

## Stock Market Seasonality- Time Varying Volatility In The Emerging Indian Stock Market

<sup>1</sup>Dr.A.Arumugam, <sup>2</sup> Dr.K.Soundararajan

1. Professor, Dept. of Management Studies Paavai Engineering College, Namakkal – 637018. Tamil Nadu, India.

2. Professor, Dept. of Management Studies Dhanalakshmi Seenivasan Engineering College, Perambalur, Tamil Nadu, India

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**Abstract:** This paper investigates seasonality and time varying volatility in the Indian stock markets. The researcher finds that there is a divergent cyclic pattern in investor actions that is reflecting not only returns, but in all aspects of trade activity. The information diffusion apparatus ensures that the stock returns across all days of the weeks and months are equal and the market participant, the balanced financial decision-maker, cannot earn any extra-normal profits. It is important to note that there are variations in explosive nature of stock takings by the “each day-of-the Week”, “every month of the Year” and “Semi-Month”. Besides, a high (low) return is connected with a correspondingly high (low) volatility for a given day. If the investors can recognize a certain pattern in instability, then it would be easier to make investment decision based on both returns and risk. Studies on the changes in the market return and stock return of companies facilitate the government to know whether the objectives of the monetary system have been realized or not. The result of the analysis enables the establishment to reformulate the system wherever required. In a developing country like India, fast development of economy is very important. It can be realized by having trade development. For which, the stock market contributes more for the development of industries in general and economic development in particular. Unless periodical assessment made, the extent of achieving this object will not be known. In a vibrant economic system periodical review is much more important. It helps to review and readjust the policy according to change of time. Changes in the market return and stock return of the selected companies have been analysed on daily basis, monthly basis and yearly basis. The present study also premeditated the risk parameter for the market return and stock return of the selected companies.

**Keywords:** Seasonality; Returns, volatility and volume traded; Calendar (Day, Week and Month) effects; Indian stock markets; Window dressing, Earning season, Efficient market hypothesis and Festival holiday.

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### I. Introduction

The ripples generate by affairs of state and macroeconomic announcements may tricky to understand broader patterns in the stock market. These patterns may replicate on a seasonal basis, or occur more at asymmetrical intervals. Seasonal patterns are anchor in yearly taxation milestone, pension and bonus payments, the quarterly "earnings season", "window-dressing" on the part of fund managers, index-rebalancing periods, possible seasonal psychological effects, production, advertising, and release cycles in industry, and a likely innumerable of other factors that are more complicated to identify and isolate. Apparently, one should not expect seasonal patterns to be set in stone as tax rates and schedules change, so should the joined seasonal effects. Despite something of a disagreement of the "efficient market hypothesis", though, these patterns do tend to keep it up persist and can be taken advantage of...most of the seasonal investment tests to the right of the screen have outperformed the general market is very radically on scales as small as a day to as long as 3 months. The values that underlies the seasonal investing plan is that more losses can be eliminated or abridged, the greater is the fall of risk and therefore the better the chance for greater profits.

For this research purposes, the word “seasonality” is defined as a number of cyclic trends that seem to exist in the stock market. A seasonal movement is a relentless time period when the stock market has a statistically high predisposition to either rise or fall. Seasonal investing relies on probabilities, uncertainties, and it underperforms due to conventional investment methods.

### Objectives of the Study

The main objectives of the research is to know the instability of market return and stock return of the sample companies listed at the Bombay Stock Exchange and at the National Stock Exchange and the seasonality of the Indian stock market with reference to time varying unpredictability. .

### **Literature review**

**Hansen, Charlotte Strunk** (This work has got its own methodology. The study uses only secondary data for analytical purpose. Secondary data are not originally collected rather obtained from published or unpublished sources. The data for the present study were collected from the websites of the Bombay Stock Exchange and from the National Stock Exchange. The data also collected from the “money” website. The collected raw data were classified and computed according to requirement of the study. With a view to study the volatility and seasonality of the Indian stock market the appropriate statistical tools have been used. This analysis further has been interpreted and observation is made out of it.

A brief review of select studies has been presented here to identify research gap and understand methodologies employed in the research area of Seasonality and volatility of Indian stock market**(2000)** This paper examines the information content of options on the Danish KFX share index. It considered the relation between the volatility implied in an option's price and the subsequently realised index return volatility. Since these options are traded infrequently and in low volumes, the errors-in-variables problem is potentially large. They address the problem directly using instrumental variables techniques. It was found that when measurement errors are controlled for, call option prices even in this very illiquid market contains information about future realised volatility over and above the information contained in historical volatility.<sup>1</sup>

**T Lavin, Angeline's (2000)** found that evidence of seasonality in stock returns during the 1926-92 periods. Dividing the data into sub-periods yields the following results: there was no evidence of stock market seasonality from 1926 to 1940, seasonality increased between 1941 and 1975 and then diminished slightly from 1976 to 1992. Specifically, the average January return was found to be significantly different than the average return in the other eleven months of the year. Seasonality was found in the high-quality end of the corporate bond market during the 1966-78 periods, but there was no evidence of seasonality in the government bond market.<sup>2</sup>

**Amanulla.S and Thiripalraju (2001)**, found that there was consistent positive returns on Wednesdays and negative returns on Tuesdays due to possible impact of the Week End Effect.<sup>3</sup>

**Moses, Lucia (2001)** opined that Veronis' report forecasts newspaper ad spending will grow at a compound annual rate of 5.7% the next five years. But with no new advertising streams on the horizon to replace the tech and Internet ads that drove spending in the late 1990s, Veronis predicts media properties won't recover as quickly as they did from the last recession. After years of publishers curtailing outlying circulation and shuttering evening editions, Broadwater said he is glad to see publishers' recent commitment to turning around circulation declines, a move crucial to their survival.<sup>4</sup>

**Unsworth, Edwin (2002)** concluded that European insurers and reinsurers, which traditionally have placed more of their investments in equities than their U.S. counterparts, recently began announcing half-year results that illustrate the adverse effects of lower investment earnings on profits. These companies, their customers and insurer rating agencies are all becoming concerned about the consequences of lower investment returns and losses. Until recently, insurers and reinsurers in continental Europe have placed between 20% and 25% of their investments in equities, though that percentage was as high as 80% for U.K. life insurance companies, according to Yann Le Pallec, a Paris-based analyst with Standard & Poor's Corp. This compares with the 1960s and 1970s, when insurer investment practices were “very conservative” with about 80% of assets invested in government bonds and most of the remainder in real estate rather than equities.<sup>5</sup>

**.A study of the U.S. (2002)**, equity market and the indices that track it will use a measure I call the “share-weighted return.” This particular figure is not provided by Morningstar or other services. The share-weighted return assigns a greater weight to stocks that have more shares outstanding and less weight to thinly-held stocks. As a result, this procedure attempts to track equity returns in proportion to the share base held by investors. Like market cap weighting, the technique acknowledges the inherent size and scope differentials among U.S. equities. But unlike market cap weighting, it does not use current stock prices in the calculation. Shares outstanding and their quarterly or annual returns are the components.<sup>6</sup>

**Harper, Richard B., (2003)** stated that investors hold cash and near-cash balances for several reasons. One typical reason to hold demand deposits and money market fund balances is to provide ready access to cash for various transaction needs and unanticipated liquidity needs. Many investors also hold cash and near-cash balances to moderate their risk exposure to equity markets and provide peace of mind and shelter from the storm when stock prices seem dangerously high or when stock market volatility soars. Fixed principal accounts are less appropriate in asset allocation and balanced account applications, though, and cash-equivalents can be a detriment to the performance of a balanced portfolio in terms of both return and downside risk protection.<sup>7</sup>

**Chotigat .T and Pandey I M. (2005)** investigated the Monthly Effect on stock returns for the stock market in India and Malaysia. This study empirically confirmed the existence of Seasonality in stock returns in both capital markets. The study suggested that the Indian Stock Market would move in the direction of higher level of efficiency and the investors would earn returns commensurate with risk.<sup>8</sup>

**Hareesh Kumar.V and Malabika Deo (2007)** analyzed the efficiency of Indian Stock Market by using S&P CNX 500 Index. They discovered the presence of Day of the Week Effect in the Indian Stock Market, which affected both the stock returns and volatility, thereby proving the Indian Stock Market to be inefficient.<sup>9</sup>

**Stovall, Sam(2007)** stated that The S&P 500 index just eclipsed the 1,500 mark for the first time since September 11, 2000. Market sages are now talking about overtaking the S&P 500's old high of 1527 in the next two months. At this rate, the S&P 500 could be up 17% for the full year. But in light of eroding fundamentals, many investors must be wondering if the recent market advance is sustainable. It's no wonder investors are considering the old Wall Street adage: "Sell in May then walk away." S&P Equity Strategy believes investors would be wise to heed the advice, but in a slightly altered fashion. There is truth in the old adage, in our opinion. Since 1945, the S&P 500 posted an average price gain of 7.1% during the November through April [N-A] period, versus a rise of only 1.6% from May through October [M-O], implying that greater profits could be made elsewhere. In addition, the performance during N-A outperformed M-O 69% of the time, as was the case in the last 12 months.<sup>10</sup>

