



AN EMPIRICAL STUDY ON SEASONAL ANOMALIES IN THE
INDIAN STOCK MARKET

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Abstract

This study investigates the existence of seasonality in India's stock market. The Efficient Market Hypothesis suggests that all securities are priced efficiently to fully reflect all the information intrinsic in the asset. The Seasonal Effects create higher or lower returns depending on the Time Series. They are called Anomalies because they cannot be explained by traditional asset pricing models. Studies on the Seasonal Effects in the Indian Stock Market are limited. In an attempt to fill this gap, this study explores the Indian Stock Market's Efficiency in the 'weak form' in the context of Seasonal Effects. The objective of this paper is to explore the Seasonal Effect on the Indian Stock Market. For the purpose this analysis selected companies and Sensex index was chosen for a period of fifteen years from 1st April 2000 to 31st March 2015. The study found that the Day of the Week Effect and Monthly Effect Pattern did not appear to exist in the Indian Stock Market during the study period.

Keywords: *Day-of-the Week Effect, Monthly Effect, Efficient Market Hypothesis, Indian Stock Market.*

INTRODUCTION

The Indian capital market is one of the oldest and largest capital markets of the world. It also has witnessed a tremendous growth and Capital Market is the backbone of the country. The Indian Capital Market plays a major role in economics of the Indian country. Nowadays many people are interested to invest in financial markets especially on equities to get high returns, and to save tax in honest way. The equity market of the country has to contribute for the growth in the economy of the country. A marked awareness in equity investment is evident throughout the world nowadays. Equity shares serve as a first-class medium for investment. They bring in reasonable returns with prospects of capital appreciation. The Indian Financial markets¹ play a crucial role in economic development through the saving investment process, also known as capital formation. A vibrant competitive financial market is a necessary concomitant to given the benefits of liberalization policies and to sustain the

¹Sharma A.K. and SBatra G. (2008), "Indian Stock Market Regulation, Performance and Policy Perspective", ISBN 81-7629-202-8, Published by Deep & Deep Publication Pvt Ltd, New Delhi-110 027.



ongoing reforms. Many financial reforms were undertaken to improve the efficiency and stability of the financial system.

The Seasonal Effects create higher or lower returns depending on the Time Series. They are called Anomalies because they cannot be explained by traditional asset pricing models. Examples of such patterns include e.g. the January effect, the day of the week effect and the Month Effect. The most common of these are monthly patterns. Certain months provide better returns as compared to others i.e. the monthly effect. Similarly, some days of the week provide lower returns as compared to other trading days i.e. days of the week effect. The existence of Seasonality in stock returns, however, violates an important hypothesis in finance called the Efficient Market Hypothesis (EMH). The Efficient Market Hypothesis is a central paradigm in finance. New data constantly enter the market place via Economic reports, Company Announcements, Political Statements, and Public Surveys. If the market is Informational efficient then security prices adjust rapidly and accurately to new information.

The presence of various anomalies indicates that the stock market is dependent. Found by the document study that there is an existence of anomalous pattern in both developing and developed stock market. Stock market anomalies have been tested widely in stock markets of developed countries. Very few studies are available on stock market anomalies in India. In an attempt to fill this gap, this study explores the Indian Stock Market's Efficiency in the 'weak form' in the context of Seasonal Effects.

REVIEW OF LITERATURE

Patel (2008)² in this paper entitled, "Calendar Effects in the Indian Stock Market", analyzed two broad based, Indian Stock Market Indices for the period from July 1999 to June 2007 and identified two separate calendar effects, i.e., November - December effect, and March - May effect. This study found that the mean returns of November - December was significantly greater than those of the other ten months. The study also found that the returns of Market may were significantly less than those of other nine months.

Mittal and Sonal Jain (2009)³ in their study were examined three types of anomalies namely Monday effect, Friday effect and day of the week effect. The study found out that none of the above anomalies exist in the Indian Stock Market. Further results of serial correlation and runs tests also supported the random walk theory and efficiency market hypothesis.

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²Jayan B. Patel (2008), "Calendar Effects in the Indian Stock Market", *International Business and Economics Research*, Vol.7, No.3, pp.61-67.

³Mittal, Sathish K. Sonal Jain (2009), "Stock Market Behavior: Evidence from Indian Market," *Vision*, Vol.13, No.3, pp.19-29.

