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# A Study of Seasonality Based Trading Strategy for Indian Stocks and Indices

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*Abstract:* **A curious seasonality reported in finance is the monthly effect which implies that the mean daily return for stock is positive and higher during the first half of the month than the second half. Another related anomaly is the turn of the month effect which is said to exist when the average daily return at the turn of the month is significantly higher than the daily return on the remaining days of the month. This paper examines seasonality effect in Indian Stocks and Indices by calendar day approach, day of week approach and week of the month approach. The results of all the approaches reveal significantly higher returns on some of the days and period in a month. The day of the week effect is found to be absent in our study. Various explanations for the observed anomalies have been considered based on past studies, but none could provide adequate explanations for the observed return regularities. The introduction of derivatives segment in India may have created a pattern near expiry. However, based on the findings, the study tries to evolve certain trading strategies which could benefit in the decision making of the investors concerned with timing of the stock market.**

*Keywords:* **Seasonality, Anomalies, Stock-Market.**

## I. INTRODUCTION

Seasonal variations in production and sales are a well-known fact in business. Seasonality refers to regular and repetitive fluctuation in a time series which occurs periodically over a span of less than a year. The main cause of seasonal variations in time series data is the change in climate for businesses. The example is here can be the sale of air conditioners during hot summer and the demand for woolen clothing during winters. Even traditions can have economic impact as the example here can be gold sales during marriage season. Similarly, stock markets exhibit systematic patterns at certain times of a month, week and day. The existence of seasonality in stock returns, however violates the very basics of efficient market hypotheses. The efficient market hypotheses relate to how quickly and accurately the market reacts to new information. New data are constantly entering the market place via economic reports, company announcements, political statements, or public surveys. If the market is information efficient then security prices adjust rapidly and accurately to new information. According to this hypothesis, security prices reflect fully all the information that is available in the market. Since all the information is already incorporated in prices, a trader is not able to make any excess returns. Thus, EMH proposes that it is not possible to outperform the market through market timing or stock selection.

A curious anomaly in the monthly pattern of stock market returns was first documented by Ariel (1987). He examined the US stock returns and found that the mean return for stock is positive only for days immediately before and during the first half of calendar months, and indistinguishable from zero for days during the second half of the month. Ariel calls this empirical finding the 'monthly effect,' which implies that returns at the beginning of the month are greater than the returns after the midpoint of the month. Following Ariel's study, Jaffe and Westerfield (1989) examined the stock market returns in the UK, Japan, Canada, and Australia and found a significant US type of monthly effect only in Australia. They, however, observed a weak evidence of the anomaly consistent with Ariel's work in the UK and Canada and, in fact, a reverse monthly effect for Japan. The reverse monthly effect is also reported by Barone's (1990) study, who investigated the Italian market and found that stock prices fall in the first part of the calendar month and then rise in the second. Another seasonality related to this monthly pattern is 'the turn-of-the-month effect' which implies that average daily return at the turn of the month is significantly positive and higher than the daily return during the remaining days of the month. Lakonishok and Smidt (1988) showed that stock returns in the US are significantly higher on turn-of-the-month trading days than on other days. Extending the analysis to nine other countries, Cadsby and Ratner (1992) documented the same findings for Australia, Canada, Switzerland, UK, and West Germany but not for France, Hong Kong, Italy, and Japan. In a recent study, Hensel and Ziemba (1996) investigated the daily return patterns in US stock market by taking a very long series from 1928 to 1993 and

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found that the mean returns in the stock market were significantly positive at the turn and in the first half of the month and significantly negative in the rest of the month. In the studies mentioned above, the day of the month anomaly has been reported only for developed capital markets mostly in the west. One's belief regarding this empirical regularity would be strengthened if it is known to also occur in yet another capital market separated from the West by distance, institutional arrangements, and culture. Hence, it is of interest to search whether such anomalies exist for a developing market such as the one in India which belongs to the east. In this paper, we investigate the daily return patterns in a month in the Indian stock market. Aggarwal and Tandon (1994) and Mills and Coutts (1995) pointed out that mean stock returns were unusually high on Fridays and low on Mondays.