**Halperin, Alex (2007)** revealed that some market pros remain optimistic about Chinese stocks, despite interest rate-hike jitters and periodic bouts of volatility Any lingering doubts about China's global clout were laid to rest when fears that the government would have to raise interest rates caused a brief panic on Apr. 19 in Asian and European markets. News that China's economy had grown at an annualized rate of 11.1% surpassed expectations, and investors feared China would have to hike rates to stave off inflation and rein in overheated growth. But analysts remain sanguine despite the Middle Kingdom's periodic bouts of volatility, good news for investors in Europe and the U.S. Though it's far more volatile than markets in the U.S. and Europe, the Chinese stock market has also displayed impressive resilience. After the Shanghai composite index plunged more than 9% on Feb. 27, it quickly rebounded to new highs. Likewise, on Apr. 19, when the market benchmark saw a large slump on interest-rate worries, it recovered most of the losses by the next day.<sup>11</sup>

**Ushad Subadar Agathe (2008)** found the average returns of Stock Exchange of Mauritius (SEM) to be the lowest in the Month of March and Highest in the Month of June. The equality of means-return tests shows that returns were statistically the same across all months. The regression analysis reveals that returns were not independent of the Months of the Year, except for January.<sup>12</sup>

**Selvarani.M and Leena Jenefa (2009)** analyzed the trends in annual returns and daily returns. A set of parametric and non-parametric tests were employed to test the equality of mean returns and standard deviations of the returns. It was found that in the NSE, there was strong evidence of April and January Effect. After the introduction of the Rolling Settlement, Friday had become significant. As far as the Day Effect was concerned, Tuesday Effect was more prevalent than Monday Effect.<sup>13</sup>

**Nageswari.P and Babu .M (2011)** examined the Week End Effect in the Indian Stock Market. The study found that the mean returns were positive for all days of the week, highest on Friday and lowest on Monday. It was inferred that the Day of the Week Pattern did not exist in the Indian Stock Market during the study period.<sup>14</sup>

**Nageswari .P and Selvam .M (2011)** 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 the above literature provides an overview of Valuation of Seasonality Effects in various Stock Markets. An attempt has been made in this study to analyze the Stock Market Seasonality in India by taking the model from the above study.<sup>15</sup>

## **II. Hypotheses Formulated**

In order to find out the dependence between successive market returns and stock returns of the selected companies, the following hypotheses have been framed. There is no inter-month effect on stock return in case of sample companies, there is no disparity in the mean returns across the days of the week, the means of the stock returns and market returns for five days are equal, daily series contains a unit root, monthly series contains a unit derivation and progress of stock returns and market returns is random.

### **Result and discussion**

In order to find out the seasonal variation in the Indian stock market, the Dickey Fuller test and Phillip- Perron tests have been employed. The stock market returns are calculated as the natural log of daily and monthly relative mean value used for this study. Following is the formula:

$$R_t = \ln \left( \frac{P_t}{P_{t-1}} - 1 \right)$$

Where:  $R_t$ = return on day 't'

$P_t$  = index mean value on day 't'

$P_{t-1}$  = index mean value on day 't-1' and  $\ln$ =natural log.

The results are given in Table 1. The positive returns in no of times have been found to be higher in BSE index and Grasim Industries Ltd about 1361 times and 1262 times respectively. The positive returns are also found to be the largest in case all companies except Bata India Ltd, Hindustan Petroleum Corporation Ltd, Satyam Computer Services Ltd and Wipro Ltd whose negative returns are higher than positive returns.

The day effect for the BSE index and companies is found by classifying mean return data into day wise. BSE index shows highest and lowest average returns on Thursdays and Tuesdays respectively. There is no strong evidence for week end effect in BSE index. While comparing the Monday mean return with Tuesday, Monday has higher mean return than Tuesday. This shows the presence of **Tuesday effect** for the entire index. For the selected pharmaceutical companies, 5 companies have negative mean return on Monday and positive mean return on Friday, it supports the **Monday effect**. Of 20 companies, 9 companies support the **Tuesday effect**. These companies have negative mean return on Tuesday and positive mean return on Monday. Most of the Tuesday mean return is lower than the Monday. **Thursday effect** is present in 12 companies. The results are given in Table 1.

**BSE Daily**

Companies	n	Monday	Tuesday	Wednesday	Thursday	Friday	TOTAL
SENSEX	no of positive returns	273	277	270	277	264	1361
	no of negative returns	225	221	230	221	226	1123
ACC Ltd	no of positive returns	269	241	260	245	232	1247
	no of negative returns	229	257	240	253	258	1237
Ashok Leyland Ltd	no of positive returns	271	235	240	258	239	1243
	no of negative returns	227	263	260	240	251	1241
Bata India Ltd	no of positive returns	256	223	240	218	236	1173
	no of negative returns	242	275	260	280	254	1311
BHEL	no of positive returns	277	248	264	258	247	1294
	no of negative returns	221	250	236	240	243	1190
CIPLA Ltd	no of positive returns	258	253	238	261	260	1270
	no of negative returns	240	245	262	237	230	1214
Grasim Industries Ltd	no of positive returns	246	257	250	253	256	1262
	no of negative returns	252	241	250	245	234	1222
HDFC Bank Ltd	no of positive returns	257	237	256	265	247	1262
	no of negative returns	241	261	244	233	243	1222
Hero Honda Motors Ltd	no of positive returns	259	244	246	246	250	1245
	no of negative returns	239	254	254	252	240	1239
Hindustan Petroleum Corporation Ltd	no of positive returns	253	266	244	234	230	1227
	no of negative returns	245	232	256	264	260	1257
ICICI Bank Ltd	no of positive returns	256	253	247	246	253	1255
	no of negative returns	242	245	253	252	237	1229
Infosys Technologies Ltd	no of positive returns	263	258	244	242	245	1252
	no of negative returns	235	240	256	256	245	1232
ITC LTD	no of positive returns	269	273	261	269	259	1331
	no of negative returns	229	225	239	229	231	1153
M&M LTD	no of positive returns	264	244	256	247	251	1262
	no of negative returns	234	254	244	251	239	1222
ONCG LTD	no of positive returns	283	230	280	250	246	1289
	no of negative returns	215	268	220	248	244	1195
Ranbaxy Laboratories Ltd	no of positive returns	246	252	256	253	246	1253
	no of negative returns	252	246	244	245	244	1231
Reliance Industries Ltd	no of positive returns	248	259	246	260	237	1250
	no of negative returns	250	239	254	238	253	1234
Sat yam Computer Services Ltd	no of positive returns	238	243	259	245	245	1230
	no of negative returns	260	255	241	253	245	1254
Wipro Ltd	no of positive returns	235	252	259	250	237	1233
	no of negative returns	263	246	241	248	253	1251
no of positive returns							
no of negative returns							
Highest positive		10	4	5	4	0	20

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returns							
Highest positive returns							

*Source: Computed data*

**Table - 2**  
**NSE Daily**

Companies	n	Monday	Tuesday	Wednesday	Thursday	Friday	TOTAL
NIFTY	no of positive returns	274	270	283	272	268	1367
	no of negative returns	224	228	217	226	222	1117
ACC Ltd	no of positive returns	270	246	259	248	248	1271
	no of negative returns	228	252	241	250	242	1213
Ashok Leyland Ltd	no of positive returns	263	232	261	237	240	1233
	no of negative returns	235	266	239	261	250	1251
Bata India Ltd	no of positive returns	253	207	252	209	226	1147
	no of negative returns	245	291	248	289	264	1337
BHEL	no of positive returns	261	255	268	244	244	1272
	no of negative returns	237	243	232	254	246	1212
CIPLA Ltd	no of positive returns	256	254	255	249	249	1263
	no of negative returns	242	244	245	249	241	1221
Grasim Industries Ltd	no of positive returns	245	254	264	243	249	1255
	no of negative returns	253	244	236	255	241	1229
HDFC Bank Ltd	no of positive returns	251	264	251	235	251	1252
	no of negative returns	247	234	249	263	239	1232
Hero Honda Motors Ltd	no of positive returns	254	252	267	251	254	1278
	no of negative returns	244	246	233	247	236	1206
Hindustan Petroleum Corporation Ltd	no of positive returns	244	264	243	241	231	1223
	no of negative returns	254	234	257	257	259	1261
ICICI Bank Ltd	no of positive returns	253	250	261	246	253	1263
	no of negative returns	245	248	239	252	237	1221
Infosys Technologies Ltd	no of positive returns	243	245	256	255	253	1252
	no of negative returns	255	253	244	243	237	1232
ITC LTD	no of positive returns	240	246	271	246	245	1248
	no of negative returns	258	252	229	252	245	1236
M&M LTD	no of positive returns	268	247	258	246	256	1275
	no of negative returns	230	251	242	252	234	1209
ONCG LTD	no of positive returns	275	225	290	241	236	1267
	no of negative returns	223	273	210	257	254	1217
Ranbaxy Laboratories Ltd	no of positive returns	260	234	265	244	250	1253
	no of negative returns	238	264	235	254	240	1231
Reliance Industries Ltd	no of positive returns	261	270	265	267	257	1320
	no of negative returns	237	228	235	231	233	1164
Satyam Computer Services Ltd	no of positive returns	241	250	243	258	235	1227
	no of negative returns	257	248	257	240	255	1257
Wipro Ltd	no of positive returns	232	252	270	251	228	1233
	no of negative returns	266	246	230	247	262	1251