⁴Mittal, Sathish K. Sonal Jain (2009), "Stock Market Behavior: Evidence from Indian Market," *Vision*, Vol.13, No.3, pp.19-29.



Nageswari and Selvam (2011)⁵ examined the day of the week effect during the post rolling settlement period. The study found that the highest mean return on Friday and the lowest mean return on Tuesday were observed during the study period. Further, there was strong significant positive relationship between Monday – Friday and no significant relationship among other days of the week. The results indicated that the day of the week effect did not exist in the Indian stock market during the study period.

STATEMENT OF THE PROBLEM

An efficient stock market can instantaneously process the information and it will be reflected on security prices. This Information Transmission Mechanism ensures that the stock returns across all days of the weeks and months are equal. Hence the market participant, the rational financial decision maker, cannot earn any abnormal profits. It is to be noted that the returns constitute only one part of the decision making process. Another part of decision making is the calculation of risk of returns. It is important that there are variations in risk of stock returns by the day of the week, month of the year.

Behavior of stock returns performance has been influenced by seasonal anomalies. The seasonality's experimental in stock returns in those countries can be classified as day of the week⁶, turn of the month effect⁷, and the size effect⁸. Again these studies have shown existence of market seasonality's. Even though there is mounting evidence concerning seasonal anomalies in US and other developed markets, there are very few studies undertaken in India. Hence, the following questions were raised in the minds of researcher.

1. What are the variations in volatility of stock returns by the day of the week and month of the year?
2. Whether return is associated correspondingly with high and low volatility for a given day?

How much tolerance of volatility (risk) of stock returns is associated with the Indian stock market?

OBJECTIVES OF THE STUDY

The overall objectives of the study are to examine the stock performance, anomalous patterns of selected companies and Sensex stocks. The specific objectives are

1. to study the existence of seasonal anomalies in stock returns
2. to examine whether the Day of the Week Pattern in Indian Stock Markets and

⁵Nageswari P.and Selvam M. (2011), "Re-Examination of the Day of the Week Effect on the Indian Stock Market: A Study With Reference to S&P CNX 500 Index", *Management Trends*, Vol.8, No.1, pp.29-42.

⁶Jaffe, Westerfield and Christopher (1989), "A Twist on the Monday Effect in Stock Prices: Evidence from the US and Foreign Stock Market", *Journal of Banking & Finance*, Vol.13, No.415, pp.641-650.

⁷Arief, Robert A. (1897), "A Monthly Effect in Stock Returns", *Journal of Financial Economics*, Vol.18, No.1, pp.161-174.

⁸Chan K. C. and Nai-Fu Chen (1991), "Structural and Return Characteristics of Small and Large Firms", *The Journal of Finance*, No.4, pp.1467-1484.



3. to identify the presence of Monthly Effect in Indian Stock Markets..

HYPOTHESES OF THE STUDY

The above objectives had the following hypotheses and they are tested:

1. There is no significant difference in stock returns among the different trading days of the week.
2. There is no significant difference in stock returns among the different months of the year.

METHODOLOGY

The empirical models used in this study.

Selection of Sample and Data Collection

The required data for the present study were the daily, weekly, monthly high and low for a period of 15 years from 2000 to 2015 for SENSEX 22 companies out of 30 companies were collected from BSE website and Bloomberg Database. As there is no availability of data for left out eight companies they have not included. For the present study Daily, Weekly and Monthly high and low share price data were collected. Indices viz., Sensex, BSE 100, BSE 200 and BSE 500 were also collected. Indices viz., NIFTY, CNX NIFTY Junior and NSE 500 Index were collected from BSE, NSE website, indiainfoline.com, moneyconrio.com and Bloomberg Database.

Period Covered

The daily, weekly and monthly share price data for individual securities (SENSEX) were collected for a period of fifteen years from 1st April 2000 to 31st March 2015. For Bombay Stock Exchange Sensitive Index, Bombay Stock Exchange 100 Index, Bombay Stock Exchange 200 Index, Bombay Stock Exchange 500 Index, National Stock Exchange S&P CNX NIFTY, National Stock Exchange CNX NIFTY Junior index and National Stock Exchange CNX 500 Index were collected for a period of fifteen years from 1st April 2000 to 31st March 2015.