## II. LITERATURE REVIEW

Watchel (1942) reported seasonality in stock returns for the first time. Rozeff and Kinney (1976) documented the January effect in New York Exchange stocks for the period 1904 to 1974. They found that average return for the month of January was higher than other months implying pattern in stock returns. Keim (1983) along with seasonality also studied size effects in stock returns. He found that returns of small firms were significantly higher than large firms in January month and attributed this finding to tax-loss-selling and information hypothesis. A similar conclusion was found by Reinganum (1983), however, he was of the view that the entire seasonality in stock returns cannot be explained by tax-loss-selling hypothesis. 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. Brown et al. (1985) studied the Australian stock market seasonality and found the evidence of December-January and July- August seasonal effects, with the latter due to a June-July tax year. However, Raj and Thurston (1994) found that the January and April effects are not statistically significant in the NZ stock market. Mill and Coutts (1995) studied calendar effect in FTSE 100, Mid 250 and 350 indices for the period 1986 and 1992. They found calendar effect in FTSE 100. Ramcharan (1997), however, didn't find seasonal effect in stock retruns of Jamaica. Choudhary (2001) reported January effect on the UK and US returns, but not in German returns. Fountas and Segredakis (2002) studied 18 markets and reported seasonal patterns in returns. The reasons for the January effect in stock returns in most of the developed countries such as US, and UK attributed to the tax loss selling hypothesis, settlement procedures, and insider trading information. Another effect is window dressing which is related to institutional trading. To avoid reporting to many losers in their portfolios at the end of year, institutional investors tend to sell losers in Decembers. They buy these stocks after the reporting date in January to hold their desired portfolio structure again. Researchers have also reported half- month effect in literature. Various studies have reported that daily stock returns in first half of month are relatively higher than last half of the month. Ariel (1987) conducted a study using US market indices from 1963 to 1981 to show this effect. Aggarwal and Tandon (1994) found in their study such effect in other international markets. Ziemba (1991) found that returns were consistently higher on first and last four days of the month. The holiday effect refers to higher returns around holidays, mainly in the pre-holiday period as compared to returns of the normal trading days. Lakonishok and Smidt (1988) studied Dow Jones Industrial Average and reported that half of the positive returns occur during the 10 preholiday trading days in each year. Ariel (1990) showed using US stock market that more than one-third positive returns each year registered in the 8 trading days prior to a market-closed holiday. Similar conclusions were brought by Cadsby and Ratner (1992) which documented significant pre-holiday effects for a number of stock markets. However, he didn't find such effect in the European stock markets. Husain (1998) studied Ramadhan effect in Pakistan stock market. He found significant decline in stock returns volatility in this month although the mean return indicates no significant change. There are also evidences of day of the week effect in stock market returns. The Monday effect was identified as early as the 1920s. Kelly (1930) based on three years data of the US market found Monday to be the worse day to buy stocks. Hirsch (1968) reported negative returns in his study. Cross (1973) found the mean returns of the S&P 500 for the period 1953 and 1970 on Friday was higher than mean return on Monday. Gibbons and Hess (1981) also studied the day of the week effect in US stock returns of S&P 500 and CRSP indices using a sample from 1962 to 1978. Gibbons and Hess reported negative returns on Monday and higher returns on Friday. Smirlock and Starks (1986) reported similar results. Jaffe and Westerfield (1989) studied day of the week effect on four international stock markets viz. U.K., Japan, Canada and Australia. They found that lowest returns occurred on Monday in the UK and Canada. However, in Japanese and Australian market, they found lowest return occurred on Tuesday. Brooks and Persand (2001) studied the five south east Asian stock markets namely Taiwan, South Korea, The Philippines, Malaysia and Thailand. The sample period

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was from 1989 to 1996. They found that neither South Korea nor the Philippines has significant calendar effects. However, Malaysia and Thailand showed significant positive return on Monday and significant negative return on Tuesday. Ajayi at el. (2004) examined eleven major stock market indices on Eastern Europe using data from 1990 to 2002. They found negative return on Monday in six stock markets and positive return on Monday in rest of them. Karmakar & Chakraborty (2000) found presence of turn of the month effect in Indian Markets. 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 days other than Monday. Sah(2009) found the presence of weekly and monthly seasonality in Nifty and Nifty Junior returns.

This study aims to understand:

1. Weather such seasonal anomalies are present in Indian Stock Indices and stocks?
2. The exact pattern of such anomalies if found to be present.
3. How it can be beneficial to individual and institutional investors in India.

## III. SAMPLE DATA AND TIME PERIOD

The data used in this study consist of the daily closing prices of S&P Nifty Index, BSE Sensex, BSE 100 and stocks ACC, BHEL, Bank of India, Colgate, GAIL, Infosys, ONGC, RIL, SBI, Sesa Goa, Sun Pharma, Tata Steel and Wipro for the period from January 2000 to October 2015. The selection of the period is basically guided by the following argument. After the year 2000, the Indian capital market witnessed major changes due to interest shown by FIIs. Also, Index derivatives were introduced in the year 2000 and single stock futures were introduced in the year 2001-02. Also the historical account period settlement system in cash market was changed to globally accepted norm rolling settlement system, which made each trading day similar in terms of settlement obligation. These period of 10 years witnessed two major bull phases 2004-05 to 2007-08 and 2009-10 and two major bear phases- 2001-2002 and 2008-09. The impact of all these would have definitely changed the walk of the market and would be more suitable to compare with current scenario. The sample data consist of prices of trading days from January 2000 to October 2015, excluding trading days from October 2010 to December 2010 which are not available to us.

With this data set we have calculated trading session returns as follows.

Ct is the closing price of the purchase day. Ct+1 is the closing price of the immediate trading session after the day of purchase. The percentage return P is calculated separately for every purchase made as follows,

$$P = ((Ct+1 – Ct)*100)/ Ct$$

The average return per trading session has been calculated as follows,
Let, n be the total number of trading sessions and P be the performance of a trading session. Than Average Return A will be,

$$A = \sum P/n.$$

The returns are calculated to study the seasonality present in day of month, week of month and day of week.

Day of month is referred to date of the month. The returns are calculated as purchase made on 1$^{st}$ of every month and sold on closing bases on the next trading session. Similarly the returns are calculated for all the dates of the month.

Week of the month is referred to different time frames in a month. A month here is divided in to five different weeks as follows.

1. 1-7
2. 7-13
3. 13-19
4. 19-25
5. 25-31

The returns are calculated as bought on first day of the week and sold on the last day of the week as defined above or the next trading session after last day of the week if last day of the week is a holiday.

The day of the week here is referred to as week days Monday, Tuesday, Wednesday, Thursday and Friday. The return of Monday means bought on Monday's closing

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price and sold on the close of the next trading session and so on for other week days.

## IV. RESULTS

In this section we examine the returns of all the days of the month, week of the month and day of the week. The test of abnormality has been done by using Z statistics for Day of Month effect and T statistics for Day of week and Week of Month effect. Following table represents the abnormal returns on above mentioned effects of seasonality. The returns are found to be abnormal at 80%, 90%, 95% or 99% confidence interval. For detailed information please refer the Annexure.