*Source: Computed data*

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**Table – 3 BSE data for Month wise for 10 years**

Companies BSE	n	April	May	June	July	August	September	October	November	December	January	February	March
SENSEX	no of positive returns	105	124	119	115	123	117	106	119	123	109	104	99
	no of negative returns	91	90	97	104	91	91	103	85	86	102	93	107
ACCLtd	no of positive returns	105	101	101	115	122	109	105	122	113	103	101	97
	no of negative returns	91	113	115	104	92	99	104	82	96	108	96	109
Ashok Leyland Ltd	no of positive returns	100	106	101	111	110	101	105	115	110	96	105	93
	no of negative returns	96	108	115	108	104	107	104	89	99	115	92	113
Bata India Ltd	no of positive returns	96	101	100	108	110	92	104	101	95	86	86	96
	no of negative returns	100	113	116	111	104	116	105	103	114	125	111	110
BHEL	no of positive returns	101	115	109	112	114	111	111	106	110	112	94	99
	no of negative returns	95	99	107	107	100	97	98	98	99	99	103	107
CIPLA Ltd	no of positive returns	102	106	105	122	116	109	111	112	101	92	96	107
	no of negative returns	94	108	111	97	98	99	98	92	108	119	101	99
Grasim Industries Ltd	no of positive returns	106	96	106	123	115	109	105	112	112	99	94	96
	no of negative returns	90	118	110	96	99	99	104	92	97	112	103	110
HDFC Bank Ltd	no of positive returns	99	103	114	112	109	110	111	111	109	101	93	94
	no of negative returns	97	111	102	107	105	98	98	93	100	110	104	112
Hero Honda Motors Ltd	no of positive returns	92	110	118	118	103	101	104	111	108	109	87	93
	no of negative returns	104	104	98	101	111	107	105	93	101	102	110	113
Hindustan Petroleum Corporation Ltd	no of positive returns	90	103	102	111	111	107	102	111	115	99	97	89
	no of negative returns	106	111	114	108	103	101	107	93	94	112	100	117
ICICI Bank Ltd	no of positive returns	98	99	100	120	118	113	94	100	125	108	95	90
	no of negative returns	98	115	116	99	96	95	115	104	84	103	102	116
Infosys Technologies Ltd	no of positive returns	97	117	101	107	100	105	111	105	116	105	102	95
	no of negative returns	99	97	115	112	114	103	98	99	93	106	95	111
ITCLTD	no of positive returns	107	119	109	116	121	116	105	105	113	105	107	113
	no of negative returns	89	95	107	103	93	92	104	99	96	106	90	93
M&MLTD	no of positive returns	92	104	110	110	107	98	116	116	123	101	99	95
	no of negative returns	104	110	106	109	107	110	93	88	86	110	98	111
ONGCLTD	no of positive returns	94	119	109	115	108	114	104	109	107	116	95	110
	no of negative returns	102	95	107	104	106	94	105	100	102	95	102	96
Ranbaxy Laboratories Ltd	no of positive returns	89	110	111	116	120	103	106	113	113	99	92	87
	no of negative returns	107	104	105	103	94	105	103	91	96	112	105	119
Reliance Industries Ltd	no of positive returns	91	115	107	114	114	98	107	112	108	102	92	96
	no of negative returns	105	99	109	105	100	110	102	97	101	109	105	110
Satyam Computer Services Ltd	no of positive returns	99	104	110	97	116	88	101	106	114	98	103	102
	no of negative returns	97	110	106	122	98	120	108	98	95	113	94	104
Wipro Ltd	no of positive returns	85	111	117	95	126	99	97	116	111	108	92	86
	no of positive returns	111	103	99	124	88	109	112	88	98	103	105	120

*c Source: Computed data*

**Table – 4 NSE data for Month wise for 10 years**

Companies NSE	n	April	May	June	July	August	September	October	November	December	January	February	March
SENSEX	no of positive returns	109	118	118	118	126	114	105	128	125	103	103	104
	no of negative returns	87	96	98	101	88	94	104	76	84	108	94	102
ACCLtd	no of positive returns	102	97	105	118	122	110	98	122	113	101	91	95
	no of negative returns	94	117	111	101	92	98	111	82	96	110	106	111
Ashok Leyland Ltd	no of positive returns	103	108	112	113	110	98	101	109	113	88	109	90
	no of negative returns	93	106	114	106	104	110	108	95	96	123	88	116
Bata India Ltd	no of positive returns	99	102	98	93	111	89	103	100	102	79	81	96
	no of negative returns	97	112	118	126	103	119	106	104	107	132	116	110
BHEL	no of positive returns	98	112	110	113	117	103	102	112	106	107	98	94
	no of negative returns	98	102	106	106	97	105	107	97	103	104	99	112
CIPLA Ltd	no of positive returns	99	105	103	116	125	107	107	115	100	91	94	109
	no of negative returns	97	109	113	103	89	101	112	89	109	120	103	97
Grasim Industries Ltd	no of positive returns	103	97	105	119	124	105	104	107	113	103	93	92
	no of negative returns	93	117	111	100	90	103	105	97	96	108	104	114
HDFC Bank Ltd	no of positive returns	105	101	108	121	106	113	97	100	105	114	98	92
	no of negative returns	91	113	108	98	108	95	112	104	104	97	99	114
Hero Honda Motors Ltd	no of positive returns	101	108	117	118	109	107	105	114	111	106	86	100
	no of negative returns	95	106	99	101	105	101	104	90	98	105	111	106
Hindustan Petroleum Corporation Ltd	no of positive returns	88	103	105	109	106	102	100	114	115	95	104	93
	no of negative returns	108	111	111	110	108	106	109	90	94	116	93	113
ICICI Bank Ltd	no of positive returns	99	114	99	108	100	107	110	109	113	108	101	101
	no of negative returns	97	100	117	111	114	101	99	95	96	103	96	105
Infosys Technologies Ltd	no of positive returns	90	110	115	115	117	100	105	110	112	98	92	92
	no of negative returns	106	104	101	104	97	108	104	94	97	113	105	114
ITCLTD	no of positive returns	102	104	108	98	116	91	100	105	114	104	107	105
	no of negative returns	94	110	108	121	98	117	109	99	95	107	90	101
M&MLTD	no of positive returns	93	104	112	118	106	98	108	122	119	106	99	99
	no of negative returns	103	110	104	101	108	110	101	82	90	105	98	107
ONGCLTD	no of positive returns	95	114	112	117	107	111	101	108	102	110	92	110
	no of negative returns	101	100	104	102	107	97	108	96	107	101	105	96
Ranbaxy Laboratories Ltd	no of positive returns	99	99	102	124	121	99	93	104	121	104	94	96
	no of negative returns	97	115	114	95	93	109	116	100	88	107	103	110
Reliance Industries Ltd	no of positive returns	107	113	106	118	116	116	102	110	113	104	111	109
	no of negative returns	89	101	110	101	98	92	107	94	96	107	86	97
Satyam Computer Services Ltd	no of positive returns	88	107	106	112	114	95	102	110	110	100	95	103
	no of negative returns	108	107	110	107	100	113	107	94	99	111	102	113
Wipro Ltd	no of positive returns	81	105	118	95	123	96	100	116	114	106	92	93
	no of positive returns	115	109	98	124	91	112	109	88	95	105	105	113

*Source: Computed data*

Monthly returns of the sample companies listed at both BSE and NSE. The monthly returns are calculated as positive returns and negative returns. These monthly returns are calculated are given in the above two table's one for BSE and another for NSE.

As far as BSE is concerned, the highest positive returns is recorded for (1336) ITC limited and this is followed by ONCG limited which has a positive return (1300). The highest negative return is calculated for Bata India limited and this is followed by Hindustan Petroleum Corporation limited.