Tools of Analysis

Returns

The investors may get returns on their equity investment in dividends and / or appreciation of capital assets over the holding period. When calculating stock returns, the cash dividends are not considered because of difficulties in collecting the details of the same. The rate of return on a stock for a given day is typically calculated by subtracting the average of high and low price on the previous day (P_{t-1}) from the average price on that day (P_t) and then dividing the resulting number by the average price as of the previous trading day (P_{t-1}):

$$i.e., Return = (P_t - P_{t-1}) / P_{t-1} * 100 \quad \dots\dots\dots (1)$$

where,

P_t = Price of a security at time t and

P_{t-1} = Price of a security at the t-1.



Day of the Week Effect by using Dummy Variables

Regression on dummy variable is used to test whether the anomalies pattern in returns are uniform across all days of the week. Gibbons and Hess method of regressing daily returns by using five dummy variables for five days of the week (i.e., Monday through Friday) is used in this study. The dummy variable regression equation is as follows:

$$R_t = \beta_1 M_t + \beta_2 T_t + \beta_3 W_t + \beta_4 Th_t + \beta_5 F_t + \varepsilon_t \dots\dots\dots (2)$$

Where,

- R_t = return on index at time t,
- $M_t, T_t, \dots\dots\dots F_t$ = dummy variable for Monday through Friday,
- β_1 through β_5 = regression parameters for mean daily returns and
- ε_t = error term.

Monthly Effect by using Dummy Variables

This model has been used by Gibbons and Hess method of regressing monthly returns by using twelve dummy variables for twelve months (i.e., January through December) is used in this study. The dummy variable regression equation is as follows:

$$R_t = \beta_1 Jan_t + \beta_2 Feb_t + \beta_3 Mar_t + \dots\dots\dots + \beta_{11} Nov_t + \beta_{12} Dec_t + \varepsilon_t \dots\dots (3)$$

Where,

- R_t = monthly return on index at time t,
- $Jan_t, Feb_t, \dots\dots\dots Dec_t$ = dummy variable for January through December,
- β_1 through β_{12} = return for each month from January through December and
- ε_t = error term.

RESULT OF DUMMY VARIABLE REGRESSION TO TEST SEASONALITY OF DAY OF WEEK EFFECT

Table.1 presents the results of dummy variable regression to test seasonality from April 2000 to March 2015. From the below Table, it is clearly observed that for study companies, Wednesday recorded highest positive coefficient value (return) and Monday exhibits the lowest coefficient value (return) during the study period. Negative coefficient value (return) is observed on Thursday and Friday. So, it is advised that the investors should buy the shares on Monday and sell these shares on Wednesday in the Bombay Stock Market. For the seven indices, Thursday (0.084 percent) and average return (0.025 percent) exhibits the highest positive return and Tuesday (0.001 percent) and average return (0.025 percent) exhibits the lowest return. Negative coefficient value is observed on Monday and Wednesday shows negative return.

Amanulla and Thiripalraju (2001) found that there were consistent positive returns on Wednesdays and negative returns on Tuesdays due to possible impact of the Week End



Effect. Hence, the hypothesis that “There is no significant difference in stock return across days of the week” is rejected. So there was strong significant positive relationship between Monday through Friday. The results indicated that the Day of the Week Effect did not exist in the Indian Stock Market during the study period.

RESULT OF DUMMY VARIABLE REGRESSION TO TEST SEASONALITY OF MONTHLY EFFECT

The results of the Dummy variable regression analysis for study companies and seven indices month wise returns during the study period from April 2000 to March 2015 demonstrated in Table 2. It is to be noted from the analysis that there was positive coefficient value (return) earned for the months of February, March, April, May, July, September and December while the negative coefficient value (return) has been earned for the remaining months. Form the table study companies which discloses the highest positive return is noted that December (0.7218 percent) immediately followed by May (0.5769 percent) and February (0.3634 percent).

