive implied variances for the specification test. Since the summation of these two coefficients is close to one, it indicates that the volatility is persistent.

Weekday returns from financial sector is not found positive and statistically significant at 1 percent level of Significance. However at 5% Monday returns (0.26) are positive and statistically significant which means Financial Sector does not follow random walk. There exist day of the week effect. Returns from no other day is found significant at even 5% level of significance. ARCH (0.09) and GARCH (0.84) are positive with probability value zero and summation of both is less than one indicating the absence of negative or explosive implied variances for the specification test. On the other hand, since the summation of these two coefficients is close to one, it indicates that the volatility is persistent.

It is clear from the results of equation (1) equation (2) for day of the week effect in FMCG sector stocks that the returns from FMCG sector on Tuesday (0.14) are found positive and statistically significant at 1 percent level of Significance. It means FMCG sector does not follow random walk. There exist day of the week effect. Returns from Wednesday (0.12) is also found significant at even 5% level of significance. ARCH (0.130) and GARCH (0.81) are positive with probability value zero and summation of both is less than one indicating the absence of negative or explosive implied variances for the specification test. On the other hand, since the summation of these two coefficients is close to one, it indicates that the volatility is persistent.

The results of equation (1) equation (2) for day of the week effect in IT sector stocks. Returns from IT sector on Tuesday (0.34) are found positive and statistically significant at 1 percent level of Significance which means Indian stock market does not follow random walk. There exist day of the week effect. Returns from Friday (0.11) is also found significant at even 5% level of significance. Therefore the day of the week effect is available in IT sector stock. ARCH (0.38) and GARCH (0.83) are positive with probability value zero and summation of both is more than one indicating the explosive implied variances for the specification test. It means today's returns are affected by both previous day returns and previous day volatility.

Returns from Media sector on all the days are found statistically insignificant at both 1 percent and 5% level of Significance which means there is random walk behavior in Media sector. Therefore there is no day of the week effect. ARCH (0.16) and GARCH (0.86) are positive with probability value zero and summation of both is more than one indicating that there is explosive implied variances for the specification test.

It is found that the Returns from Metal sector on Monday (0.21) are positive and statistically significant at 1 percent level of Significance which means Metal sector stocks does not follow random walk. There exist day of the week effect. Returns from Friday (0.16) is also found significant at even 5% level of significance. Therefore the day of the week effect is available in an Indian stock Market. ARCH

(0.15) and GARCH (0.80) are positive with probability value zero and summation of both is more than one indicating the explosive implied variances for the specification test. It means today's returns are affected by both previous day returns and previous day volatility.

Returns from Pharma sector on Wednesday (0.17) and Friday (0.11) found positive and statistically significant at 1 percent level of Significance which means Indian stock market does not follow random walk. There exist day of the week effect. Therefore the day of the week effect is available in an Indian stock Market. ARCH (0.11) and GARCH (0.83) are positive with probability value zero and summation of both is more than one indicating the explosive implied variances for the specification test. It means today's returns are affected by both previous day returns and previous day volatility.

It is found that the Returns from Metal sector on Wednesday (-0.92) and Thursday (-4.74) found positive and statistically significant at 1 percent level of Significance which means Indian stock market does not follow random walk. There exist day of the week effect. Therefore the day of the week effect is available in an Indian stock Market. ARCH (1.29) and GARCH (0.55) are positive with probability value zero and summation of both is more than one indicating the explosive implied variances for the specification test. It means today's returns are affected by both previous day returns and previous day volatility.

It is found that the returns from Reality sector on Wednesday (-0.92) and Thursday (-4.74) found positive and statistically significant at 1 percent level of Significance which means Indian stock market does not follow random walk. There exist day of the week effect. Therefore the day of the week effect is available in an Indian stock Market. ARCH (1.29) and GARCH (0.55) are positive with probability value zero and summation of both is more than one indicating the explosive implied variances for the specification test. It means today's returns are affected by both previous day returns and previous day volatility.

CONCLUSION

Efficient market hypothesis decides the patterns of returns from the stock Market. Therefore market efficiency is one of the decisive factor for Investment opportunities in the stock Market. There were numerous studies on market efficiency Indian stock market. Maximum studies in the area treat the stock Market as Homogeneous and try to relate the results of Base Indices with overall stock market efficiency. However we have collected some recent International evidence that the stock market is not homogeneous and there anomalies are different for different kind of stocks. Therefore the study will contribute in the area by re-examining the phenomena of calendar anomalies for stocks of eleven different sectors. The Analysis of stocks of eleven sectors provide us very interesting results

in the area of calendar anomalies. It is clear from the above that the returns from the Monday and Friday are positive and significant at 5% level of significance for Auto, Banking, Energy and Metal Sector Indicating Strong Monday and Friday Anomaly in stock Market. It could be possible the Monday returns could be Accumulated Saturday and Sunday returns. Friday Anomaly is more widely spread in Stock Market as this anomaly is Present in all sectors except Media and PSU sector returns reason could be information flow. It might possible that investor might want to invest in the stock market on information's available to him during whole week before the start of next week. Wednesday is also found positive and significant at 5% level of significance for FMCG, IT and Pharma Sector returns. Tuesday is found positive only in FMCG sector. Media Sector follow random walk behavior as there is no day of the week effect. There is negative Wednesday and Friday for PSU Banks.

Researcher has studied the day of the week effect in Bombay stock exchange. However same studied could be conducted in National Stock exchange. This study has consider only daily dummies to study the random walk behavior of Indian stock market. Inclusion of other variables Inflation, Interest rate can bring new insights in the area. It is also possible to study how these anomalies are changing the behavior of actual Investors and other stakeholders.

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