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An Examination of Seasonality in Indian Stock Markets With Reference to NSE

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The capital market in India is a market for securities, where companies and governments can raise long term funds. It is a market designed for the selling and buying of stocks and bonds. Stocks and bonds are the two major ways to generate capital and long term funds. Thus, the bond markets and stock markets are considered as capital markets. The capital markets consist of the primary market, where new issues are distributed to investors, and the secondary market, where existing securities are traded. In addition, the Indian Equity Markets and the Indian Debt markets do form part of the Indian Capital market. The Indian Equity Market depends mainly on monsoons, global funds flowing into equities and the performance of various companies. The Indian Equity Market is almost wholly dominated by two major stock exchanges -National Stock Exchange of India Ltd. (NSE) and The Bombay Stock Exchange (BSE). The benchmark indices of the two exchanges - Nifty of NSE and Sensex of BSE are closely monitored by the investors. The two exchanges also have an F and O (Futures and options) segment for trading in equity derivatives including the indices. The major players in the Indian Equity Market are Mutual Funds, Financial Institutions and FIIs representing mainly Venture Capital Funds and Private Equity Funds. The Indian Equity Market at present is a lucrative field for investors. The Indian stocks are profitable not only for long and medium-term investors, but also for the position traders, short-term swing traders and also very short term intra-day traders and speculators.

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In India as on December 30 2007, market capitalisation (BSE 500) at US$ 1638 billion was 150 per cent of GDP, matching well with other emerging economies and selected matured markets. The presence of the seasonal or monthly effect in stock returns has been reported in several developed and emerging stock markets. What is seasonality? This is a surprisingly difficult question, for which there is no simple answer. At the most basic level, there is the intuition that seasonality is an approximately cyclical pattern in a time series that more or less repeats itself each year. Complicating matters is the possibility that the pattern will drift or change in amplitude from year to year. The consensus among economists is that three basic exogenous factors give rise to seasonality in economic data. The first factor is the weather: temperature, hours of daylight, and the likelihood of severe storms. All change somewhat predictably with the calendar and affect the costs of doing many types of business. Second, predictable and regular calendar events, such as Christmas, Diwali, financial year endings affect production and consumption decisions. Third, social conventions have an impact on the timing of certain activities.

Objectives of the Study

The objectives of the study are as follows:

1. To examine days of the week effect in the returns of CNX Nifty and Nifty Junior
2. To examine weekend effect in CNX Nifty and Nifty Junior returns.
3. To examine the seasonality in monthly returns of the Nifty and Nifty Junior returns.

Literature Review

Seasonality or calendar anomalies such as month of the year and day of the week effects has remained a topic of interest for research since long time in developed as well as developing countries. Gultekin and Gultekin (1983) examined the presence of stock market seasonality in sixteen industrial countries. Their evidence shows strong seasonalities in the stock market due to January returns, which is exceptionally large in fifteen of sixteen countries. There is also evidence of the day-of the-week effect in the US (Smirlock and Starks, 1986) and other markets (Jaffe and Westerfield, 1985; 1989) and intra-month effects in the US stock returns (Ariel, 1987). The existence of seasonal effect has been found in Australia (Officer, 1975;

Brown, Keim, Kleidon and Marsh, 1983), the UK (Lewis, 1989), Canada (Berges, McConnell, and Schlarbaum, 1984; Tinic, Barone-Adesi and West, 1990) and Japan (Aggarwal, Rao and Hiraki, 1990). Boudreaux (1995) reported the presence of the month-end effect in markets in Denmark, Germany and Norway. Ziemba (1991) found that returns were consistently higher on first and last four days of the month. Pandey (2002) reported the existence of seasonal effect in monthly stock returns of BSE Sensex in India and confirmed the January effect. Bodla and Jindal (2006) studied Indian and US market and found evidence of seasonality. 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.

Methodology

Data Source and Variable Selection

In order to achieve the objectives of the study, closing prices and stock returns of CNX Nifty and Nifty Junior were obtained from NSE data files and the Handbook of Statistics on Indian Economy published by the Reserve Bank of India. The study is carried out using daily and monthly data on S&P Nifty and Nifty Junior for the period March 2003 to April 2014 obtained from the Handbook of Statistics on Indian Economy published by the Reserve Bank of India and NSE data files and involves 2775 daily observations.

Defining Variables

To test the presence of seasonality in stock returns of Nifty and Nifty Junior, it has been used one technique called Dummy Variable Regression Model. This technique is used to quantity qualitative aspects such as race, gender, religion and after that one can include as an another explanatory variable in the regression model. The variable which takes only two values is called dummy variable. They are also called categorical, indicator or binary variables in literature. While 1 indicates the presence of an attribute and 0 indicates absence of an attribute.