TABLE I: ABNORMAL RETURNS

| Security Name | Day of the month showing Abnormal Returns | Week of the month showing abnormal Returns | Day of the week Showing Abnormal Returns |
|---|---|---|---|
| ACC | 1, 31 | - | - |
| BHEL | 9, 25, 31 | 3, 5 | - |
| BOI | 1, 25, 31 | - | - |
| BSE 100 | 1, 25, 31 | 2, 5 | - |
| COLGATE | 1, 21, 31 | 2, 3 | - |
| GAIL | - | 1, 2, 5 | - |
| INFOSYS | 31 | - | - |
| NIFTY | 1, 25, 31 | 5 | - |
| ONGC | 1, 6, 25 | 2, 3, 5 | - |
| RELIANCE | 25, 31 | 2, 5 | - |
| SBI | 1, 25, 31 | 2 | - |
| SENSEX | 1, 25, 31 | 2, 5 | - |
| SESA GOA | 10, 25 | - | - |
| SUN | 1, 4, 10 | - | - |
| TATA | 1 | 2 | - |
| WIPRO | - | - | - |

From the tables in Annexure 1 it clear that the returns for securities tested have some seasonal bias and returns are found to be abnormal on some of the days of month, week of the month. However we could not find any kind of bias on day of the week basis. The securities have shown significant positive bias at the end of the month and beginning of the month.

NIFTY:
The average return of Nifty has been 0.092% on daily bases during the test period. The average return during 23rd of a month to 4th of next month has been found to be 0.27%. The average return of the rest of the period from 5th of a month to 22nd of a month is found to be -0.03%.

ACC:
The average trading session return on ACC is found to be 0.33% during 23-4 period against overall average of 0.11%. And the return is found to be average -0.06% during 5-22 of a month. The abnormal returns are found to be on the immediate trading session after 1st and 31st of a month.

BHEL:
Trading sessions after 9th, 25th and 31st have abnormal returns for BHEL. Returns for 3rd and 5th week of a month are also found to have abnormal returns. The average return in the range 23-4 is found to be 0.46% against overall return of 0.19%. 5-22 range has average return of -0.0006%.

BOI:
The BOI has abnormal returns on immediate trading sessions after 1, 25 and 31 of a month. The average return of 23-4 is 0.40% against overall average of 0.20%. The return for the range 5-22 is found to be 0.07%.

BSE 100:
The returns are found to be abnormal on 1, 25 and 31. 2 and 5th week of a month are found to have abnormal returns. The average return between 23-4 is 0.30% against overall average of 0.08%.

COLGATE:
The abnormal returns are found to be purchases made on close on 1, 21 and 31st. 2nd and 3rd week of a month are found to be abnormal.

GAIL:
GAIL does not have any abnormal returns on day of month basis but 1,2 and 5th weeks of month are found to be abnormal.

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INFOSYS:

Purchases made on 31st close are found to have abnormal returns on next trading session. No week of the month irregularities are found.

ONGC:
Purchases made on close of 1, 6 and 25 are found to be giving abnormal returns. 2, 3 and 5th weeks of a month have abnormal returns.

RELIANCE:

Immediate trading sessions after 25th and 31st of a month are found to be abnormal. 2nd and 5th weeks of a month are found to be abnormal.

SBI:
State Bank of India has given abnormal returns on trading sessions after 1st, 25th and 31st of a month. 2nd week of a month is found to be abnormal.

SENSEX:
SENSEX has given abnormal returns matching the other major indices NIFTY. The abnormal days of a month are found to be trading sessions after 1, 25 and 31. 2nd and 5th weeks of a month are found to be abnormal.

SESA GOA:

On day of the month basis trading sessions after 10th and 25th have been found abnormal. No week of the month anomaly is found to be present.

SUN PHARMA:

Immediate trading session 1st, 4th and 10th of a month are found to be abnormal. No week of the month abnormalities are found.

TATA STEEL:

Immediate trading session after 1st of a month is found to be abnormal. 2nd week of the month is found to be abnormal.

WIPRO:
WIPRO does not have any day of month, week of month or day of week regularity in our study.

## V. CONCLUSION

We found seasonal effects present in Indian stock Markets. For three major indices we found day of the month and week of the month effect to be present. For securities tested, only WIPRO did not have any seasonality. We could not find any pattern or regularities present in day of the week effect, which contradicts other research done on this phenomena, one of the reasons can be use of a parametric test by us.

For all the securities tested we found 23rd of a month to 4th of next month range to be abnormally positive against overall average. This period, for some of the securities tested have generated, more than average 5% return. The 5th week of a month is found to be abnormally positive for Indian Markets in the data set. Similarly immediate trading sessions after 1st, 25th and 31st are found to be abnormally positive. The average return of Nifty in our study for the period 1-15 of a month is found to be 0.09% and return for the period 16-31 is found to be 0.10%. This very well can be used by an investor interested in timing the market to generate higher returns. Furthermore this kind of patterns for short run can also be identified and exploited.

Derivatives Expiry:

Previously, Karmakar & Chakraborty(2000) found first half of a month to be abnormally positive for SENSEX. The study was conducted for the period 1985-2000. The reason for such abnormality considered by them was announcement of earning in the first half of the month by companies (Penman, 1987) Or Fund flows during the first half of the month. The returns from the year 2000 to 2015 are found to be different and the second half of the month is found slightly more positive. One of the reasons for this change can be the introduction of Derivatives segment in India in the year 2000. The expiry for the monthly contract happens on the last Thursday of a month and this could have affected the pattern. Further study co relating derivatives expiry and days 23rd to 4th of months, can throw some light on this change.