Regarding NSE, the highest positive returns (1325) goes to Reliance Industries limited and M&M limited placed at the second highest positive scorer, besides the highest negative return goes to Bata India limited (1350) and Reliance industries scored (1178) and occupied the second highest negative scorer.

### III. Testing Of Hypotheses

#### Result of chi-square

Further chi-square was applied to examine the hypothesis that there is any seasonal or inter month effect or not .For this purpose, first a contingency table consisting of months showing positive returns & negative returns between two sets of months were prepared. The first set includes May to September and November to February. In contrast the second set comprises the month showing poor growth or negative returns as concluded in Table 4.4.1.These months include April, October and March.

H<sub>0</sub>: There is no inter –month or inter-day effect on Stock Return in case of sample companies.

H<sub>1</sub>: There is an inter month effect on Stock Return in case of sample companies.

Calculated chi square value =  $(O-E)^2/E = 12.73$

With degrees of freedom  $(c-1) \times (r-1)$  i.e  $1 \times 1 =1$ , critical value is 3.841.Since the calculated value is greater than the critical value; Null Hypothesis is rejected at 5% level of significance. It implies that there is an inter month effect on stock return in case of sample companies.

**Table - 5**  
**Chi - Square**  
**NSE DAILY**

S. No	Company Name	Chi – square Calculated	D.F	Chi – square Table value	P - Value	Inferences
2	ACC Ltd	1.64	1	3.84	0.20	H <sub>0</sub> :Accept
3	Ashok Leyland Ltd	5.49	1	3.84	0.02	H <sub>0</sub> :Reject
4	Bata India Ltd	13.15	1	3.84	0.00	H <sub>0</sub> :Reject
5	BHEL	2.16	1	3.84	0.14	H <sub>0</sub> :Accept
6	CIPLA Ltd	0.18	1	3.84	0.67	H <sub>0</sub> :Accept
7	Grasim Industries Ltd	1.55	1	3.84	0.21	H <sub>0</sub> :Accept
8	HDFC Bank Ltd	2.57	1	3.84	0.11	H <sub>0</sub> :Accept
9	Hero Honda Motors Ltd	2.87	1	3.84	0.27	H <sub>0</sub> :Accept
10	Hindustan Petroleum Corporation Ltd	3.55	1	3.84	0.06	H <sub>0</sub> :Accept
11	ICICI Bank Ltd	0.06	1	3.84	0.81	H <sub>0</sub> :Accept
12	Infosys Technologies Ltd	1.32	1	3.84	0.25	H <sub>0</sub> :Accept
13	ITC LTD	2.33	1	3.84	0.13	H <sub>0</sub> :Accept
14	M&M LTD	2.23	1	3.84	0.14	H <sub>0</sub> :Accept
15	ONCG LTD	20.99	1	3.84	0.00	H <sub>0</sub> ;Reject
16	Ranbaxy Laboratories Ltd	3.99	1	3.84	0.05	H <sub>0</sub> :Reject
17	Reliance Industries Ltd	3.01	1	3.84	0.31	H <sub>0</sub> :Accept
18	Sat yam Computer Services Ltd	1.72	1	3.84	0.19	H <sub>0</sub> : Accept
19	Wipro Ltd	6.22	1	3.84	0.01	H <sub>0</sub> : Reject

**Source:** Computed data

Calculated value of chi-square and table value of chi-square and other descriptive statistics regarding the chi-square. These results have been derived to test the hypotheses for NSE daily analysis. The null hypothesis is framed as there is no inter-day effect on stock returns of the sample companies. As per this analysis, there is no inter-day effect on stock returns of ACC limited, BHEL, CIPLA limited, Grasim Industries, HDFC Bank Limited, Hero Honda motors Limited, Hindustan petroleum limited, ICICI bank limited, Infosys technologies, ITC Limited, M&M limited, Reliance Industries and Sathyam computer services. For other companies, there is existence of inter-day effect on stock returns; these have been done at 5 per cent level of significance.

**Table -6 BSE DAILY**

S. No	Company Name	Chi – square	D.F	Chi – square Table value	P – Value	Inferences
2	ACC Ltd	5.25	1	3.84	0.02	H <sub>0</sub> :Reject
3	Ashok Leyland Ltd	6.28	1	3.84	0.01	H <sub>0</sub> :Reject
4	Bata India Ltd	4.37	1	3.84	0.04	H <sub>0</sub> :Reject
5	BHEL	1.31	1	3.84	0.25	H <sub>0</sub> :Accept
6	CIPLA Ltd	3.12	1	3.84	0.08	H <sub>0</sub> :Accept
7	Grasim Industries Ltd	0.49	1	3.84	0.48	H <sub>0</sub> :Accept
8	HDFC Bank Ltd	2.58	1	3.84	0.11	H <sub>0</sub> :Accept
9	Hero Honda Motors Ltd	1.28	1	3.84	0.26	H <sub>0</sub> :Accept
10	Hindustan Petroleum Corporation Ltd	4.89	1	3.84	0.03	H <sub>0</sub> :Reject
11	ICICI Bank Ltd	0.84	1	3.84	0.36	H <sub>0</sub> :Accept
12	Infosys Technologies Ltd	1.94	1	3.84	0.16	H <sub>0</sub> :Accept
13	ITC LTD	2.87	1	3.84	0.32	H <sub>0</sub> :Accept
14	M&M LTD	1.51	1	3.84	0.22	H <sub>0</sub> :Accept
15	ONGC LTD	8.13	1	3.84	0.00	H <sub>0</sub> :Reject
16	Ranbaxy Laboratories Ltd	0.27	1	3.84	0.60	H <sub>0</sub> :Accept
17	Reliance Industries Ltd	1.12	1	3.84	0.15	H <sub>0</sub> :Accept
18	Sat yam Computer Services Ltd	1.28	1	3.84	0.26	H <sub>0</sub> :Accept
19	Wipro Ltd	2.28	1	3.84	0.13	H <sub>0</sub> :Accept

*Source: Computed data*

Regarding the inter-day effect on stock returns in BSE, there is existence of inter-day effect on returns of ACC limited, Ashok Leyland Limited, Bata India limited, Hindustan Petroleum limited, ONGC limited, since the calculated values of chi-square are more than the table values of Chi-square at 5 per cent level of significance.

**Table – 7 NSE Monthly**

S. No	Company Name	Chi – square	D.F	Chi – square Table value	P - Value	Inferences
1	NIFTY	3.30	1	3.84	0.07	H <sub>0</sub> :Accept
2	ACC Ltd	16.48	1	3.84	0.00	H <sub>0</sub> :Reject
3	Ashok Leyland Ltd	12.05	1	3.84	0.00	H <sub>0</sub> :Reject
4	Bata India Ltd	5.24	1	3.84	0.02	H <sub>0</sub> :Reject
5	BHEL	2.82	1	3.84	0.09	H <sub>0</sub> :Accept
6	CIPLA Ltd	9.82	1	3.84	0.00	H <sub>0</sub> :Reject
7	Grasim Industries Ltd	9.85	1	3.84	0.00	H <sub>0</sub> :Reject
8	HDFC Bank Ltd	6.64	1	3.84	0.01	H <sub>0</sub> :Reject
9	Hero Honda Motors Ltd	4.93	1	3.84	0.03	H <sub>0</sub> :Reject
10	Hindustan Petroleum Corporation Ltd	9.03	1	3.84	0.00	H <sub>0</sub> :Reject
11	ICICI Bank Ltd	4.61	1	3.84	0.03	H <sub>0</sub> :Reject
12	Infosys Technologies Ltd	9.99	1	3.84	0.00	H <sub>0</sub> :Reject
13	ITC LTD	7.96	1	3.84	0.01	H <sub>0</sub> :Reject
14	M&M LTD	6.95	1	3.84	0.01	H <sub>0</sub> :Reject
15	ONGC LTD	4.74	1	3.84	0.03	H <sub>0</sub> :Reject
16	Ranbaxy Laboratories Ltd	13.99	1	3.84	0.00	H <sub>0</sub> :Reject
17	Reliance Industries Ltd	5.15	1	3.84	0.02	H <sub>0</sub> :Reject
18	Sat yam Computer Services Ltd	6.40	1	3.84	0.01	H <sub>0</sub> :Reject
19	Wipro Ltd	20.02	1	3.84	0.00	H <sub>0</sub> :Reject

*Source: Computed data*

As far as inter- month effect on returns of the selected companies at NSE is concerned, the calculated values of chi-square are less than the table value of chi-square for BHEL only. Therefore, it is concluded that there is no existence of inter-month effect of returns of BHEL limited. For other companies, the calculated values of chi-square are more than the table values of chi-square. Hence, it is found that there is existence of inter-month effect on returns of the companies.

