



## Stock Market Seasonality: A Study of the Indian Stock Market (NSE)

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### ABSTRACT

*This paper aims to examine stock market seasonality effect (month of the year effect and the day of the week effect) in Indian stock market for the S&P CNX Nifty (NSE). The data used in this study is daily closing prices of the market index (NSE-Index) over the period from 1st April 2002 to 31st March 2012 for Month of the year effect and 1st April 2007 to 31st March 2012 for Day of the week effect. To test for the presence of the month-of-the-year effect and day-of-the-week effect on stock market returns (NSE). Kruskal Wallis test and one way ANOVA were used to see if any significant difference exists in average daily returns across week day and monthly return. The result of the study I found that this non existence of the day effect and month of year effect means the seasonality is not present in Indian stock Market. MS excel and SPSS 15 were used to carry out the analysis.*

**Keywords : Seasonality Effect, Day of the week effect, month of year effect, One way ANOVA and kruskal walis test**

### INTRODUCTION:

The day-of-the-week effect continues to be one of the more interesting stock market anomalies to study because the existence of significant day-of-the-week effects would be very useful for developing profitable trading strategies. Investors could buy stocks on days with abnormally low returns and sell stocks on days with abnormally high return.

Several empirical studies have studied the phenomena of calendar effects in stock markets, where returns tend to show higher (or lower) than average returns is specific calendar periods. Calendar effects are anomalies in stock returns that relate to the calendar, such as the day-of-the-week, the month-of-the-year, or holidays, and well-known examples are the Monday effect and the January effect. Such anomalies cast doubts to the "efficient market hypothesis"

The existence of the calendar anomalies is a denial of the weak form of efficient market hypothesis which states that stock returns are time invariant which means that there is no short-term seasonal pattern in the stock returns. The subsistence of seasonal pattern in the stock return infers that a market is inefficient and investors should be able to earn abnormal return. That's why finance researchers have been interested to find out the existence of the calendar anomalies or seasonality in the stock returns in different markets. Among the calendar anomalies day of the week effect is most widely documented anomaly and have been comprehensively investigated by the finance researchers in different markets of different countries considering different securities and indices and different institutional framework.

### LITERATURE REVIEW:

Extensive literature is available regarding day of the week effect and other market anomalies across the globe. Jaffe and Westerfield (1985) examined daily stock market return for the U.S., U.K., Japan, Canada and Australia. They found so called week-end effect in each country. They contrasted the previous studies of the U.S and concluded that lowest mean returns for both the Japanese and Australian markets occur on Tuesday. Harris (1986) examined weekly and intraday patterns in common stock prices using transaction data. He found that for large firms, negative Monday return accrue

between the Friday close and the Monday open and for small firms they accrue primarily during the Monday trading day. He also concluded that on Monday morning, prices drop, while on the other weekday mornings, they rise. In some related studies Thoebald and Price (1984), Simrlock and Starts (1986), Board and Sutcliffe (1988), Cohers and Cohers (1995) and Tang and Kwok (1997) and many others support the previous studies and concluded that Mondays average return are negative and Fridays average return are positive. That means, share prices tend to decline on opening day (Monday) of the week and tend to increase on the closing day (Thursday) of the week.

Corhay and Rad (1994) and Theodossiou and Lee (1995) investigated the behavior of stock market volatility and its relationship to expected returns for major European stock markets. Both studies report the existence of significant conditional heteroskedasticity in stock price behavior. No relationship between stock market volatility and expected returns is found. None of these studies, however, has investigated the variation in stock market volatility with respect to day of the week patterns. Finding certain patterns in volatility may be useful in several ways, including the use of predicted volatility pattern in hedging and speculative purposes; use of predicted volatility in valuation of certain assets specifically stock index options. This paper provides evidence on day of the week effect pattern in stock market volatility.

More recently, Choudhry (2000) examined seasonality of returns and volatility under a unified framework but the study has a misspecification issue with regard to conditional mean. Bhattacharya (2003) used GARCH framework by incorporating the lagged returns (BSE 100) as explanatory variables in the conditional mean. They have used reporting and non-reporting weeks to study the day of week effect. All these studies have used end of day data.

Kumari and Mahendra (2006) studied the day of the week effect using data from 1979 to 1998 on BSE and NSE. They reported negative returns on Tuesday in the Indian stock market. Moreover, they found returns on Monday were higher compared to the returns of other days in BSE and NSE. Choudhary and Choudhary (2008) studied 20 stock markets

of the world using parametric as well as non-parametric tests. He reported that out of twenty, eighteen markets showed significant positive return on various day other than Monday. The scope of the study is restricted to days of the week effect, weekend effect and monthly effect in stock returns of S&P CNX Nifty and select firms. The half month effect and holiday effect are not studied. Siddhartha Bhattacharya, Sengupta and Sarkar (2012) studied the day of week effect. They found that there is no impact of the weekdays on returns generated on NSE and "day of the week" effect does not exist.

**HYPOTHESES**

The following hypotheses could be tested using various statistical tests Using kruskal walis test

Ho: The average stock returns are equal on all days of the week or there is no daily effect

Ha: The average stock returns are not equal on all days of the week or there is daily effect (in a week, at least one day return/s is/are different from other days of week) Using one way ANOVA test

Ho: The average stock returns are equal on all months of the year or there is no monthly effect

Ha: The average stock returns are not equal on all months of the year or there is monthly effect (In a year, at least one month return/s is/are different from other months)

**OBJECTIVES:**

The objectives of the study are as follows:

- a) To examine days of the week effect in the returns of S&P CNX Nifty
- b) To examine the seasonality in monthly returns of S&P CNX Nifty.