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Annexure I: Day of the Month

| | | T- Table @ 4 d.f. | Z – Table |
|---|---|---|---|
| * | C. I. 80% | 1.533 | 1.282 |
| # | C. I. 90% | 2.132 | 1.645 |
| $ | C. I. 95% | 2.776 | 1.96 |
| @ | C. I. 99% | 4.604 | 2.58 |

ACC

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.71 | 2.3 | 1.42763 | 16 | 0.09 | 3.4 | - |
| 2 | 0.11 | 3.2 | 0 | 17 | -0.22 | 3.2 | - |
| 3 | 0.41 | 2.8 | 0.59022 | 18 | -0.23 | 3.0 | - |
| 4 | 0.13 | 2.2 | 0.05016 | 19 | -0.4 | 2.5 | - |
| 5 | -0.03 | 2.3 | - | 20 | -0.28 | 2.1 | - |
| 6 | 0.26 | 2.4 | 0.34654 | 21 | -0.27 | 2.5 | - |
| 7 | 0.32 | 2.5 | 0.46582 | 22 | 0.0007 | 2.4 | - |
| 8 | -0.18 | 2.7 | - | 23 | 0.13 | 2.5 | 0.04332 |
| 9 | -0.32 | 2.0 | - | 24 | 0.51 | 2.5 | 0.86996 |
| 10 | 0.06 | 2.3 | - | 25 | 0.62 | 2.2 | 1.23998 |
| 11 | -0.04 | 2.4 | - | 26 | -0.04 | 2.5 | - |
| 12 | -0.199 | 3.2 | -0.531 | 27 | 0.43 | 3.1 | 0.56561 |
| 13 | 0.37 | 2.9 | 0.49576 | 28 | 0.1 | 3.7 | - |
| 14 | -0.04 | 2.8 | - | 29 | 0.36 | 3.9 | 0.35599 |
| 15 | 0.09 | 2.5 | - | 30 | -0.11 | 2.5 | - |
| | | | | 31 | 0.99 | 2.9 | 1.66654 |

BHEL

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.73 | 2.5 | 1.16988 | 16 | 0.18 | 2.6 | - |
| 2 | 0.43 | 3.5 | 0.37962 | 17 | -0.27 | 2.7 | - |
| 3 | -0.03 | 3.3 | - | 18 | -0.15 | 3.6 | - |
| 4 | 0.24 | 2.0 | 0.13579 | 19 | -0.52 | 2.6 | - |
| 5 | 0.21 | 2.4 | 0.04526 | 20 | 0.11 | 2.5 | - |
| 6 | -0.05 | 2.2 | - | 21 | 0.26 | 2.6 | 0.14990 |
| 7 | 0.63 | 3 | 0.81660 | 22 | 0.18 | 3.1 | - |
| 8 | -0.06 | 2.5 | - | 23 | 0.36 | 2.1 | 0.43820 |
| 9 | -0.44 | 2.2 | - | 24 | 0.4 | 2.5 | 0.45673 |
| 10 | -0.01 | 2.7 | -0.402 | 25 | 1.04 | 2.7 | 1.72094 |
| 11 | 0.05 | 2.5 | - | 26 | 0.39 | 2.9 | 0.3762 |
| 12 | -0.17 | 2.5 | -0.7739 | 27 | 0.19 | 3.0 | 0 |
| 13 | 0.31 | 3.3 | 0.19884 | 28 | 0.46 | 4.5 | 0.33258 |
| 14 | -0.47 | 3.8 | - | 29 | 0.58 | 4.2 | 0.51212 |
| 15 | 0.14 | 3.4 | - | 30 | 0.3 | 2.8 | 0.21795 |
| | | | | 31 | 0.92 | 3.0 | 1.34585 |

BOI

| Dat | %Me | %S | Z | D | %Me | %S. | Z |
|---|---|---|---|---|---|---|---|
| 1 | 1.01 | 2.9 | 1.533976 | 1 | 0.51 | 3.07 | 0.56221 |
| 2 | 0.59 | 2.4 | 0.879121 | 1 | -0.03 | 3.32 | -0.38572 |
| 3 | 0.02 | 3.4 | -0.29134 | 1 | 0.01 | 3.38 | -0.31298 |
| 4 | 0.35 | 2.9 | 0.2812 | 1 | 0.12 | 5.28 | -0.08436 |
| 5 | -0.3 | 3.0 | -0.91877 | 2 | -0.27 | 2.9 | -0.90236 |
| 6 | -0.19 | 2.5 | -0.85154 | 2 | 0.09 | 3.19 | -0.19199 |
| 7 | -0.06 | 2.7 | -0.52073 | 2 | 0.02 | 4.08 | -0.24564 |
| 8 | 0.72 | 3.5 | 0.813269 | 2 | -0.07 | 3.35 | -0.44875 |
| 9 | 0.06 | 2.9 | -0.26879 | 2 | 0.32 | 2.8 | 0.23861 |
| 10 | 0.1 | 2.3 | -0.23493 | 2 | 1.13 | 2.85 | 1.81684 |
| 11 | -0.21 | 2.9 | -0.78717 | 2 | 0.11 | 3.29 | -0.15231 |
| 12 | 0.39 | 3.6 | 0.288249 | 2 | -0.11 | 3.25 | -0.53108 |
| 13 | 0.39 | 3.7 | 0.283613 | 2 | -0.08 | 3.89 | -0.40076 |
| 14 | -0.47 | 3.7 | -0.99743 | 2 | 1.01 | 7.22 | 0.62463 |
| 15 | 0.29 | 3.4 | 0.143581 | 3 | -0.09 | 3.47 | -0.46532 |
| | | | | 3 | 0.97 | 2.52 | 1.70126 |