**Table – 8 BSE Monthly**

S. No	Company Name	Chi – square	D.F	Chi – square Table value	P - Value	Inferences
1	NIFTY	3.70	1	3.84	0.05	H <sub>0</sub> :Accept
2	ACC Ltd	9.20	1	3.84	0.00	H <sub>0</sub> :Reject
3	Ashok Leyland Ltd	6.35	1	3.84	0.01	H <sub>0</sub> :Reject
4	Bata India Ltd	1.87	1	3.84	0.17	H <sub>0</sub> :Accept
5	BHEL	2.79	1	3.84	0.10	H <sub>0</sub> :Accept
6	CIPLA Ltd	8.05	1	3.84	0.01	H <sub>0</sub> :Reject
7	Grasim Industries Ltd	10.50	1	3.84	0.00	H <sub>0</sub> :Reject
8	HDFC Bank Ltd	5.58	1	3.84	0.02	H <sub>0</sub> :Reject
9	Hero Honda Motors Ltd	8.39	1	3.84	0.00	H <sub>0</sub> :Reject
10	Hindustan Petroleum Corporation Ltd	7.63	1	3.84	0.01	H <sub>0</sub> :Reject
11	ICICI Bank Ltd	12.62	1	3.84	0.00	H <sub>0</sub> :Reject
12	Infosys Technologies Ltd	6.06	1	3.84	0.01	H <sub>0</sub> :Reject
13	ITC LTD	1.21	1	3.84	0.27	H <sub>0</sub> :Accept
14	M&M LTD	8.34	1	3.84	0.00	H <sub>0</sub> :Reject
15	ONGC LTD	3.31	1	3.84	0.07	H <sub>0</sub> :Accept
16	Ranbaxy Laboratories Ltd	11.71	1	3.84	0.00	H <sub>0</sub> :Reject
17	Reliance Industries Ltd	7.06	1	3.84	0.01	H <sub>0</sub> :Reject
18	Sat yam Computer Services Ltd	8.60	1	3.84	0.00	H <sub>0</sub> :Reject
19	Wipro Ltd	22.49	1	3.84	0.00	H <sub>0</sub> :Reject

Source: Computed data

Values of chi-square to test whether there is existence of inter-month, effect on returns of companies listed at BSE. As per this analysis, there is presence of inter-month effect on returns of Bata India limited, ITC limited, ONGC limited, since calculated values of chi-square for these companies are less than the table values of chi-squares. For the remaining companies, there is no inter-month effect on returns of the companies.

**Results of H – Test**

A non-parametric Kruskal – wallis test is applied in a place of a conventionally used parametric one-way analysis of variance. It is felt that the kruskall-wallis test is an appropriate one for the data typified of non-normality, heteroscedastic variance like the security return. Since the result of the normality test indicates that the distributions of the returns are non-normal, we use the non-parametric test, the *Kruskal-Wallis* to check the results for equality of mean returns.

The *Kruskal-Wallis* statistic is as follows:

$$H = \left[ \frac{12}{N(N+1)} \times \sum_{j=1}^k \frac{R_j^2}{n_j} \right] - 3(N + 1)$$

Where: k = number of samples;

N<sub>j</sub> = number of values in jth sample;

N =  $\sum n_j$  = total number of values;

R<sub>j</sub> = sum of ranks in the sample

When N values are ranked together (the statistic is approximately Chi-square distributed degrees of freedom equal to k-1). The null hypothesis tested is that there are no differences in the mean daily returns across the weekdays. If the computed ‘H’ is greater than the critical value, the null hypothesis cannot be accepted. Conversely, if the computed ‘H’ value is less than the critical value, the alternate hypothesis cannot be accepted.

Pattern of Seasonality is determined by using pair-wise multiple comparison procedure, we can indirectly test which pair shows significant deviations from one another and uncover the general pattern of high – low tendencies in the data. The test procedure relies on the Kruskal – Wallis rank sum R<sub>j</sub>. The data in the rank – day matrix prepared for ‘H’ test is used for this purpose. For a given overall significance level of  $\alpha$  decide  $\tau_\mu \neq \tau_\nu$

$$R = |R_\mu - R_\nu| \geq Z[\alpha/K(K - 1)][N(N + 1)/12]^{1/2} \left[ \frac{1}{n_\mu} + \frac{1}{n_\nu} \right]^{1/2}$$

Where:  $\mu = 1, 2 \dots k-1$

$\nu = \mu+1 \dots k$

N = total number of daily/weekly means

n = number of daily /weekly means in the  $\mu$ th and  $\nu$ th column

R = average rank sum of the  $\mu$ th and  $\nu$ th columns

$Z(\alpha/K(K+1))$ = the upper percentage point of the unit normal distribution for a given value.

The Index returns series and stock returns series of sample companies is tested by using “H” test and the result is given in Table 9 .

Ho: There is no difference in the mean returns across the days of the week

H1: There is a difference in the mean returns across the days of the week

The computed ‘H’ value is lower than this critical value for all the BSE and NSE indices, and for selected sample companies also (Table 10) except Hindustan Petroleum Corporation listed BSE, Bata India Ltd listed at NSE and ONGC listed both BSE and NSE at 5 % level of significance with 4 degrees of freedom. So the null hypothesis is accepted. Hence, there is no difference between the mean return across the days of the week except Hindustan Petroleum Corporation and ONGC.

Further h-test is used to test difference in the mean returns across the months of the year with following hypothesis.

Ho: There is no difference in the mean returns across the months of the year

H1: There is a difference in the mean returns across the months of the year

The computed ‘H’ value is lower than this critical value for all the BSE and NSE indices and for selected sample companies at 5 % level of significance with 11 degrees of freedom. So the null hypothesis is accepted. Hence, there is no difference between the mean return across the months of the year except Hindustan Petroleum Corporation and ONGC listed at BSE and Hindustan Petroleum Corporation ltd listed at NSE. This provides evidence as to the presence of regularity in common stock return during the study period. Having identified regularity in equity returns, a further enquiry is desirable to uncover the pattern of seasonality.

Table – 9 H - Test  
BSE DAILY

	SEN SEX	ACC Ltd	Ashok Leylan d Ltd	Bata India Ltd	BHEL	CIPL A Ltd	Grasi m Indus tries Ltd	HDFC Bank Ltd	Hero Hond a Moto rs	Hindusta n Petroleu m Corpora tion	ICICI Bank Ltd	Infosys Technol gies Ltd	ITC LTD	M&M LTD	ONG C	Ranba xy	Relian ce	Satya m	Wipr o
Mean rank	1232	1238	1297	1296.9	1272.9	1252.0	1215.6	1251.6	1242.8	1255.1	1270.1	1275.8	1245.1	1264.5	1289.4	1226.1	1236.6	1208.0	1218.5
	1245	1203	1183	1191	1232.5	1232.1	1240.0	1187.6	1233.3	1324.8	1255.5	1280.8	1273.8	1219.1	1179.5	1242.7	1268.1	1233.2	1247.7
	1246	1269	1225	1278	1244.7	1205.3	1228.5	1233.5	1226.2	1229.9	1220.2	1243.2	1237.0	1237.9	1303.3	1232.3	1218.9	1263.7	1282.5
	1235	1225.9	1275.9	1204.8	1246.6	1262.4	1233.2	1287.2	1224.3	1209.9	1216.8	1187.9	1217.2	1233.9	1230.8	1245.4	1261.7	1256.8	1244.9
	1254	1276.9	1230.7	1241.8	1215.5	1261.2	1275.8	1252.8	1286.8	1192.0	1250.1	1224.5	1236.9	1257.3	1208.7	1266.3	1227.1	1250.9	1218.4
Chi square	0.31	3.63	7.81	8.01	1.70	2.25	2.06	5.11	2.53	10.33	2.08	5.69	1.64	1.30	10.79	0.91	1.79	1.94	2.70
Degrees of freedom	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asympsi g	0.99	0.46	0.10	0.09	0.79	0.69	0.72	0.28	0.64	0.04	0.72	0.22	0.80	0.86	0.03	0.92	0.77	0.75	0.61
Inferenc es	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Rej ect	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Rej ect	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t

