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An Empirical Study of the Weekend Effect in the Indian Stock Market



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Abstract

A vast body of literature exists regarding the presence of seasonal effect, mainly, day-of-the-week or monthly effect in the stock returns of both the developed as well as the developing markets. This paper investigates the day-of-the-week effect on the Indian stock market returns. The study covers the post reform period from 1998 to 2005. The study uses the daily return data of the stocks listed on the National Stock Exchange and Bombay Stock Exchange. The empirical research has been conducted using the descriptive statistics method on the daily returns from both the S&P CNX Nifty index as well as BSE Sensex index. Results obtained indicate the significant presence of the day of the week effect on both the stock returns indices, though the results are not identical. These imply that the stock market in India is inefficient, and so it is possible for the investors to reap excess profits by timing their investments according to the day of the week.

Keywords: Stock Returns, Day-of-the-Week Effect, Random, Walk Model
Introduction

The day-of-the-week effect refers to the existence of a pattern on the part of stock returns, whereby these returns are linked to the particular day of the week. The most common ones are the January Effect and the Day-of the-Week Effect. It is contended that the average return on Monday is significantly less than the average over the other days of the week. The last trading days of the week, particularly Friday, are characterised by substantially positive returns; while Monday the first trading day of the week differs from other days, even producing negative returns. The presence of such an effect would mean that equity returns are not independent of the day of the week, which is evidence against the random walk theory.

The first three sections have been devoted respectively to the introductory analysis (Section I), literature survey (Section II) and database and methodology of the study (Section III). Section IV lays down the objectives and the broad hypothesis of the study while Section V deals with the results of the empirical tests conducted to check the day-of-the week effect of the Indian stock market. Section VI very briefly concludes the study.

Aim of the Study

The main aim of the study is to examine the behaviour of the stock prices in the Indian stock market after the introduction of the various financial sector reforms by testing for the presence of weekend effect in the stock prices. This will enable us to examine whether the Indian stock market is efficient in its weak-form over the entire period of our study or whether the introduction of the financial sector reforms in the late 90s had made the Indian stock market weak-form efficient.

Literature Survey

The presence of calendar anomalies has been documented extensively for the last two decades in financial markets. The most common ones are the January Effect and the Day-of the-Week Effect. The day-of-the-week effect refers to the existence of a pattern on the part of stock returns, whereby these returns are linked to the particular day of the week. The day of the week patterns have been investigated extensively in different markets. A number of studies [Cross (1973); French (1980); Lakonishok and Levi (1982); Rogalski (1984); Keim and Stambaugh (1984); Harris (1986); Agarwal and Rivoli (1989)] document that the

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distribution of stock returns varies according to the day of the week. The average return on Monday is significantly less than the average over the other days of the week. The last trading days of the week, particularly Friday, are characterised by substantially positive returns; while Monday the first trading day of the week differs from other days, even producing negative returns. The presence of such an effect would mean that equity returns are not independent of the day of the week, which is evidence against the random walk theory. The focus of nearly all the studies above has been to check the existence of seasonal pattern in mean return. The relationship has been verified mainly in the USA. Amongst the studies investigating the day of the week anomaly for the US market, Cross (1973) studied the returns on the S&P 500 Index over the period of 1953 to 1970. His findings indicate that the mean return on Friday is higher than the mean return on Monday. Similar results were reported by French (1980) who also studied the S&P 500 Index for the period 1953-1977. Gibbons and Hess (1981) find negative Monday returns for 30 stocks of Dow Jones Industrial Index. Keim and Stambaugh (1984) further investigated the weekend effect by using longer time periods for various portfolios. Their results also confirm the findings of the previous studies. Several studies also attempted to explain the Monday effect, among them is the calendar time hypothesis, which states that Monday returns should be higher than other weekday returns because of the delay between trading and settlements in stocks [Gibbons and Hess (1981); French (1982); Keim and Stambaugh (1984)]. These studies measure Monday return between the closing price on Friday and the closing price on Monday. Rogalski (1984) answers the question of whether prices fall between Friday close and Monday opening or during the day on Monday. He decomposes daily returns into trading and non-trading day returns and finds that all of the average negative returns from Friday close to Monday close occur during the non-trading hours. Average trading day returns (open to close) are identical for all days.