BSE 100

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.57 | 1.5 | 1.71261 | 16 | 0.01 | 1.7 | - |
| 2 | 0.21 | 1.8 | 0.37921 | 17 | 0.003 | 1.9 | - |
| 3 | 0.36 | 1.9 | 0.79211 | 18 | -0.15 | 2.0 | -0.6418 |
| 4 | 0.17 | 1.3 | 0.34448 | 19 | -0.19 | 1.9 | - |
| 5 | -0.02 | 1.6 | -0.3619 | 20 | -0.25 | 1.7 | - |
| 6 | -0.14 | 1.6 | - | 21 | -0.2 | 1.7 | - |
| 7 | 0.16 | 1.6 | 0.25645 | 22 | 0.05 | 2.0 | - |
| 8 | 0.06 | 1.9 | - | 23 | 0.2 | 1.8 | 0.35292 |
| 9 | -0.21 | 1.4 | - | 24 | 0.24 | 1.7 | 0.49071 |
| 10 | -0.21 | 1.8 | - | 25 | 0.55 | 1.6 | 1.58206 |
| 11 | -0.08 | 1.4 | - | 26 | 0.06 | 1.8 | - |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | -0.15 | 1.9 | - | 27 | 0.25 | 1.8 | 0.48902 |
| 13 | -0.004 | 2.1 | - | 28 | -0.2 | 2.4 | - |
| 14 | -0.27 | 2.5 | - | 29 | 0.6 | 4.4 | 0.64999 |
| 15 | 0.36 | 2.3 | 0.65391 | 30 | 0.25 | 1.5 | 0.59629 |
| | | | | 31 | 0.59 | 1.6 | 1.69716 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | -0.11 | 2.8 | -0.5044 | 27 | 0.53 | 3.1 | 0.66954 |
| 13 | -0.23 | 3.1 | - | 28 | -0.06 | 4.6 | - |
| 14 | -0.38 | 3.1 | - | 29 | 0.89 | 3.3 | 1.24852 |
| 15 | 0.22 | 2.8 | 0.13820 | 30 | 0.42 | 2.6 | 0.56728 |
| | | | | 31 | 0.88 | 3.3 | 1.23165 |

COLGATE

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.49 | 1.5 | 1.47635 | 16 | -0.2 | 1.5 | - |
| 2 | 0.53 | 2.4 | 1.00845 | 17 | 0.13 | 1.9 | 0.14487 |
| 3 | 0.41 | 2.5 | 0.71709 | 18 | -0.02 | 2.0 | - |
| 4 | 0.12 | 1.7 | 0.13119 | 19 | 0.0007 | 1.7 | -0.2463 |
| 5 | -0.3 | 2.2 | - | 20 | -0.05 | 1.3 | - |
| 6 | 0.1 | 1.6 | 0.07043 | 21 | -0.45 | 1.4 | - |
| 7 | 0.02 | 1.8 | - | 22 | 0.004 | 1.7 | - |
| 8 | -0.1 | 1.6 | - | 23 | 0.17 | 1.6 | 0.31083 |
| 9 | -0.28 | 1.4 | - | 24 | 0.48 | 2.7 | 0.82691 |
| 10 | -0.08 | 1.9 | - | 25 | 0.44 | 2.2 | 0.89730 |
| 11 | -0.15 | 1.2 | - | 26 | 0.25 | 2.0 | 0.46671 |
| 12 | 0.02 | 1.6 | - | 27 | -0.29 | 2.0 | - |
| 13 | 0.07 | 1.7 | - | 28 | 0.12 | 3.2 | 0.07045 |
| 14 | -0.3 | 2.1 | - | 29 | 0.42 | 2.0 | 0.92615 |
| 15 | -0.05 | 1.7 | - | 30 | 0.61 | 2.1 | 1.37510 |
| | | | | 31 | 0.34 | 2.3 | 0.62637 |

INFOSYS

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.11 | 2.8 | 0.03990 | 16 | 0.34 | 2.2 | 0.63109 |
| 2 | 0.17 | 2.9 | 0.15297 | 17 | 0.09 | 3.0 | 0.00090 |
| 3 | 0.56 | 3.0 | 0.86172 | 18 | 0.003 | 3.1 | - |
| 4 | 0.56 | 2.6 | 1.00755 | 19 | 0.28 | 3.3 | 0.31947 |
| 5 | 0.13 | 2.9 | 0.07696 | 20 | -0.45 | 2.5 | - |
| 6 | -0.21 | 2.5 | - | 21 | -0.11 | 2.6 | - |
| 7 | 0.56 | 2.9 | 0.90021 | 22 | -0.08 | 2.6 | - |
| 8 | -0.16 | 2.1 | - | 23 | 0.36 | 2.1 | 0.69404 |
| 9 | -0.52 | 3.9 | -0.8657 | 24 | 0.11 | 2.2 | 0.05095 |
| 10 | -0.65 | 4.1 | - | 25 | 0.48 | 2.6 | 0.82985 |
| 11 | 0.002 | 3.4 | - | 26 | -0.13 | 2.7 | - |
| 12 | -0.17 | 2.9 | - | 27 | 0.58 | 2.9 | 0.91952 |
| 13 | -0.11 | 3.0 | - | 28 | -0.33 | 3.9 | - |
| 14 | -0.35 | 4.6 | - | 29 | 0.47 | 3.3 | 0.62493 |
| 15 | 0.04 | 2.8 | - | 30 | 0.55 | 2.7 | 0.92896 |
| | | | | 31 | 0.65 | 2.4 | 1.27776 |