To examine the weekend effect and days of the week effect, the following dummy variable regression model is specified as follows:

$$\mathbf{Y = \alpha + \beta 1 Monday + \beta 2 Tuesday + \beta 3 wednesday + \beta 4 thrusday + \mu}$$

The variables Monday, Tuesday, Wednesday and Thursday are defined as:

Monday = 1 if trading day is Monday; 0 otherwise, Tuesday = 1 if trading day is Tuesday; 0 otherwise, Wednesday = 1 if the trading day is Wednesday; 0 otherwise, Thursday = 1 if the trading day is Thursday; 0 otherwise, α represents the return of the benchmark category which is Friday in the study. Y represents Nifty returns. Similarly, to examine monthly effects, the following dummy variable regression model is specified as follows:

$$\mathbf{Y = \alpha + \beta 1 may + \beta 2 june + \beta 3 july + \beta 4 august + \beta 5 september + \beta 6 october + \beta 7 november + \beta 8 december + \beta 9 january + \beta 10 february + \beta 11 march + \mu}$$

Where Y = Monthly returns of Nifty, May= 1 if the month is May; 0 otherwise, June = 1 if the month is June; 0 otherwise, July = 1 if the month is July; 0 otherwise, August= 1 if the month is August; 0 otherwise, September = 1 if the month is September; 0 otherwise

October = 1 if the month is October; 0 otherwise, November = 1 if the month is November; 0 otherwise, December = 1if the month is December; 0 otherwise, January = 1 if the month is January; 0 otherwise, February = 1 if the month is February; 0 otherwise, March= 1 if the month is March; 0 otherwise.

Statistical Techniques

To examine the stock market seasonality in India, first we measure stock return as given below:

$$\mathbf{R_t = \left(\frac{P1 - P0}{P0}\right) * 100}$$

Where Rt is the return in period t, P_1 and P_0 are the monthly (daily) closing prices at time t and t-1 respectively of Nifty and Nifty Junior.

Dickey Fuller and Augmented Dickey Fuller Tests

It is also important to test stationarity of a series lest OLS regression results will be spurious. Therefore, we will first test whether Nifty return is stationary by using DF and ADF tests of stationarity.

Dummy Variable Regression Model

To test the presence of seasonality in stock returns of Nifty and Nifty Junior, we have used one technique called dummy variable regression model. This technique is used to quantity qualitative aspects such as race, gender, religion and after that one can include as an another explanatory variable in the regression model. The variable which takes only two values is called dummy variable. They are also called categorical, indicator or binary variables in literature. While 1 indicates the presence of an attribute and 0 indicates absence of an attribute.

Analysis of Seasonality in Nifty Returns

HYPOTHESES

a) Returns on all the days of weeks are equal. Symbolically,

H0: $\beta_1=\beta_2=\beta_3=\beta_4$

H_1: At least one β_i is different

b) H0: $\beta_1=0$

H_1: $\beta_1\neq0$

c) H0: $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=\beta_6=\beta_7=\beta_8=\beta_9=\beta_{10}=\beta_{11}$

H_1: At least one β_i is different

DESCRIPTIVE STATISTICS

Descriptive statistics of Nifty and Nifty Junior were computed. The results are reported in Table: 1 below:

TABLE 1: Descriptive Statistics for Nifty and Nifty Junior

Summary Statistics	Nifty	Nifty Junior
Mean	0.082236041	0.07992026
Median	0.172691351	0.12984562
Standard Deviation	1.554059767	1.60448374
Kurtosis	9.331580486	9.84240267
Skewness	-0.253767748	0.01171541
Minimum	-12.08917052	-12.23774
Maximum	16.22289274	17.744066

The mean returns for Nifty were 0.082236041 while for Nifty Junior, the mean returns were 0.07992026. The variability of returns can be studied from the standard deviation of the distributions. The standard deviation for Nifty was recorded to be 1.554059767 while the standard deviation for Nifty Junior was recorded to be 1.60448374. Thus it can be seen that stocks of Nifty are performing better compared to Nifty Junior and are also less volatile compared to Nifty Junior.

Dickey Fuller Test of Stationarity

In time series econometrics, it is now customary to check stationarity of a series before using it in regression analysis in order to avoid spurious regression. The stationarity of Nifty and Nifty Junior returns were tested by augmented Dickey-Fuller Test. The results are reported in Table 2 and Table 3 for Nifty and Nifty Junior respectively.

TABLE 2: Unit Root Test for CNX Nifty

Null Hypothesis: STOCK_RETURNS has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=27)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-47.00350	0.0001
Test critical values:	1% level		-3.432515	
	5% level		-2.862382	
	10% level		-2.567263	

TABLE 3: Unit Root Test for Nifty Junior

Null Hypothesis: STOCK_RETURNS has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=27)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-49.31880	0.0001
Test critical values:	1% level		-3.432517	
	5% level		-2.862383	
	10% level		-2.567263	

The results of ADF model show that monthly and daily Nifty and Nifty Junior series are stationary in their level form.