Day-of-the-week pattern is also observed in other US markets. The futures market, the Treasury bill market and the bond market display a pattern similar to that of the equity market (Comell 1985; Dyl and Maberty 1986). Day-of-the-week effect is also documented for other stock markets around the world. Among them, Jaffe and Westerfield (1985) investigate the weekend effect in four developed markets, namely Australia, Canada, Japan and the UK. The results indicate the existence of weekend effect in all countries studied. Contrary to the previous studies of the US market, the lowest mean returns for both Japanese and Australian stock markets were found to be on Tuesday. Solnik and Bousquet (1990) test day of the week effect for Paris Bourse, reporting a strong and persistent negative return on Tuesday, which is in line with the studies on Australia and Japan. Barone (1990) reports similar results for the Italian stock market with the largest decline in stock prices occurring during the first two days of the week and

more pronounced on Tuesday. More recently, Agarwal and Tandon (1994), Alexakis and Xanthakis (1995) and Balaban (1995) also showed that the distribution of stock returns varies by day-of-the-week for various countries. In sum, day-of-the-week effect in stock returns is a common phenomenon and observed across different countries and different types of markets, specifically the developed markets.

However, once again the day-of-the-week effect in emerging stock markets has not been extensively researched. Poshakwale (1996) provided empirical evidence on week form efficiency and the day-of-the-week effect in Bombay Stock Exchange over a period of 1987-1994. Arora and Das (2007) investigated the day-of-the-week effect in the stocks listed on the Bombay Stock Exchange and National Stock Exchange for the post-reform period of November 1994 to September 2007. They used daily return data for the NSE and BSE listed stocks and analysed the day-of-the-week effect in three different phases of the market i.e. 'consolidation phase', 'bearish phase' and the 'bullish phase'. The study concluded the existence of the seasonality in the form of the day-of-the-week effect in stock returns in India for 66 stocks spanning across various sectors. However, the day-of-the-week effect was found to be absent in the bullish phase as well as the bearish phase, which was a departure from the previous belief on the existence of this effect in all phases of the market. Gupta (2006) examined the day-of-the-week effect on the Indian stock market after the introduction of the rolling settlements for a three-year period 2002-2005. The results showed the returns to be the highest on Friday for all the Indices and provided evidence of the day-of-the-week effect for BSE 100 and S&P CNX 500 indices for the Indian stock market.

Database and Methodology

To gauge the impact of macroeconomic events on the stock market efficiency, the period of study has been so selected that it entails the most radical financial sector reforms in the Indian history. Reforms in Indian stock market started in the early 90s, which had led to enormous and sweeping changes in all facets of the market economy. On the basis of the above consideration our period of study for examining stock market efficiency has been selected from 1st April 1998 to 31st March 2005. Further our period of study has been divided into parts. Period I comprises of the stage from 1st April 1998 to 31st March 2002 while Period II comprises of the period from 1st April 2002 to 31st March 2005. This basis ensures that Period I encompasses all the first as well as second generation economic reforms that were undertaken in the late 90s and the early part of this century. However in Period II, additionally, derivatives have been introduced so that the real impact of the introduction of stock derivatives along with the stock market reforms on the market efficiency could be ascertained. We also consider a gap of one year between two sub-periods under study (i.e., Period I from 1st April 1998 to 31st March 2001 while Period II from 1st April 2002 to 31st March 2005). This has been done deliberately to gauge the

impact of the derivative instruments on the financial markets as the gap of one year would ensure that the derivatives instruments are established, their effects are accommodated and their initial shocks are adjusted for in the market. Therefore, in this study we have divided the whole period into two periods – one is pre-reforms period (i.e., Period I) and the other is post-reforms period (i.e., Period II). Further, these two sub-periods have been considered in two ways - one having no gap between the two sub- periods (termed as the Financial time period A) and the other having a gap of one year (termed as the Financial time period B).