In the seven indices the highest positive returns is found in December for BSE SENSEX (0.960 percent), BSE 100 (1.608 percent) and BSE 200 (1.227 percent), Others are shown in different months for BSE 500 (0.709 percent) found in May, NIFTY (1.612 percent) and NIFTY JUNIOR (0.988 percent) found in February , NSE 500 (1.563 percent) found in March. The lowest positive return is observed in September for BSE SENSEX (0.165 percent), May for BSE 100 (0.613 percent), November for BSE 200 (0.422 percent), February for BSE 500 (0.120 percent), July for NIFTY (0.086 percent), NIFTY JUNIOR (0.058 percent), and August for NSE 500 (0.197 percent).



Table 1. Result of Dummy Variable Regression Analysis for Day of the Week Effect from 1st- April - 2000 to 31st- March - 2015

S.No	Company	Monday		Tuesday		Wednesday		Thursday		Friday		R-Square
		Co-efficient	t-value	Co-efficient	t-value	Co-efficient	t-value	Co-efficient	t-value	Co-efficient	t-value	
1	BHEL	-0.005	-0.100	0.093	1.692	0.128	2.520	-0.025	-0.461	0.019	0.376	0.015
2	CIPLA	-0.021	-0.501	-0.066	-1.507	-0.011	-0.240	0.011	0.217	-0.004	-0.091	0.052
3	GAIL	0.008	0.194	0.011	0.231	0.046	0.927	0.030	0.583	0.034	0.678	0.012
4	HDFC	0.028	0.742	0.014	0.304	-0.015	-0.340	0.066	1.579	0.000	0.006	0.007
5	HDFCBANK	0.003	0.068	0.017	0.370	0.037	0.829	-0.037	-0.779	-0.018	-0.383	0.049
6	HERO	-0.037	-0.989	0.027	0.575	0.032	0.697	-0.004	-0.086	0.018	0.392	0.048
7	HINDALCO	0.024	0.750	-0.014	-0.382	0.001	0.015	0.025	0.660	-0.016	-0.477	0.060
8	HUL	-0.065	-1.819	0.014	0.350	0.036	0.913	-0.048	-1.152	-0.044	-1.093	0.050
9	ICICIBANK	0.047	1.270	0.034	0.791	0.031	0.753	0.024	0.574	0.002	0.048	0.090
10	INFY	0.025	0.597	-0.005	-0.108	-0.042	-0.915	0.018	0.402	-0.044	-1.050	0.064
11	ITC	-0.085	-2.195	0.079	1.820	0.009	0.214	0.016	0.341	0.009	0.194	0.085
12	L&T	-0.022	-0.636	-0.008	-0.193	0.036	0.978	-0.061	-1.557	-0.049	-1.313	0.014
13	M&M	0.047	1.204	0.050	1.148	-0.048	-1.093	0.022	0.523	-0.021	-0.521	0.047
14	ONGC	0.010	0.256	0.027	0.627	0.085	1.879	-0.017	-0.369	0.005	0.115	0.060
15	RIL	-0.002	-0.077	0.000	0.008	-0.015	-0.349	-0.039	-0.964	0.001	0.015	0.002
16	SBIN	-0.011	-0.351	-0.016	-0.437	0.081	2.238	-0.011	-0.284	0.041	1.132	0.066
17	STER	0.005	0.165	0.048	1.238	0.038	0.992	-0.005	-0.114	-0.028	-0.728	0.050



18	SUNPHARMA	0.030	0.623	0.034	0.673	0.051	0.950	-0.024	-0.476	0.001	0.028	0.050
19	TATAMOTORS	0.021	0.638	0.005	0.125	0.059	1.484	0.059	1.333	-0.007	-0.193	0.055
20	TATAPOWER	0.026	0.839	-0.055	-1.563	-0.005	-0.144	-0.053	-1.348	0.050	1.369	0.045
21	TATASTEEL	0.036	1.247	-0.002	-0.057	-0.026	-0.664	0.023	0.592	-0.055	-1.613	0.051
22	WIPRO	-0.044	-1.127	0.053	1.236	-0.056	-1.415	-0.024	-0.553	-0.033	-0.771	0.104
	Study Companies	0.001	0.036	0.015	0.316	0.021	0.465	-0.002	-0.061	-0.006	-0.176	0.049
	SENSEX	0.012	0.382	0.047	1.115	-0.065	-1.587	0.051	1.165	0.007	0.189	0.024
	BSE 100	-0.009	-0.276	0.035	0.860	-0.073	-1.854	0.037	0.867	0.009	0.233	0.029
	BSE 200	0.018	0.597	0.027	0.693	-0.056	-1.448	0.036	0.866	0.013	0.340	0.026
	BSE 500	-0.014	-0.381	-0.036	-0.747	0.004	0.088	0.084	1.596	-0.098	-2.041	0.053
	NIFTY	-0.038	-1.191	-0.049	-1.255	0.019	0.456	0.005	0.008	0.037	0.962	0.039
	NIFTY JUNIOR	-0.019	-0.632	0.001	0.027	-0.020	-0.555	-0.014	-0.341	0.029	0.779	0.056
	NSE 500	-0.001	-1.305	-0.001	-0.030	0.013	0.267	-0.018	-0.367	0.035	0.740	0.005