Dummy Variable Regression Analysis

Next, days of the week effects in daily Nifty and Nifty Junior returns were studied. The results for Nifty and Nifty Junior are reported in Table 4 and Table 5 respectively.

TABLE 4: Dummy Variable Regression for Nifty(Weekly Data)

Dependent Variable: STOCK_RETURNS
Method: Least Squares
Date: 04/14/14 Time: 15:31
Sample: 3/04/2003 4/10/2014
Included observations: 2775

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.140441	0.065461	2.145408	0.0320
MONDAY	-0.083881	0.092951	-0.902421	0.3669
TUESDAY	-0.078657	0.092867	-0.846988	0.3971
WEDNESDAY	-0.018717	0.093037	-0.201173	0.8406
THURSDAY	-0.110620	0.093080	-1.188438	0.2348
R-squared	0.000728	Mean dependent var		0.082236
Adjusted R-squared	-0.000715	S.D. dependent var		1.554060
S.E. of regression	1.554615	Akaike info criterion		3.722133
Sum squared resid	6694.615	Schwarz criterion		3.732815
Log likelihood	-5159.460	Hannan-Quinn criter.		3.725991
F-statistic	0.504501	Durbin-Watson stat		1.771171
Prob(F-statistic)	0.732448			

The benchmark day in the model is Friday represented by the intercept which provided a return of 0.140441 percent on an average of the sample period. Returns of Monday, Tuesday, Wednesday and Thursday can be found out by deducting the coefficients of these days from the benchmark day, that is, Friday which were 0.224322, 0.219098, 0.159158 and 0.251061 respectively. The coefficient of Monday is not significant at 5 percent level which indicates that there is no *weekend effect* in Nifty returns. Further, none of the coefficients are significant at conventional levels of significance indicating that there are number days of the week effects in the Nifty returns. R_2 is 0.000728 which means that for every 1% change in the independent variables, there is 0.000728% change in the dependent variable.

TABLE 5: Dummy Variable Regression for Nifty(Weekly Data)				
Dependent Variable: STOCK_RETURNS				
Method: Least Squares				
Date: 04/15/14 Time: 22:38				
Sample (adjusted): 1 2774				
Included observations: 2774 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.071936	0.067597	1.064194	0.2873
MONDAY	-0.003055	0.095983	-0.031826	0.9746
TUESDAY	0.037923	0.095896	0.395462	0.6925
WEDNESDAY	-0.041264	0.096073	-0.429508	0.6676
THURSDAY	0.046368	0.096161	0.482192	0.6297
R-squared	0.000384	Mean dependent var		0.079920
Adjusted R-squared	-0.001060	S.D. dependent var		1.604484
S.E. of regression	1.605334	Akaike info criterion		3.786341
Sum squared resid	7135.979	Schwarz criterion		3.797026
Log likelihood	-5246.655	Hannan-Quinn criter.		3.790200
F-statistic	0.266205	Durbin-Watson stat		1.868790
Prob(F-statistic)	0.899785			

The benchmark day in the model is Friday represented by the intercept which provided a return of 0.071936 percent on an average of the sample period. Returns of Monday, Tuesday, Wednesday and Thursday can be found out by deducting the coefficients of these days from the benchmark day, that is, Friday which were 0.074991, 0.0681437, 0.1132 and 0.025568 respectively. The coefficient of Monday is not significant at 5 percent level which indicates that there is no *weekend effect* in Nifty Junior returns. Further, none of the coefficients are significant at conventional levels of significance indicating that there are number days of the week effects in the Nifty Junior returns. R_2 is 0.000384 which means that for every 1% change in the independent variables, there is 0.000384% change in the dependent variable. Seasonality of Nifty and Nifty Junior returns using monthly data was also studied. The results for are reported in Table 6 and Table 7 respectively.

TABLE 6: Dummy Variable Regression for Nifty(Monthly Data)

Dependent Variable: STOCK_RETURNS
Method: Least Squares
Date: 04/15/14 Time: 12:55
Sample: 3/04/2003 4/10/2014
Included observations: 2775

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.196354	0.104728	1.874895	0.0609
MAY	-0.156490	0.145725	-1.073867	0.2830
JUNE	-0.191113	0.145281	-1.315475	0.1885
JULY	-0.045465	0.144703	-0.314192	0.7534
AUGUST	-0.100388	0.146028	-0.687458	0.4919
SEPTEMBER	0.030273	0.146646	0.206434	0.8365
OCTOBER	-0.210328	0.146962	-1.431172	0.1525
NOVEMBER	-0.079279	0.147609	-0.537090	0.5912
DECEMBER	0.062578	0.146180	0.428085	0.6686
JANUARY	-0.306599	0.146489	-2.092976	0.0364
FEBRUARY	-0.243233	0.148619	-1.636618	0.1018
MARCH	-0.131539	0.143731	-0.915177	0.3602