The series of daily returns on BSE Sensex and S&P CNX Nifty Index are tested in this study for the existence, if any, of the day- of –the- week effect. The stock return data used in this study consists of logarithmic first differences of the BSE Sensex and Nifty (S&P CNX) indices' daily closing values. There is a total of 1744 observations for BSE Sensex and 1760 observations for Nifty (S&P CNX) ranging from 1st April, 1998 to 31st March, 2005. If there is no day-of-the-week effect, then the mean return found at the end of each day of the week would be statistically same.

Objectives and Hypothesis of the Study

The objective of the study is to test whether one can obtain abnormal profit by trading on the basis of the day of the week. Thus, we have the single –line hypothesis for the study as:

The Indian stock market is devoid of the day-of-the-effect i.e., excess profit will not accrue to an investor by trading on any particular day of the week.

Empirical Results

Table 1 reports the estimated values of a few preliminary descriptive statistics for the entire study period as well as for both the sub-periods of the financial time-periods A and B on the daily returns of the BSE Sensex and the S&P CNX Nifty indices. Table 2, on the other hand, gives the day-wise figures of those statistics for the sub-periods I and II of the financial time period A for the NSE Nifty index while Table 3 gives the corresponding figures for the time period B. The respective values for the BSE Sensex are given in Table 4 for period A and in Table 5 for period B. Table 6 depicts the day-wise statistics over the entire period for the Nifty index while the corresponding figures for the BSE Sensex index is presented in Table 7.

From Table 1, we find that the mean return for both the indices is -0.004 if the entire period of study is considered which is statistically insignificant. The daily return series for both the indices are positively skewed at 1% level of significance and follow leptokurtic distribution, again being significant at 1% level of significance. Thus over the entire study period, the daily return curves for both BSE Sensex and NSE Nifty indices for all days taken together, do not conform to a normal distribution. If we consider the financial time periods A and B, we find that the average daily returns of both the indices are significantly different from zero for both the sub-periods. The skewness values are significant for the

sub-period II of both the indices for both A and B (at 1% level of significance), however it is significant at 5% level for only sub-period I of the BSE Sensex index and insignificant otherwise. The kurtosis values are significantly different from three for all the sub-periods for both the indices at 1% level of significance. Thus, the daily return series for all days taken together of neither the BSE Sensex nor NSE Nifty indices conform to a normal curve.

We now consider the day-wise mean, skewness and kurtosis values for the Nifty index in Tables 2 and 3. We find that the average daily Nifty return for almost each day of the week is not significantly different from zero for the sub-periods I and II of time period A (except for Tuesday which has a mean daily return for sub-period I significant at 1% while the corresponding value for Thursday is significant at 5%) as seen in Table 2. Similar results also hold for both the sub-periods of time-period B (Table 3). However, the weekend mean returns (average daily return on Thursdays and Fridays) are substantially positive than the average daily returns at the beginning of the week (Mondays and Tuesdays). We observe the highest return on Thursday and the lowest returns on Monday. This is true for both the sub-periods I and II of both the time periods A and B i.e, whether a gap of one year is introduced or not while evaluating the daily returns of the Nifty index. The skewness and kurtosis values are significant for the daily returns of each day of the week for nearly the sub-periods I and II of both A and B for the NSE Nifty index (Table 2 and 3). Thus, the distributions for the daily Nifty returns do not conform to a normal distribution for either any one of the days.

Considering the corresponding values for the BSE Sensex index in Tables 4 and 5, we find that the average daily return for each day of the week for the sub-periods I and II of both A and B time periods is not significantly different from zero (except that Tuesday mean returns in sub-period I of time-period A has significant negative returns while Thursday mean returns in sub-period I of time-period B has significant positive returns). Nonetheless, we once again find, as in case of NSE Nifty index, the daily average returns at the end of the week (Thursday and Friday) is substantially greater than that at the beginning of the week. The kurtosis values being significant for both the sub-periods corresponding to each day of the week in case of both the time periods A and B, along with most of the significant skewness values, leads us to conclude that the daily return curve for the BSE Sensex index for neither of the days conform to a normal curve.