GAIL

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.78 | 2.8 | 1.22219 | 16 | -0.49 | 2.8 | -1.2681 |
| 2 | 0.38 | 2.8 | 0.44932 | 17 | 0.85 | 4.2 | 0.91061 |
| 3 | 0.2 | 2.1 | 0.12829 | 18 | -0.25 | 2.8 | - |
| 4 | 0.49 | 3.1 | 0.60287 | 19 | -0.44 | 2.6 | - |
| 5 | 0.1 | 2.6 | - | 20 | -0.2 | 2.8 | - |
| 6 | 0.12 | 2.6 | - | 21 | -0.15 | 2.4 | - |
| 7 | 0.3 | 1.9 | 0.42829 | 22 | 0.21 | 2.9 | 0.11401 |
| 8 | 0.23 | 3.0 | 0.14652 | 23 | -0.32 | 2.7 | - |
| 9 | -0.24 | 2.3 | - | 24 | 0.47 | 2.9 | 0.60808 |
| 10 | 0.02 | 2.9 | - | 25 | 0.58 | 2.4 | 0.99341 |
| 11 | -0.32 | 2.2 | - | 26 | 0.09 | 2.6 | - |

NIFTY

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.54 | 1.5 | 1.6303 | 16 | -0.02 | 1.6 | - |
| 2 | 0.14 | 1.7 | 0.15184 | 17 | 0.02 | 1.8 | - |
| 3 | 0.25 | 1.8 | 0.47810 | 18 | -0.15 | 1.9 | - |
| 4 | 0.15 | 1.3 | 0.24464 | 19 | -0.25 | 1.7 | - |
| 5 | -0.05 | 1.6 | - | 20 | -0.009 | 1.7 | - |
| 6 | -0.02 | 1.5 | - | 21 | -0.16 | 1.6 | -0.8661 |
| 7 | 0.16 | 1.6 | 0.23663 | 22 | -0.05 | 1.7 | - |
| 8 | 0.1 | 1.7 | 0.02604 | 23 | 0.16 | 1.9 | 0.19515 |
| 9 | -0.21 | 1.4 | - | 24 | 0.16 | 1.6 | 0.22807 |
| 10 | -0.18 | 1.7 | - | 25 | 0.58 | 1.6 | 1.63678 |
| 11 | -0.07 | 1.3 | -0.6489 | 26 | 0.03 | 1.7 | - |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | -0.03 | 1.9 | - | 27 | 0.18 | 1.8 | 0.26628 |
| 13 | 0.3 | 3.6 | 0.31728 | 28 | -0.08 | 2.0 | - |
| 14 | -0.3 | 2.5 | - | 29 | 0.54 | 3.9 | 0.62515 |
| 15 | 0.32 | 2.4 | 0.51814 | 30 | 0.26 | 1.5 | 0.61946 |
| | | | | 31 | 0.54 | 1.6 | 1.51173 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | 0.03 | 2.37 | -0.3289 | 27 | 0.48 | 3.2 | 0.52945 |
| 13 | 0.09 | 2.77 | -0.1608 | 28 | 0.05 | 2.3 | - |
| 14 | -0.09 | 2.98 | - | 29 | 0.61 | 4.2 | 0.57778 |
| 15 | 0.36 | 3.37 | 0.31391 | 30 | 0.62 | 2.6 | 0.95629 |
| | | | | 31 | 0.83 | 2.3 | 1.56371 |

ONGC

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 1.13 | 2.9 | 1.83101 | 16 | -0.09 | 2.9 | - |
| 2 | 0.33 | 2.4 | 0.40248 | 17 | 0.08 | 2.7 | -0.1407 |
| 3 | 0.2 | 2.3 | 0.12103 | 18 | 0.02 | 2.6 | - |
| 4 | 0.59 | 2.2 | 1.07921 | 19 | 0.03 | 2.1 | - |
| 5 | -0.06 | 2.6 | - | 20 | 0.31 | 2.4 | 0.36811 |
| 6 | -0.43 | 2.0 | - | 21 | -0.4 | 2.7 | - |
| 7 | 0.02 | 2.2 | - | 22 | 0.18 | 2.3 | 0.06988 |
| 8 | 0.08 | 2.1 | - | 23 | -0.18 | 2.5 | - |
| 9 | -0.13 | 2.2 | - | 24 | 0.13 | 2.6 | - |
| 10 | -0.22 | 2.5 | - | 25 | 0.86 | 2.3 | 1.71130 |
| 11 | -0.09 | 1.7 | - | 26 | 0.33 | 2.5 | 0.39456 |
| 12 | 0.23 | 3.6 | 0.12270 | 27 | 0.03 | 3.0 | - |
| 13 | -0.15 | 3.1 | - | 28 | 0.49 | 3.6 | 0.52438 |
| 14 | -0.43 | 2.5 | - | 29 | 0.88 | 4.6 | 0.86662 |
| 15 | 0.14 | 2.9 | - | 30 | 0.13 | 2.2 | - |
| | | | | 31 | 0.67 | 2.3 | 1.23728 |