**METHODOLOGY AND DATA COLLECTION:**

In order to examine the stated hypothesis, daily closing prices of the National stock exchange of India's general index NSE nifty were utilized for the period 1/04/2006 to 31/3/2012 (Day of week effect) and 1/04/2002 to 31/3/2012 (Month of year effect). NSE data was collected because it is the largest stock exchange in India. The daily return for sequential working days viz., Monday-Tuesday, Tuesday-Wednesday, Wednesday-Thursday, Thursday-Friday, and Friday- Monday were calculated using following equation:

$$R_n = (P_n - P_{n-1}) / P_{n-1}$$

Where,  $R_n$  = Return of the nth Day

$P_n$  = Closing price for n

$P_{n-1}$  = Closing price for n-1 day

Here I taken log return by using following formula

$$\text{Log}(1+r_i) = \log(p_i/p_j) = \log(p_i) - \log(p_j)$$

**DISCUSSION OF RESULTS:**

To examine the Day of week effect,

**One way ANOVA**

**Table 5 Descriptives return of NSE**

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
april	10	.0078412	.02892624	.00914728	-.0128514	.0285338	-.02938	.06068
May	10	-.0019568	.05492265	.01736807	-.0412461	.0373325	-.08301	.10743
june	10	.0036175	.03455513	.01092729	-.0211017	.0283368	-.08110	.05173
july	10	.0107678	.02413427	.00763193	-.0064968	.0280324	-.04263	.03509
august	10	.0092084	.02624779	.00830028	-.0095681	.0279850	-.03988	.05841
september	10	.0172109	.03168955	.01002112	-.0054584	.0398803	-.04607	.05110
october	10	-.0040980	.05614111	.01775338	-.0442589	.0360629	-.13318	.07008

**Table 1 Tests of Normality**

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Return of NSE	.068	1483	.000	.943	1483	.000

a Lilliefors Significance Correction

From above table shows the tests of normality of daily return at 95% significance level. Here the significance value of .000 which is less than .05, it means we fail to reject null hypothesis. We interpret that the Daily return of NSE is not normally distributed. So we proceed for the non parametric test.

**Kruskal-Wallis Test**

**Table 2 Ranks**

	Day of week	N	Mean Rank
Return of NSE	monday	296	743.19
	tuesday	297	731.43
	wednesday	302	765.83
	thursday	294	726.31
	friday	294	742.69
	Total	1483	

**Table 3 Test Statistics(a,b)**

	Return of NSE
Chi-Square	1.514
df	4
Asymp. Sig.	.824

a Kruskal Wallis Test

b Grouping Variable: Day of week

The above Ranks table (table 2) shows the details about the mean ranks for each day. The Wednesday is highest (765.83) and Thursday is Lowest (726.31) mean rank.

The Test statistics table (table 3) give information about whether the difference is statistically significant or by chance. The Chi-square statistic is 1.514 and the associated significance is .824 (which is higher than .05). The null hypothesis is thus not rejected and we say that the average index returns are different at least one day of week is by chance. Simply the average stock returns are equal on all days of the week or there is no daily effect

**To Examine the month of year effect,**

**Table 4 Tests of Normality**

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
return of NSE	.067	120	.200(*)	.966	120	.004

\* This is a lower bound of the true significance.

a Lilliefors Significance Correction

From above table shows the tests of normality of daily return at 95% significance level. Here the significance value of .020 which is higher than .05, it means we accept null hypothesis. We interpret that the monthly of NSE is normally distributed. So we can apply parametric test for further test.

november	10	.0116075	.03078656	.00973557	-.0104158	.0336309	-.04232	.04869
December	10	.0213442	.02185880	.00691236	.0057073	.0369810	-.01909	.06586
january	10	-.0118687	.03616570	.01143660	-.0377401	.0140027	-.07732	.05089
february	10	-.0015711	.01648823	.00521404	-.0133661	.0102239	-.03746	.01526
march	10	.0050947	.03159562	.00999141	-.0175074	.0276969	-.04269	.04400
Total	120	.0055998	.03430716	.00313180	-.0006015	.0118011	-.13318	.10743

The above table shows descriptive statistics for NSE monthly return. From the table we can interpret that mean return of NSE is negative in the month of January, February, May and October, and rest of months mean return is positive. In the month of December NSE give highest return (.0213)

**Table 6 Test of Homogeneity of Variances return of NSE**

Levene Statistic	df1	df2	Sig.
1.651	11	108	.095

From the table test of homogeneity of variances the levene's statistic along with 95% significance level. The F-value 1.651 and its associated significance is 0.095 which is higher than 0.05. (0.095>0.05) so we accept the null hypothesis. It means variance of monthly return of NSE is equal

**Table 7 ANOVA return of NSE**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.010	11	.001	.735	.703
Within Groups	.130	108	.001		
Total	.140	119			

ANOVA table provide information for testing hypothesis. F value is used as a test of significance of difference in mean across the groups. F-ratio with its associated p-value (sig.) 0.703. It indicated probability of observed value happening by chance. The results show that differences between means of 12 months are not significant. Thus, we fail to reject the null hypothesis and say that there is no difference in mean monthly return across the months in a year.

#### CONCLUSION:

The presence of the day of the week effect in stock market returns has been one of the hotly debated issues in the finance literature. In this study, I tried to examine the seasonality of stock market in India. I considered the S&P CNX Nifty as the representative of stock market in India and tested whether seasonality is present in Nifty return using daily and monthly data sets. The study found that daily and monthly seasonality are not present in Nifty return. The reason behind this non existence of the day effect may be due to the increased volatility, increased awareness among Indian investors, Globalization of Indian Economy, reach of Media, emergence of Derivatives segment and Increase in disposable Income.

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