When the return for each day is analysed over the entire period of study for the BSE Sensex index, the findings, as given in Table 7, indicate that Friday has a mean return of .009% while Monday has a mean return of -.15% (the Monday returns are statistically significant at 10% level). On the other hand, the returns for Wednesday and Thursday are positive. However, the returns are not statistically significantly different from zero. Skewness for all days taken together as well as for each day for the entire

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period (except for Monday and Thursday) is statistically significant at 1% level while for Wednesday it is significant at 5% level. Furthermore all the results for excess kurtosis are also significant at 1% level. Thus over the entire period, the curves corresponding to each day of the week for daily return data of the BSE Sensex index does not conform to a normal curve. Similar results also hold for the NSE Nifty index. The corresponding figures for S&P CNX Nifty index is presented in Table 6. The mean return for the seven-year period on Nifty index is -0.0004 while the standard deviation of the return is 0.01660. On comparison with the BSE Sensex return over the same period, we find that not only the mean return is the same but also the variation is negligibly less. The skewness and kurtosis measures over the entire period are 0.396 and 4.430. Both of them are statistically significant at 1% level. When the return for each day is analysed over the entire period, the results show that Monday has an average return of 0.02% while Friday has a mean return of 0.08%. This is similar to result obtained on the BSE Sensex index and exactly in accordance with the available literature on the day-of-the-week effect. The lowest return occurs on Tuesday (-.34%) while the maximum return on the Nifty index occurs on Thursday (.12%)[which is the same as on BSE Sensex index]. Standard deviation is also not the same throughout -- the first and the last two trading days of the week report the highest variation while the middle of the week is the comparatively stable. Skewness measures for all days are statistically significantly different from zero at 1% level of significance except for Monday when it is insignificant. Kurtosis measures are significant at 1% level for all five days of the week for Nifty returns. Thus the daily return data over the entire period, for each day of the week for the Nifty index does not follow a normal distribution. Consequently, the non-normal frequency distributions of the daily stock return series for both the indices deviate from the prior condition of the random walk model.

Conclusion

We can, therefore, conclude that the analysis of the daily return data for each day of the week for both the BSE Sensex and NSE Nifty indices does confirm the existence of week-end effect in the Indian stock market. The mean daily returns for both the indices for the sub-periods as well as the entire period is substantially greater on Thursdays and Fridays (also positive) than that on Mondays and Tuesdays (which has negative returns). The variability of the returns is also not the same – it is more at the beginning and end than at the middle of the week. This is in tune with the available literature on the subject of day-of-the-week effect [Cross (1973); Lakonishok and Levi (1982); Rogalski (1984); Keim and Stambaugh (1984); Harris (1986a, 1986b)].

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Table 1: Descriptive Statistics Results on the Daily Returns of BSE SENSEX and NSE NIFTY Indices

Statistic	Period A				Period B			
	BSE Sensex		Nifty		BSE Sensex		Nifty	
	PdI	PdII	PdI	PdII	PdI	PdII	PdI	PdII
No. of observations	987	757	1003	757	740	757	756	757
Mean	.0000 (0.00)	.0009*** (1.87)	.0000 (0.00)	-.001** (-1.96)	.0000 (0.00)	-.0009*** (-1.87)	.0001 (0.13)	-.001** (-1.96)
s.d.#	.01915	.01331	.01823	.01414	.0203	.01331	.01941	.01414
Skewness	.167** (2.141)	.971* (10.910)	.083 (1.078)	1.176* (13.213)	.134 (1.489)	.971* (10.910)	.022 (.247)	1.176* (13.213)
kurtosis	1.350* (-10.58)	10.800* (44.07)	1.952* (-6.81)	11.920* (50.39)	1.096* (-10.8)	10.800* (44.07)	1.672* (-7.46)	11.920* (50.39)

Statistic	Entire Period	
	BSE Sensex	Nifty
No. Of observations	1744	1760
Mean	-.0004 (-1.00)	-.0004 (-1.00)
s.d.#	.01687	.01660
Skewness	.371* (6.288)	.396* (6.828)
kurtosis	3.385* (3.29)	4.430* (12.22)

Notes: * significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Key: #: s.d. implies Standard deviation of the daily returns of the NSE Nifty as well as BSE Sensex index.