SBI

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 1.06 | 2.3 | 2.13233 | 16 | 0.03 | 2.3 | -0.3067 |
| 2 | 0.61 | 2.3 | 1.06616 | 17 | 0.02 | 2.6 | -0.2998 |
| 3 | 0.37 | 2.5 | 0.46398 | 18 | -0.13 | 2.5 | - |
| 4 | -0.14 | 1.9 | - | 19 | -0.04 | 2.2 | -0.5016 |
| 5 | 0.25 | 2.4 | 0.20287 | 20 | -0.4 | 2.5 | - |
| 6 | -0.05 | 2.3 | - | 21 | -0.27 | 2.5 | - |
| 7 | 0.03 | 2.3 | -0.3054 | 22 | -0.005 | 2.7 | - |
| 8 | 0.02 | 2.4 | - | 23 | 0.19 | 2.4 | 0.06845 |
| 9 | 0.13 | 2.2 | - | 24 | 0.06 | 2.4 | - |
| 10 | -0.08 | 2.3 | -0.5735 | 25 | 0.83 | 2.5 | 1.48031 |
| 11 | -0.03 | 2.5 | - | 26 | -0.16 | 2.6 | -0.6673 |
| 12 | 0.21 | 2.6 | 0.10387 | 27 | 0.46 | 3.0 | 0.55492 |
| 13 | -0.17 | 3.0 | - | 28 | 0.01 | 2.8 | - |
| 14 | -0.43 | 3.5 | - | 29 | 0.37 | 6.5 | 0.17905 |
| 15 | 0.79 | 3.2 | 1.09273 | 30 | 0.27 | 2.4 | 0.24695 |
| | | | | 31 | 1.11 | 2.6 | 2.01117 |

RELIANCE

| Dat | %Mea | %S. | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.28 | 2.5 | 0.24498 | 16 | 0.42 | 3.5 | 0.38989 |
| 2 | -0.1 | 2.4 | - | 17 | -0.21 | 2.3 | -0.8965 |
| 3 | 0.33 | 2.65 | 0.33616 | 18 | 0.17 | 2.7 | 0 |
| 4 | -0.07 | 2.28 | - | 19 | -0.19 | 3.4 | - |
| 5 | 0.15 | 2.03 | - | 20 | 0.005 | 2.7 | - |
| 6 | -0.17 | 2.72 | - | 21 | -0.001 | 2.1 | -0.4449 |
| 7 | 0.07 | 2.06 | - | 22 | 0.18 | 2.5 | 0.02209 |
| 8 | 0.27 | 2.66 | 0.20931 | 23 | 0.19 | 2.7 | 0.04064 |
| 9 | -0.02 | 1.99 | - | 24 | 0.12 | 2.5 | -0.1079 |
| 10 | -0.25 | 2.36 | - | 25 | 0.77 | 2.3 | 1.43993 |
| 11 | -0.02 | 2.12 | -0.499 | 26 | 0.31 | 2.6 | 0.29751 |

SENSEX

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.49 | 1.5 | 1.47509 | 16 | 0.02 | 1.5 | - |
| 2 | 0.14 | 1.7 | 0.18666 | 17 | -0.02 | 1.9 | -0.2989 |
| 3 | 0.26 | 1.8 | 0.53282 | 18 | -0.11 | 1.8 | - |
| 4 | 0.13 | 1.4 | 0.19089 | 19 | -0.22 | 1.8 | - |
| 5 | -0.03 | 1.5 | - | 20 | -0.16 | 1.7 | - |
| 6 | -0.08 | 1.6 | - | 21 | -0.19 | 1.6 | - |
| 7 | 0.18 | 1.6 | 0.33270 | 22 | 0.02 | 1.8 | -0.1846 |
| 8 | 0.11 | 1.8 | 0.08472 | 23 | 0.18 | 1.8 | 0.29654 |
| 9 | -0.14 | 1.4 | - | 24 | 0.16 | 1.7 | 0.25546 |
| 10 | -0.18 | 1.8 | - | 25 | 0.56 | 1.6 | 1.61296 |
| 11 | -0.13 | 1.5 | - | 26 | 0.08 | 1.7 | - |

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|---|---|---|---|---|---|---|---|
| 12 | -0.08 | 1.8 | - | 27 | 0.22 | 1.8 | 0.41758 |
| 13 | 0.03 | 1.9 | - | 28 | -0.15 | 2.2 | - |
| 14 | -0.29 | 2.4 | - | 29 | 0.53 | 4.0 | 0.61437 |
| 15 | 0.33 | 2.3 | 0.59262 | 30 | 0.25 | 1.4 | 0.64509 |
| | | | | 31 | 0.62 | 1.6 | 1.80449 |

SESA GOA

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.64 | 3.2 | 0.61864 | 16 | -0.35 | 3.6 | - |
| 2 | 0.53 | 3.3 | 0.41181 | 17 | -0.2 | 4.0 | - |
| 3 | 0.71 | 4.1 | 0.57829 | 18 | -0.28 | 4.3 | - |
| 4 | 0.51 | 3.1 | 0.40524 | 19 | -0.05 | 3.8 | - |
| 5 | 0.48 | 4.0 | 0.2736 | 20 | -0.06 | 3.6 | - |
| 6 | -0.24 | 3.4 | - | 21 | -0.003 | 3.5 | - |
| 7 | 0.55 | 3.4 | 0.43573 | 22 | 0.22 | 4.0 | - |
| 8 | 0.52 | 3.4 | 0.38958 | 23 | 0.14 | 3.3 | - |
| 9 | -0.14 | 2.7 | - | 24 | 0.5 | 3.8 | 0.31488 |
| 10 | -0.55 | 3.0 | -1.5353 | 25 | 1.28 | 3.0 | 1.83150 |
| 11 | -0.08 | 3.7 | - | 26 | 0.3 | 3.9 | 0.02804 |
| 12 | 0.05 | 4.5 | - | 27 | 0.95 | 5.1 | 0.73145 |
| 13 | 0.87 | 4.0 | 0.81110 | 28 | 0.04 | 3.7 | - |
| 14 | 0.51 | 4.6 | 0.27658 | 29 | 1.18 | 6.9 | 0.72308 |
| 15 | 0.46 | 4.2 | 0.23636 | 30 | -0.25 | 3.0 | - |
| | | | | 31 | 0.3 | 2.8 | 0.03934 |