Table 2. Result of Dummy Variable Regression Analysis for Monthly Effect from 1st- April - 2000 to 31st- March - 2015

S. No	Company	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	R-Square
1	BHEL	-1.110	-1.024	1.560	-1.442	-0.077	-0.100	-0.238	1.513	-0.199	-0.786	0.376	0.866	0.809
2	CIPLA	-3.101	3.787	-2.553	1.155	0.935	-0.198	-0.635	0.529	0.101	0.863	0.792	-1.794	0.994
3	GAIL	-1.540	-0.490	-0.085	-0.324	-0.031	-0.738	-0.537	0.817	-0.807	0.156	0.454	0.118	0.879
4	HDFC	-0.570	-0.221	0.249	-0.239	-0.175	-0.447	-0.166	-0.597	0.550	-0.383	-0.997	0.766	1.000
5	HDFCBANK	1.416	0.442	-2.109	1.466	0.229	0.129	0.454	0.083	-0.202	0.039	-0.664	-0.788	0.924
6	HERO	0.100	-0.662	-0.541	-1.032	1.269	-0.199	-1.253	0.909	-1.456	-0.469	-2.280	0.770	0.710
7	HINDALCO	0.795	1.561	1.929	2.133	0.671	-1.211	1.254	-0.549	1.152	-0.329	0.761	0.187	0.949
8	HUL	0.614	-0.023	-0.166	0.831	1.528	-0.943	0.045	-0.881	-0.579	0.145	-0.460	1.181	0.998
9	ICICIBANK	0.966	-0.247	-0.965	-0.918	0.199	0.773	0.786	0.486	-0.580	-0.820	0.949	-0.319	0.970
10	INFY	0.617	4.113	1.411	-0.440	-0.984	-1.669	0.151	-0.871	0.878	-2.533	-1.735	2.607	0.953
11	ITC	-1.408	0.154	0.863	-0.193	-0.247	0.195	-0.233	-0.427	1.259	-0.491	0.246	-0.334	0.758
12	L&T	-3.557	2.448	-0.832	-0.261	0.666	-2.815	-0.404	-1.107	2.296	0.603	-3.504	3.783	0.892
13	M&M	3.971	-0.677	0.336	2.284	3.028	-0.062	0.772	-2.448	1.070	-2.632	-0.519	4.484	0.997
14	ONGC	-0.244	0.024	-0.075	-0.139	0.193	-0.720	0.146	0.358	0.081	-1.375	2.368	-0.326	0.982
15	RIL	-0.505	1.974	7.573	0.841	2.974	-2.348	-1.885	-0.462	3.324	1.018	-0.389	3.162	0.644
16	SBIN	-2.065	-1.426	0.400	-1.504	0.906	-0.414	1.967	1.400	-3.329	-0.979	-0.558	2.112	0.981
17	STER	0.307	-1.470	-1.668	1.386	-0.207	0.613	1.027	0.422	-0.237	0.785	-3.248	-4.559	0.871
18	SUNPHARMA	0.537	0.081	-0.069	-0.030	-0.105	0.299	-0.405	-0.551	-0.008	-0.721	-1.111	0.752	0.995