Table 2: Descriptive Statistics Results for Each Day of the Week on S & P CNX NIFTY for Period A (1998-2002 and 2002-2005)

Statistic	Day of the Week									
	Monday		Tuesday		Wednesday		Thursday		Friday	
	Pd.I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II
No. of Observations	203	152	196	152	197	148	204	151	208	161
Mean	-.0015 (-1.22)	-.0016 (-1.52)	-.006* (-4.90)	-.0001 (0.11)	.0008 (0.67)	-.0012 (-1.11)	.0023** (1.65)	0002 (0.14)	.0009 (0.72)	.0001 (0.08)
S.D.#	.01764	.01292	.01714	.01154	.01673	.01314	.01992	.01715	.01803	.01689
Skewness	.558* (3.263)	-1.436* (7.289)	-.544* (3.126)	.118 (.599)	.253 (1.462)	.483** (2.42)	.496** (2.198)	2.991* (15.183)	.312*** (1.846)	2.925* (15.314)
Kurtosis	1.986* (-2.98)	8.762* (14.74)	1.097* (-5.5)	1.271* (-4.42)	1.543* (-4.22)	.244* (-6.96)	1.359* (-4.84)	21.196* (46.42)	1.694* (-3.89)	21.344* (48.27)

Notes: * significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Key: #: S.D. implies Standard deviation of the daily returns of the NSE Nifty index.

Table 3: Descriptive Statistics Results for Each Day of the Week on S & P CNX NIFTY for Period B (1998-2001 and 2002-2005)

Statistic	Day of the Week									
	Monday		Tuesday		Wednesday		Thursday		Friday	
	Pd.I	Pd.II	PdI	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II
No. of Observations	151	152	147	152	147	148	153	151	156	161
Mean	-.0025 (-1.61)	-.0016 (-1.52)	-.0076* (-5.17)	-.0001 (-0.11)	.0015 (1.04)	-.0012 (-1.11)	.0027 (1.54)	0002 (0.14)	.0007 (0.45)	.0001 (0.08)
S.D.#	.01904	.01292	.01784	.01154	.01745	.01314	.02170	.01715	.01928	.01689
Skewness	.518* (2.63)	-1.436* (7.29)	-.549* (2.74)	.118 (.599)	.206 (1.03)	.483** (2.43)	.424** (2.16)	2.991* (15.18)	.336*** (1.73)	2.925* (15.31)

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Kurtosis	1.634* (-3.48)	8.762* (14.74)	.766* (-5.63)	1.271* (-4.42)	1.446* (-3.91)	.244* (-6.96)	.888* (-5.42)	21.20* (46.42)	1.438* (-4.05)	21.34* (48.27)
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Notes : * significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Key: #: S.D. implies Standard deviation of the daily returns of the NSE Nifty index.

Table 4: Descriptive Statistics Results for Each Day of the Week of BSE Sensex for Period A (1998-2002 and 2002-2005)

Statistic	Day of the Week									
	Monday		Tuesday		Wednesday		Thursday		Friday	
	Pd.I	Pd.II	Pd. I	Pd. II	PdI	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II
No. of Observation	196	145	195	152	197	148	202	151	208	161
Mean	-.0013 (-1.08)	-.0016 (-1.52)	-.002*** (-1.65)	-.0001 (-0.12)	.0011 (0.84)	-.0011 (-1.11)	.0021 (1.49)	.0009 (0.81)	.0017 (1.13)	.0001 (0.08)
S.D.#	.01683	.01294	.01851	.01061	.01845	.01202	.02005	.01370	.02161	.01614
Skewness	.654* (3.76)	-1.194* (-6.06)	-.414* (-2.38)	.075 (.38)	.213 (1.23)	.282 (1.42)	-.102 (-.596)	.684* (3.47)	.396** (2.34)	2.652* (13.88)
Kurtosis	2.19** (-2.35)	8.905* (15.1)	1.153* (-5.34)	.665* (-5.97)	1.226* (-5.14)	.120* (-7.27)	1.567* (-4.20)	3.287 (0.73)	1.359* (-4.88)	18.06* (39.6)

Notes: * significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Key: #: S.D. implies Standard deviation of the daily returns of the BSE Sensex index.