Source: Computed data

Table – 10 BSE MONTHLY

	SENSE X	ACC Ltd	Ashok Leylan d Ltd	Bata India Ltd	BHEL	CIPL A Ltd	Grasim Industri es Ltd	HDF C Bank Ltd	Hero Hond a Moto rs	Hindusta n Petroleu m Corpora tion	ICIC I Bank Ltd	Info sys Tech. Ltd	ITC LTD	M& M LTD	ONG C	Ranba xy	Relian ce	Satya m	Wipr o
Mean rank	53.30	51.80	82.60	71.75	52.00	50.00	69.80	61.15	62.20	74.00	53.65	51.80	70.90	49.80	55.90	60.50	61.80	53.20	52.60
	54.40	54.60	56.60	56.20	56.30	47.20	40.20	51.10	49.50	41.60	55.70	54.60	46.90	48.60	62.90	58.60	58.90	59.80	59.40
	63.60	68.70	50.90	53.20	69.50	61.30	63.10	55.50	67.50	62.30	59.50	68.70	66.50	62.20	61.50	56.70	59.40	70.60	59.30
	66.00	48.10	51.60	56.00	63.40	69.50	69.90	71.40	63.00	68.10	61.10	48.10	54.40	63.40	73.00	65.10	60.70	49.30	50.40
	72.80	79.80	77.20	80.80	77.10	80.00	76.00	57.90	62.80	76.90	53.35	79.80	74.00	57.90	60.00	91.20	65.70	63.40	74.40
	57.20	57.80	51.25	51.90	48.30	70.00	53.00	71.60	65.00	49.80	62.80	57.80	38.10	44.50	50.80	58.40	72.90	46.60	47.80
	53.30	73.10	54.60	48.60	58.40	47.30	54.60	50.50	49.10	54.70	59.10	73.10	46.30	64.40	55.10	39.00	52.10	67.30	56.20
	80.80	75.80	66.75	75.35	69.60	76.80	65.90	67.30	76.10	68.20	66.00	75.80	76.60	82.50	62.00	74.90	61.30	83.20	89.30
	76.70	65.20	73.70	82.20	58.60	69.90	69.90	75.40	67.60	68.60	79.30	65.20	71.70	78.20	62.40	67.30	76.80	71.30	71.50
	52.90	46.10	45.60	45.00	52.30	39.30	56.80	66.00	59.60	56.30	61.50	46.10	65.90	69.00	61.90	49.00	54.10	57.50	60.90
	53.50	52.70	75.50	50.40	71.30	47.80	54.40	47.15	54.80	53.50	56.20	52.70	67.80	60.70	52.20	54.70	53.30	53.30	54.00
	41.50	52.30	39.70	54.60	49.20	66.90	52.40	51.00	48.80	52.00	57.80	52.30	46.90	44.80	68.30	50.60	49.00	50.50	50.20
	Chi square	12.28	12.08	17.91	15.82	8.32	16.69	9.58	8.51	6.60	10.59	4.46	12.08	15.74	13.73	3.68	16.25	6.18	10.92
Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Asympsi g	0.34	0.36	0.08	0.15	0.69	0.12	0.57	0.67	0.83	0.48	0.95	0.36	0.15	0.25	0.98	0.13	0.86	0.45	0.26
Inferenc es	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t	Ho Accep t

Source: Computed data

Source: Computed data

**Stock Market Seasonality- Time Varying Volatility In The Emerging Indian Stock Market**

**Table - 11 NSE DAILY**

	NIFTY	ACC Ltd	Ashok Leyland Ltd	Bata India Ltd	BHEL	CIPL A Ltd	Grasim Industries Ltd	HDF C Bank Ltd	Hero Honda Motors	Hindustan Petroleum Corporation	ICICI Bank Ltd	Infosys Technologies Ltd	ITC LTD	M&M LTD	ONG C	Ranbaxy	Reliance	Satya m	Wipro
Mean rank	1236	1245.7	1269.5	1270.1	1211.7	1228.6	1205.8	1198.9	1195.9	1213.6	1249.9	1208.9	1224.7	1264.4	1277.5	1263.3	1226.6	1222.9	1201.9
	1228	1232.1	1166.1	1148.6	1240.4	1225.6	1229.2	1242.5	1199.6	1284.9	1239.9	1245.8	1214.8	1210.2	1151.3	1223.8	1250.0	1250.8	1263.0
	1272	1280.0	1248.9	1305.2	1258.8	1225.0	1238.6	1239.6	1252.4	1222.8	1264.6	1246.1	1294.9	1268.0	1363.8	1276.7	1275.4	1236.7	1305.3
	1230	1216.0	1203.5	1141.2	1188.2	1196.8	1211.7	1198.9	1208.3	1186.4	1192.7	1253.7	1244.6	1226.8	1219.2	1200.2	1222.1	1264.1	1243.6
	1247	1238.4	1207.1	1230.2	1195.3	1219.1	1209.4	1215.0	1238.9	1186.8	1265.9	1258.2	1233.2	1243.1	1199.5	1248.5	1238.3	1237.9	1197.2
Chi square	1.27	2.18	6.53	20.93	3.56	0.66	0.80	1.78	2.49	6.38	3.45	1.47	3.80	2.35	25.84	3.67	1.77	0.94	7.85
Degrees of freedom	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp sig	0.87	0.70	0.16	0.00	0.47	0.96	0.94	0.78	0.65	0.17	0.49	0.83	0.43	0.67	0.00	0.45	0.78	0.92	0.10
Inferences	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Reject	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Reject	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept	H <sub>0</sub> Accept					

Source: Computed data

**Table - 12 NSE MONTHLY**

*Table - 12 NSE MONTHLY*

	NIFTY	ACC Ltd	Ashok Leyland Ltd	Bata India Ltd	BHEL	CIPL A Ltd	Grasim Industries Ltd	HDF C Bank Ltd	Hero Honda Motors	Hindustan Petroleum Corporation	ICICI Bank Ltd	Infosys Tech Ltd	ITC LTD	M&M LTD	ONG C	Ranbaxy	Reliance	Satya m	Wipro	
Mean rank	47.20	60.50	68.30	69.90	56.00	58.70	60.90	52.90	41.40	50.70	46.80	45.60	65.90	40.70	62.20	64.40	65.00	52.70	46.50	
	51.40	43.90	71.50	58.30	56.10	37.20	54.80	64.10	64.10	63.30	53.30	56.30	56.70	55.10	60.50	61.50	60.60	59.60	60.90	
	55.10	39.00	55.50	52.30	48.30	56.70	50.30	46.90	59.90	45.20	56.10	61.50	48.20	50.10	56.10	56.50	56.10	56.30	53.70	
	69.10	78.30	48.40	62.60	79.70	72.90	71.60	67.30	66.20	50.50	54.00	47.10	78.90	67.90	72.90	65.20	58.00	65.40	51.40	
	63.30	73.00	69.40	63.40	65.80	74.10	74.50	60.20	59.30	53.90	58.20	62.10	57.60	61.30	69.40	73.40	57.40	53.20	64.70	
	71.10	59.70	56.90	71.60	61.50	80.00	64.80	64.30	70.00	67.40	60.50	76.60	59.70	49.40	60.60	85.10	75.60	58.20	59.90	
	59.90	51.60	51.80	48.30	59.10	61.10	52.20	65.40	57.10	43.70	58.20	67.70	38.70	57.30	54.10	47.00	61.80	57.70	53.90	
	68.20	70.80	60.80	70.30	69.70	51.70	63.40	55.30	61.00	77.30	72.00	81.50	58.90	75.70	53.80	45.20	59.10	74.30	74.60	
	84.90	86.80	76.60	85.60	62.30	82.90	66.10	70.40	71.40	91.70	82.70	76.00	81.10	78.20	60.40	70.40	68.80	77.90	94.00	
	62.60	62.80	59.00	57.60	57.50	56.10	70.30	74.10	70.10	75.90	70.10	55.10	78.20	75.00	63.70	55.20	65.60	63.30	63.30	
	57.00	59.20	62.80	40.10	74.70	46.90	56.70	62.50	55.10	65.90	65.00	56.80	68.00	52.00	57.90	59.30	57.90	59.40	59.40	
	35.80	40.40	45.40	46.00	37.30	47.70	40.40	42.40	50.40	40.50	49.10	51.50	45.30	47.30	60.30	44.20	38.70	49.50	43.70	
	Chi square	14.66	20.66	8.40	14.93	11.63	18.41	9.07	8.14	7.08	22.59	9.75	14.59	16.55	14.08	3.50	13.56	7.10	6.60	16.52
	Degrees of freedom	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Asymp sig	0.20	0.04	0.68	0.19	0.39	0.07	0.62	0.70	0.79	0.02	0.55	0.20	0.12	0.23	0.98	0.26	0.79	0.83	0.12	
Inferences	H <sub>0</sub> Accept	H <sub>0</sub> Reject	H <sub>0</sub> Accept	H <sub>0</sub> Reject	H <sub>0</sub> Accept															

Source: Computed data

Since The Levene Statistic p value =sig is greater than  $\alpha = 0.01$ , so we fail to reject the null hypothesis that the variance are all equal. Since the variances appear to be equal, we may continue with ANOVA.