19	TATAMOTORS	0.637	-0.107	0.354	1.695	0.039	-0.398	-1.370	-2.733	1.515	2.303	-0.895	2.205	0.944
20	TATAPOWER	-0.219	0.122	-0.126	1.061	0.705	-0.085	1.927	-1.673	0.737	-0.584	-1.027	2.203	0.795
21	TATASTEEL	0.965	0.214	0.058	-0.026	0.254	-0.103	0.390	-0.701	0.570	0.048	-0.846	0.113	0.971
22	WIPRO	-0.403	-0.578	-1.378	-1.394	0.921	-0.175	-0.214	1.002	-1.445	-1.483	-1.817	-1.310	0.915
	Study Companies	-0.173	0.363	0.189	0.223	0.577	-0.483	0.072	-0.249	0.213	-0.347	-0.641	0.723	0.906
	SENSEX	-0.160	0.956	-0.609	0.606	0.299	-0.568	0.326	-1.181	0.165	-0.123	-1.177	0.960	0.957
	BSE 100	-0.422	-0.782	-0.108	-0.129	0.613	-0.964	1.174	-0.989	-0.020	-1.200	-0.506	1.608	0.963
	BSE 200	-0.560	-0.451	0.147	-0.309	0.850	-1.045	1.098	-0.756	-0.705	-1.166	0.422	1.227	0.998
	BSE 500	-0.536	0.120	-0.197	-0.581	0.709	-0.796	0.669	0.544	-0.443	0.190	0.224	-0.321	0.868
	NIFTY	0.635	1.612	-0.081	0.293	-0.443	-0.992	0.086	0.913	0.475	0.385	-0.759	-0.514	0.873
	NIFTY JUNIOR	0.607	0.988	-0.537	0.555	-0.106	-0.967	0.058	0.414	0.483	0.429	-0.854	-0.187	0.878
	NSE 500	0.532	0.377	1.563	-1.240	0.228	-0.745	-1.291	0.197	0.879	-0.048	-1.079	-0.615	0.854



SUMMARY OF FINDINGS

For the day of the week effect, the used tool of dummy variable regression to test seasonality. It is clearly observed that for study companies, that recorded highest positive coefficient value (return) on Wednesday and Monday exhibits the lowest coefficient value (return) during the study period. Negative coefficient value (return) is observed on Thursday and Friday. For the seven indices, Thursday average return exhibits the highest positive return and Tuesday average return exhibits the lowest return. Negative coefficient value is observed on Monday and Wednesday shows negative return. Hence, the hypothesis that “There is no significant difference in stock return across days of the week” is rejected. So there was strong significant positive relationship between Monday through Friday. The dummy variable regression analysis of returns for all the 22 companies and the seven indices shows evidence for significant variation across all days of the week

Monthly effect is observed in the Indian stock market. The highest positive return is noted that December immediately followed by May and February and lowest positive return is observed in July for the study companies. It is to be noted from the analysis that there was positive coefficient value (return) earned for the months of February, March, April, May, July, September and December while the negative coefficient value (return) has been earned for the remaining months. In the seven indices the highest positive returns is found in December for BSE SENSEX, BSE 100 and BSE 200, Others are shown in different months for BSE 500 found in May, CNX NIFTY and CNX NIFTY JUNIOR found in February, NSE 500 found in March. The lowest positive return is observed in September for BSE SENSEX, May for BSE 100), November for BSE 200), February for BSE 500, July for CNX NIFTY, CNX NIFTY JUNIOR, and August for NSE 500. Hence, for the study companies and the seven indices, it is found that the highest return is shown in December. Hence, the hypothesis that “There is no significant difference in stock return across the month effect of the calendar year” is rejected. The analysis of returns for all the 22 companies and the seven indices shows evidence for significant variation across the month of the calendar year.

CONCLUSION

- ❖ The study found that there was maximum return earned on Wednesday and negative returns recorded on Monday during the study period.
- ❖ The regression results confirmed the seasonal effect does not exist in stock returns in India. The study further reveal that January, February and March have negative returns but are the best months to buy the scrips (buy low) and November and December show significant positive high returns goading us to conclude that these two months are the best period to sell the securities (sell high).
- ❖ Tax-loss selling hypothesis could be the possible explanations for the above phenomenon.
- ❖ The returns in the stock market are not independent across different trading days of the week.
- ❖ The Study also provides evidence that the market was not able to price the risk appropriately as higher returns were possible by taking less risk and this indicates market inefficiency.



- ❖ The Study found out that the day of the week effect and monthly effect pattern did not appear to exist in Indian Stock Market.
- ❖ The findings of this study would possibly help in understanding and explaining such seasonality for the Indian stock markets.

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