Table 5: Descriptive Statistics Results for Each Day of the Week of BSE Sensex for Period B (1998-2001 and 2002-2005)

Statistic	Day of the Week									
	Monday		Tuesday		Wednesday		Thursday		Friday	
	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II	Pd. I	Pd. II
No. of Observations	145	152	146	152	147	148	151	151	156	161
Mean	-.0015 (-1.02)	-.0016 (-1.6)	-.0026 (-1.62)	-.0001 (-0.12)	.0016 (0.99)	-.0011 (-1.11)	.0028*** (1.66)	.0009 (0.81)	.0023 (1.22)	.0001 (0.08)
S.D.	.01773	.01294	.01937	.01061	.01947	.01202	.02080	.01370	.02366	.01614
Skewness	.840* (4.18)	-1.19* (6.06)	-.445** (-2.21)	.075 (.38)	.189 (.94)	.282 (1.42)	-.378*** (1.92)	.684* (3.47)	.431** (2.22)	2.652* (13.9)
Kurtosis	2.338*** (-1.65)	8.905* (15.1)	.977* (-5.07)	.665* (-5.97)	1.111* (-4.76)	.120* (-7.27)	1.508* (-3.81)	3.287 (0.73)	.906* (-5.42)	18.06* (39.6)

Notes: * significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Key: # : S.D. implies Standard deviation of the daily returns of the BSE Sensex index.

Table 6: Descriptive Statistics Results for Each Day of the Week of S & P CNX Nifty Index for Entire Period (1998-2005)

Statistic	Day of the week					
	All Days	Monday	Tuesday	Wednesday	Thursday	Friday
No. of Observations	1760	355	348	345	355	369
Mean	-0.0004 (-0.76)	-0.0002 (-0.24)	-0.0034* (-4.15)	-0.0001 (1.08)	0.0012 (1.2)	0.0008 (0.88)
Stand. dev.	0.01660	0.01585	0.01522	0.0153	0.01880	0.1752
Skewness	0.396* (6.828)	0.190 (1.473)	-0.611* (-4.664)	0.362* (2.763)	1.318* (10.217)	1.320* (10.394)
Kurtosis	4.430* (12.22)	3.855* (3.31)	1.795* (-4.62)	1.435* (-5.97)	6.867* (14.99)	8.943* (23.49)

Notes: * significant at 1% level.

z-values are in the parentheses.

Entire Period implies the whole period from 1998 to 2005.

Table 7: Descriptive Statistics Results for Each Day of the Week of BSE Sensex Index for Entire Period (1998-2005)

Statistic	Day of the Week					
	All Days	Monday	Tuesday	Wednesday	Thursday	Friday
No.of Observations	1744	348	347	345	353	369
Mean	-0.0004 (-1.000)	-0.0015*** (-1.829)	-0.0012 (-1.429)	0.0002 (0.236)	0.0004 (0.425)	0.0009 (0.891)
Stand. dev.	0.01687	0.01524	0.01558	0.01603	0.01771	0.01941
Skewness	0.371* (6.288)	0.185 (1.412)	-0.481* (-3.672)	0.321** (2.450)	0.165 (1.269)	0.928* (7.307)
Kurtosis	3.385* (3.29)	3.981* (3.76)	2.087* (-3.50)	1.635* (-5.21)	2.161* (-3.24)	5.130* (8.42)

Notes:* significant at 1% level. ** significant at 5% level. *** significant at 10% level.
z-values are in the parentheses.

Entire Period implies whole period of our study 1998-2005.