In order to test the equality of means of daily stock returns and market returns of week days, the null and alternative hypotheses are ;H<sub>0</sub>:  $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$  (the means of the stock return and market return for five days are equal) H<sub>1</sub>: at least one pair is unequal.It is assumed that stock return and market return obtained are distributed normally with means  $\mu_1, \mu_2, \mu_3, \mu_4,$  and  $\mu_5$  for five days Monday, Tuesday, Wednesday, Thursday and Friday respectively. Further it is assumed that the standard deviations of the distribution of returns for Monday, Tuesday, Wednesday, Thursday and Friday are equal and constant. This assumption implies that the mean returns may differ on account of trading the shares at different days in the stock exchange, but they do not affect the dispersion of the returns.

The foregoing calculations can be summarized in the Table 13.

Table – 13 ANOVA FOR SEASONALITY BSE DAILY

Companies	Levene Statistics	Sing		Sum of squares	df	Mean square	F	sign	R <sup>2</sup>	Adjust R <sup>2</sup>
ACC Ltd	1.561	0.182	Between groups	0.040	4	0.010	1.378	0.239	0.002	0.001
			Within groups	18.086	2479	0.007	-	-		
Ashok Leyland Ltd	0.811	0.518	Between groups	0.185	4	0.046	1.041	0.385	0.002	0.000
			Within groups	110.36	2479	0.045	-	-		
Bata India Ltd	0.403	0.807	Between groups	0.083	4	0.021	1.002	0.405	0.002	0.000
			Within groups	51.328	2479	0.021	-	-		
Bhell	0.065	0.992	Between groups	0.005	4	0.001	0.305	0.874	0.000	-0.001
			Within groups	10.924	2479	0.004	-	-		
Cipla Ltd	0.302	0.877	Between groups	0.016	4	0.004	1.319	0.261	0.002	0.001
			Within groups	7.520	2479	0.003	-	-		
Grasim Industries Ltd	0.950	0.434	Between groups	0.096	4	0.024	1.052	0.379	0.002	0.000
			Within groups	56.398	2479	0.023	-	-		
HDFC Bank Ltd	1.031	0.389	Between groups	0.021	4	0.005	0.536	0.709	0.001	-0.001
			Within groups	24.219	2479	0.010	-	-		
Hero Honda Motors Ltd	0.780	0.538	Between groups	0.025	4	0.006	2.334	0.054	0.004	0.002
			Within groups	6.733	2479	0.003	-	-		
Hindustan Petroleum Corporation	2.110	0.077	Between groups	0.007	4	0.002	1.612	0.168	0.003	0.001
			Within groups	2.563	2479	0.001	-	-		
ICICI Bank Ltd	2.574	0.036	Between groups	0.001	4	0.000	0.216	0.930	0.000	-0.000
			Within groups	2.227	2479	0.001	-	-		
Infosys Technologies	1.532	0.190	Between groups	0.013	4	0.003	1.803	0.125	0.003	0.001
			Within groups	4.600	2479	0.002	-	-		
ITC Ltd	1.209	0.305	Between groups	0.007	4	0.002	0.807	0.520	0.001	0.000
			Within groups	5.288	2479	0.002	-	-		
M&M Ltd	1.283	0.274	Between groups	0.129	4	0.032	1.199	0.309	0.002	0.000
			Within groups	66.754	2479	0.027	-	-		
ONGC Ltd	0.624	0.646	Between groups	0.051	4	0.013	1.711	0.145	0.003	0.001
			Within groups	18.502	2479	0.007	-	-		
Ranbaxy Laboratories	1.764	0.133	Between groups	0.015	4	0.004	1.169	0.322	0.002	0.000
			Within groups	7.882	2479	0.003	-	-		
Reliance	2.226	0.064	Between	0.008	4	0.002	0.895	0.466	0.001	0.000

Industries Ltd			groups							
			Within groups	5.880	2479	0.002	-	-		
Sathyam Computers Services Ltd	0.733	0.569	Between groups	0.013	4	0.003	1.229	0.296	0.002	0.000
			Within groups	6.675	2479	0.003	-	-		
Wipro Ltd	0.335	0.854	Between groups	0.103	4	0.026	0.943	0.438	0.002	0.000
			Within groups	67.498	2479	0.027	-	-		
Sensex	0.637	0.636	Between groups	0.047	4	0.012	0.860	0.487	0.001	0.000
			Within groups	34.184	2479	0.014	-	-		

**Table – 14 ANOVA FOR SEASONALITY NSE DAILY**

Companies		Sum <sup>2</sup>	df	Mean <sup>2</sup>	F	sign	R <sup>2</sup>	Adjust R <sup>2</sup>
ACC Ltd	Between groups	0.001	4	0.000	0.192	0.943	0.000	-0.001
	Within groups	2.785	2479	0.001	-	-		
Ashok Leyland Ltd	Between groups	0.007	4	0.002	1.217	0.301	0.002	0.000
	Within groups	3.402	2479	0.001	-	-		
Bata India Ltd	Between groups	0.013	4	0.003	2.695	0.029	0.004	0.003
	Within groups	3.037	2479	0.001	-	-		
Bhell	Between groups	0.004	4	0.001	1.003	0.405	0.002	0.000
	Within groups	2.412	2479	0.001	-	-		
Cipla Ltd	Between groups	0.003	4	0.001	0.536	0.709	0.001	-0.001
	Within groups	2.928	2479	0.001	-	-		
Grasim Industries Ltd	Between groups	0.002	4	0.001	0.822	0.511	0.001	0.000
	Within groups	1.858	2479	0.001	-	-		
HDFC Bank Ltd	Between groups	0.003	4	0.001	0.074	0.589	0.001	0.000
	Within groups	2.388	2479	0.001	-	-		
Hero Honda Motors Ltd	Between groups	0.003	4	0.001	1.052	0.379	0.002	0.000
	Within groups	1.712	2479	0.001	-	-		
Hindustan Petroleum Corporation Ltd	Between groups	0.003	4	0.001	0.819	0.513	0.001	0.000
	Within groups	2.459	2479	0.001	-	-		
ICICI Bank Ltd	Between groups	0.003	4	0.001	0.732	0.570	0.001	0.000
	Within groups	2.741	2479	0.001	-	-		
Infosys Technologies Ltd	Between groups	0.005	4	0.001	1.011	0.400	0.002	0.000
	Within groups	3.246	2479	0.001	-	-		
ITC Ltd	Between groups	0.001	4	0.000	0.314	0.869	0.001	-0.001
	Within groups	2.186	2479	0.001	-	-		
M&M Ltd	Between groups	0.002	4	0.001	0.524	0.718	0.001	-0.001
	Within groups	2.544	2479	0.001	-	-		
ONGC Ltd	Between groups	0.016	4	0.004	5.241	0.000	0.008	0.007
	Within groups	1.867	2479	0.001	-	-		
Ranbaxy Laboratories Ltd	Between groups	0.004	4	0.001	1.069	0.370	0.002	0.000
	Within groups	2.185	2479	0.001	-	-		

Reliance Industries Ltd	Between groups	0.001	4	0.000	0.538	0.708	0.001	-0.001
	Within groups	1.677	2479	0.001	-	-		
Sathyam Computers Services Ltd	Between groups	0.011	4	0.003	1.133	0.339	0.002	0.000
	Within groups	5.783	2479	0.002	-	-		
Wipro Ltd	Between groups	0.009	4	0.002	1.279	0.276	0.002	0.000
	Within groups	4.483	2479	0.002	-	-		
Nifty	Between groups	0.001	4	0.000	0.748	0.559	0.001	0.000
	Within groups	0.746	2479	0.000	-	-		