SUN PHARMA

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.58 | 1.8 | 1.31710 | 16 | -0.15 | 4.2 | - |
| 2 | 0.63 | 3.1 | 0.86335 | 17 | 0.28 | 2.6 | 0.29638 |
| 3 | -0.14 | 3.1 | - | 18 | 0.12 | 2.9 | - |
| 4 | 0.96 | 2.7 | 1.63640 | 19 | -0.18 | 2.6 | - |
| 5 | -0.05 | 2.0 | - | 20 | 0.08 | 2.6 | - |
| 6 | 0.006 | 2.5 | - | 21 | -0.07 | 2.7 | - |
| 7 | 0.27 | 2.3 | 0.30284 | 22 | 0.24 | 2.0 | 0.27700 |
| 8 | -0.11 | 2.2 | -0.627 | 23 | 0.14 | 2.4 | 0 |
| 9 | -0.2 | 2.2 | - | 24 | 0.14 | 2.7 | 0 |
| 10 | -0.46 | 2.5 | - | 25 | 0.02 | 2.7 | -0.2412 |
| 11 | -0.15 | 1.9 | - | 26 | 0.34 | 3 | 0.37118 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 12 | 0.009 | 2.0 | - | 27 | 0.45 | 2.4 | 0.69597 |
| 13 | 0.5 | 2.7 | 0.72623 | 28 | 0.01 | 3.3 | - |
| 14 | 0.27 | 2.6 | 0.27838 | 29 | 0.28 | 3.4 | 0.22593 |
| 15 | 0.49 | 2.5 | 0.75825 | 30 | 0.24 | 2.3 | 0.23999 |
| | | | | 31 | -0.17 | 2.3 | - |

TATA STEEL

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z Statistic |
|---|---|---|---|---|---|---|---|
| 1 | 0.96 | 3.1 | 1.42307 | 16 | 0.04 | 2.7 | - |
| 2 | 0.07 | 3.0 | - | 17 | 0.24 | 3.1 | 0.14368 |
| 3 | 0.5 | 3.4 | 0.54712 | 18 | -0.16 | 3.0 | - |
| 4 | 0.26 | 2.7 | 0.20173 | 19 | 0.26 | 3.6 | 0.15129 |
| 5 | -0.38 | 3.0 | - | 20 | 0.19 | 3.1 | 0.05353 |
| 6 | -0.03 | 2.5 | - | 21 | -0.49 | 2.9 | - |
| 7 | -0.23 | 3.4 | - | 22 | 0.03 | 3.3 | - |
| 8 | 0.27 | 3.1 | 0.19381 | 23 | 0.21 | 2.9 | 0.09373 |
| 9 | -0.11 | 2.4 | -0.6111 | 24 | 0.56 | 3.0 | 0.73019 |
| 10 | -0.42 | 2.8 | - | 25 | 0.46 | 2.7 | 0.60083 |
| 11 | -0.34 | 2.3 | - | 26 | -0.19 | 3.3 | - |
| 12 | -0.12 | 3.6 | - | 27 | 0.31 | 3.5 | 0.23525 |
| 13 | 0.27 | 2.8 | 0.21265 | 28 | 0.02 | 3.2 | - |
| 14 | 0.09 | 3.7 | - | 29 | 0.99 | 9.8 | 0.47059 |
| 15 | 0.64 | 3.4 | 0.78603 | 30 | 0.45 | 2.8 | 0.56064 |
| | | | | 31 | 0.7 | 2.8 | 1.05865 |

WIPRO

| Dat | %Mea | %S | Z | Dat | %Mea | %S | Z |
|---|---|---|---|---|---|---|---|
| 1 | 0.13 | 3.3 | 0.07479 | 16 | 0.28 | 2.8 | 0.38637 |
| 2 | 0.24 | 3.4 | 0.25014 | 17 | 0.3 | 4.6 | 0.26023 |
| 3 | 0.38 | 3.7 | 0.44391 | 18 | -0.21 | 3.6 | - |
| 4 | 0.32 | 2.8 | 0.45589 | 19 | -0.15 | 3.4 | - |
| 5 | 0.02 | 3.3 | - | 20 | -0.27 | 3.0 | - |
| 6 | -0.09 | 3.2 | -0.2998 | 21 | -0.12 | 3.9 | - |
| 7 | 0.19 | 2.9 | 0.20159 | 22 | 0.02 | 3.7 | - |
| 8 | -0.26 | 2.8 | - | 23 | 0.42 | 3.4 | 0.54538 |
| 9 | -0.43 | 4.0 | - | 24 | 0.26 | 3.3 | 0.29172 |
| 10 | -1.02 | 3.6 | - | 25 | 0.66 | 3.6 | 0.88683 |
| 11 | 0.4 | 2.9 | 0.60477 | 26 | -0.41 | 3.5 | -0.7852 |

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|---|---|---|---|---|---|---|---|
| 12 | -0.1 | 3.7 | -0.2725 | 27 | 0.74 | 4.0 | 0.90718 |
| 13 | 0.04 | 3.3 | - | 28 | -0.56 | 6.3 | - |
| 14 | -0.13 | 4.2 | - | 29 | 0.42 | 4.2 | 0.44304 |
| 15 | 0.73 | 3.2 | 1.12225 | 30 | 0.38 | 3.3 | 0.49029 |
| | | | | 31 | 0.46 | 2.9 | 0.71259 |