R-squared	0.004849	Mean dependent var	0.082236
Adjusted R-squared	0.000887	S.D. dependent var	1.554060
S.E. of regression	1.553370	Akaike info criterion	3.723046
Sum squared resid	6667.006	Schwarz criterion	3.748682
Log likelihood	-5153.726	Hannan-Quinn criter.	3.732304
F-statistic	1.223932	Durbin-Watson stat	1.783956
Prob(F-statistic)	0.264787		

The benchmark month in the model is April represented by the intercept which provided return of 0.196354 percent on an average over the sample period. None of the coefficients are significant except January month which indicate the presence of January effect in Nifty monthly returns. R2 is 0.004849 which indicates that for every 1% change in the independent variable, there is a subsequent change of 0.004849% in the dependent variable.

TABLE 7: Dummy Variable Regression For Nifty(Monthly Data)

Dependent Variable: STOCK_RETURNS

Method: Least Squares

Date: 04/15/14 Time: 22:40

Sample (adjusted): 1 2774

Included observations: 2774 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.172677	0.108389	1.593121	0.1112
MAY	-0.245096	0.150654	-1.626883	0.1039
JUNE	-0.091588	0.150195	-0.609795	0.5420
JULY	-0.013861	0.149599	-0.092652	0.9262
AUGUST	-0.105104	0.150965	-0.696210	0.4864
SEPTEMBER	0.082995	0.151603	0.547453	0.5841
OCTOBER	-0.148683	0.151929	-0.978637	0.3278
NOVEMBER	-0.059722	0.152597	-0.391373	0.6956
DECEMBER	0.037705	0.151123	0.249501	0.8030
JANUARY	-0.292098	0.151442	-1.928782	0.0539
FEBRUARY	-0.199036	0.153638	-1.295485	0.1953
MARCH	-0.081846	0.148597	-0.550792	0.5818

R-squared	0.004549	Mean dependent var	0.079920
Adjusted R-squared	0.000585	S.D. dependent var	1.604484
S.E. of regression	1.604015	Akaike info criterion	3.787213
Sum squared resid	7106.247	Schwarz criterion	3.812857
Log likelihood	-5240.864	Hannan-Quinn criter.	3.796474
F-statistic	1.147502	Durbin-Watson stat	1.876215
Prob(F-statistic)	0.319282		

The benchmark month in the model is April represented by the intercept which provided return of 0.172677 percent on an average over the sample period. None of the coefficients are significant. R2 is 0.004549 which is indicates that every 1% change in the independent variable causes 0.004549% change in the dependent variable.

Findings and Conclusions

In this study, the seasonality of stock market in India has been examined. CNX Nifty was considered as the representative of stock market in India and it was tested whether seasonality is present in Nifty and Nifty Junior returns using daily and monthly data sets. The study found that monthly seasonality is present in Nifty and Nifty Junior returns. An analysis of the mean

performances of CNX Nifty and Nifty Junior showed that the performance of Nifty was netter compared to Nifty Junior. It was also found that stock returns of Nifty Junior were more volatile compared to those of CNX Nifty thus proving that it is better and safe to trade in CNX Nifty compared to Nifty Junior. The stationarity of stock returns of CNX Nifty and Nifty Junior were analysed and it was recorded that the stock returns of both the indices were stationary in their level form. Through the analysis of stock market seasonality using daily data, it was found that no seasonality was present and there was no days of the week or weekend effect in Nifty and Nifty Junior returns as none of the coefficients were significant at 5% significance level. In case of monthly analysis of returns, the study found that the January effect existed in Nifty returns as the coefficient was found to be significant at 5% level of significance. But there was no seasonality observed in Nifty Junior returns as none of the coefficients were significant at 5% level of significance.

References:

Gujrati, D.N. (2003). Basic Econometrics, McGraw Hill, India.

Aggarwal, Anup, and Kishore Tandon (1994), "Anomalies or Illusions? Evidence from Stock Markets in Eighteen Countries," *Journal of International Money and Finance*.

Ariel, Robert A. (1987), "A Monthly Effect in Stock Returns," *Journal of Financial Economics*.

Ariel, Robert. A. (1990), "High Stock Returns before Holidays: Existence and Evidence on Possible Causes," *Journal of Finance*.

Keim, D.B. (1989), "Trading patterns, bid-ask spreads, and estimated security returns: The case of common stocks at calendar turning points", *Journal of Financial Economics*.

Wachtel, S.B. (1942), "Certain Observation on Seasonal Movement in Stock Prices," *Journal of Business*.

Websites:

www.nseindia.com

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