**Table – 15 ANOVA FOR SEASONALITY BSE MONTHLY**

Companies		Sum <sup>2</sup>	df	Mean <sup>2</sup>	F	sign	R <sup>2</sup>	Adjust R <sup>2</sup>
ACC Ltd	Between groups	0.312	11	0.028	1.274	0.249	0.115	0.025
	Within groups	2.409	108	0.022	-	-		
Ashok Leyland Ltd	Between groups	0.546	11	0.050	1.185	0.306	0.108	0.017
	Within groups	4.524	108	0.042	-	-		
Bata India Ltd	Between groups	0.426	11	0.039	1.516	0.136	0.134	0.045
	Within groups	2.759	108	0.026	-	-		
Bhell	Between groups	0.172	11	0.016	0.887	0.555	0.083	-0.011
	Within groups	1.906	108	0.018	-	-		
Cipla Ltd	Between groups	0.417	11	0.038	1.455	0.159	0.129	0.040
	Within groups	2.816	108	0.026	-	-		
Grasim Industries Ltd	Between groups	0.235	11	0.021	0.829	0.611	0.078	-0.016
	Within groups	2.784	108	0.026	-	-		
HDFC Bank Ltd	Between groups	0.120	11	0.011	0.946	0.500	0.088	-0.005
	Within groups	1.245	108	0.012	-	-		
Hero Honda Motors Ltd	Between groups	0.154	11	0.014	0.879	0.563	0.082	-0.011
	Within groups	1.722	108	0.016	-	-		
Hindustan Petroleum Corporation Ltd	Between groups	0.093	11	0.008	1.011	0.442	0.093	0.001
	Within groups	0.899	108	0.008	-	-		
ICICI Bank Ltd	Between groups	0.281	11	0.026	0.613	0.814	0.054	-0.037
	Within groups	4.499	108	0.042	-	-		
Infosys Technologies Ltd	Between groups	0.312	11	0.028	1.274	0.249	0.115	0.025
	Within groups	2.409	108	0.022	-	-		
ITC Ltd	Between groups	0.291	11	0.026	1.847	0.055	0.158	0.073
	Within groups	1.546	108	0.014	-	-		
M&M Ltd	Between groups	0.275	11	0.025	1.046	0.412	0.096	0.004
	Within groups	2.580	108	0.024	-	-		
ONGC Ltd	Between groups	0.061	11	0.006	0.307	0.983	0.030	-0.068
	Within groups	1.962	108	0.018	-	-		
Ranbaxy Laboratories Ltd	Between groups	0.333	11	0.030	1.616	0.104	0.141	0.054
	Within groups	2.021	108	0.019	-	-		
Reliance Industries Ltd	Between groups	0.042	11	0.004	0.311	0.982	0.031	-0.068
	Within groups	1.338	108	0.012	-	-		
Sathyam Computers Services Ltd	Between groups	0.410	11	0.037	0.873	0.569	0.082	-0.012
	Within groups	4.613	108	0.043	-	-		
Wipro Ltd	Between groups	0.570	11	0.052	1.150	0.331	0.105	0.014
	Within groups	4.865	108	0.045	-	-		
Sensex	Between groups	0.070	11	0.006	1.099	0.369	0.101	0.009
	Within groups	0.625	108	0.006	-	-		

**Table – 16 ANOVA FOR SEASONALITY NSE MONTHLY**

Companies		Sum <sup>2</sup>	df	Mean <sup>2</sup>	F	sign	R <sup>2</sup>	Adjust R <sup>2</sup>
ACC Ltd	Between groups	0.365	11	0.033	2.008	0.034	0.170	0.085
	Within groups	1.782	108	0.017	-	-		
Ashok Leyland Ltd	Between groups	0.199	11	0.018	0.687	0.776	0.063	-0.033
	Within groups	2.973	108	0.028	-	-		

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Bata India Ltd	Between groups	0.317	11	0.029	1.708	0.081	0.148	0.061
	Within groups	1.821	108	0.017	-	-		
Bhell	Between groups	0.162	11	0.015	1.136	0.341	0.104	0.012
	Within groups	1.401	108	0.013	-	-		
Cipla Ltd	Between groups	0.418	11	0.038	2.078	0.028	0.175	0.091
	Within groups	1.975	108	0.018	-	-		
Grasim Industries Ltd	Between groups	0.119	11	0.011	0.711	0.726	0.068	-0.027
	Within groups	1.650	108	0.015	-	-		
HDFC Bank Ltd	Between groups	0.111	11	0.010	0.661	0.772	0.063	-0.033
	Within groups	1.651	108	0.015	-	-		
Hero Honda Motors Ltd	Between groups	0.156	11	0.014	1.179	0.310	0.107	0.016
	Within groups	1.302	108	0.012	-	-		
Hindustan Petroleum Corporation Ltd	Between groups	0.251	11	0.023	1.888	0.049	0.161	0.076
	Within groups	1.306	108	0.012	-	-		
ICICI Bank Ltd	Between groups	0.260	11	0.024	1.075	0.388	0.099	0.007
	Within groups	2.378	108	0.022	-	-		
Infosys Technologies Ltd	Between groups	0.209	11	0.019	1.116	0.356	0.102	0.011
	Within groups	1.838	108	0.017	-	-		
ITC Ltd	Between groups	0.214	11	0.019	1.639	0.098	0.143	0.056
	Within groups	1.282	108	0.012	-	-		
M&M Ltd	Between groups	0.233	11	0.021	1.188	0.304	0.108	0.017
	Within groups	1.929	108	0.018	-	-		
ONGC Ltd	Between groups	0.037	11	0.003	0.245	0.993	0.024	-0.075
	Within groups	1.496	108	0.014	-	-		
Ranbaxy Laboratories Ltd	Between groups	0.167	11	0.015	1.141	0.337	0.104	0.013
	Within groups	1.436	108	0.013	-	-		
Reliance Industries Ltd	Between groups	0.072	11	0.007	0.625	0.804	0.060	-0.036
	Within groups	1.138	108	0.011	-	-		
Sathyam Computers Services Ltd	Between groups	0.192	11	0.017	0.561	0.856	0.054	-0.042
	Within groups	3.353	108	0.031	-	-		
Wipro Ltd	Between groups	0.642	11	0.058	1.450	0.162	0.129	0.040
	Within groups	4.349	108	0.040	-	-		
Nifty	Between groups	0.057	11	0.005	1.140	0.338	0.104	0.013
	Within groups	0.488	108	0.005	-	-		

The analysis of variance has been applied to all sample companies listed both at BSE and NSE to test the null hypothesis that the means of the stock return and market return for five days are equal. The calculate values of ANOVA 'F' is compared to table of 'F' at 4 degrees of freedom. The calculated ANOVA results are less than the table value (6.39) of 'F'. Hence, it is concluded that the means of the stock return and market return for five days are equal for the sample companies listed at BSE and at NSE. This is applicable to both daily and monthly returns of sample companies. And also it is found that none of the company has unequal mean returns.

### Suggestions

In wide-ranging, Indian financial market is said to be underdeveloped market when compared to the markets of foreign countries. The efficient financial markets lead to efficient functions of the stock exchanges. It

is here by suggested that steps should be taken by the authority concerned to develop the financial market on the lines of foreign markets. The short-term researches on daily and monthly fluctuations in the company's market return and stock return can be done and the results can be informed to the investors. The will be much helpful to them to take wise investment decision.

The recent past changes in the market and stock returns and companies can be shown by trend lines with the help of an electronic device. This will help to the investors to take quick decision without referring any credentials. The factors that primarily cause for the high volatility should be indicated to the investors. Insider-trading occupies a predominant role in some company. It leads to deceptive activities by the companies. Rules and regulation in issuing shares should be strictly modified to protect the investors and to avoid artificial increase and decrease in the prices of shares of companies. Stable profits of companies will lead to stability in the market returns and stock returns of companies. Further it minimizes the degree of Preakness of volatility.

There are special rating agencies in India to rate the prices of shares and securities of companies listed at BSE and NSE. But they use different symbols and terms to indicate the extent of risk that associated with the companies. It is suggested that these rating agencies have to take on uniform methodology and avoid intricate terms in order to make possible recognition of market risks. Stability of Government and stability of Governments policies are very important. They affect the market return and stock return. Therefore care should be taken while framing Governments policies in taking sides and cost-effective affairs. Policies like export – import policy, fiscal policy and other important policies should be taken without affecting the stock markets with national interests. It is suggested that the number of companies can be included both at BSE and NSE. It will give a inclusive views and ideas on the market return and stock return of the listed companies. It will be very helpful to the investor if they are given reasons for changes in the previous market return and stock return. It will help them to take correct decision in future investment.

#### **IV. Conclusion**

The role of industry in monetary development of a country is very important. It is said to be a country is developed country when it has well industrial development and its share in the country's national output is very significant. The industrial development is necessary to develop the other sectors of an economy since they are mutually interrelated each other. As far as developing countries like India is concerned; there is lack of industrial growth for desire of capital resources. In those days the business enterprises raised their money only by way of financial institutions and on their own. In a course of time, the role of peoples' saving started to enter into the industrial finance in the forms of shares and stocks. There is need foe existence of stock exchanges in it to acquire the savings of the people and lend them to the industrial houses which they need.

But, there is existence of greater degree of risk associated with this investment that there is scope for big gain or big loss. In order to have gain, the investors carefully watch the profitability a solvency of the business firms. In this situation the volatility and seasonality of market return and stock return of the companies occupy an important place. The Bombay Stock Exchange and National Stock Exchange play crucial roles in preparing the volatility and seasonality of the returns on shares of companies. The high volatility leads to ambiguity in the gain and low volatility leads to conviction of gain. The present study analyzed the volatility and seasonality of market return and stock return of some selecte companies in India listed at Bombay Stock Exchange and National Stock Exchange. From this analysis there have been ups and downs in the stability of returns on the share and stocks. The present study concludes that the volatility and seasonality of market return and stock return of sample companies are not same in all the days of a week, in all the months of the year. This is due to changes in the socio, economic and political factors within the country and outside the country. If the above suggestions are fulfilled, the stability in the stock return and market return can be normalized and it will bring more funds to the company and more gains to the investor ultimately India will flourished in the economic development.

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