The short-term impact of analyst recommendations: evidence from the Indian stock market

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Abstract

Purpose – This study aims to evaluate the short-term impact of brokerage analysts' recommendations on abnormal returns using a sample selected from the S&P BSE 100 in the Indian context. The efficient market hypothesis, specifically, its semi-strong form, is tested for "Buy" stock recommendations published in the electronic version of Business Standard. The crucial issue is, are there any abnormal returns that can be earned following a recommendation? If so, how quickly do prices incorporate the information value of these recommendations? It tests the impact of analyst recommendations on average abnormal returns (AARs) and standardized abnormal returns (SRs) to determine their statistical significance.

Design/methodology/approach – Using a sample of stock recommendations published in the e-version of Business Standard, the event study methodology is used to determine whether AARs and SRs are significantly different from zero for the duration of the event window by using several significance tests.

Findings – The findings indicate a marginal opportunity for profit in the short term, restricted to the event day. However, the effect does not persist, i.e. the market is efficient in its semi-strong form implying that investors cannot consistently earn abnormal returns by following analysts' recommendations. Post the event date, the market reaction to analyst recommendations becomes positive, however, insignificant until the ninth day after the recommendation providing support to the underreaction hypothesis given by Shliefer (2000) and post-recommendation price drift documented by Womack (1996). The study contributes by using different statistical tests to determine the significance of returns.

Practical implications – There are important implications for traders, investors and portfolio managers. The speed with which market prices incorporate publicly available information is useful in formulating trading strategies. However, stock characteristics such as market capitalization, volatility and level of analyst coverage need to be incorporated while making investment decisions.

Originality/value – The study contributes by using different statistical tests to determine the significance of returns.

Keywords Analysts' recommendations, Market efficiency, Abnormal returns, Event study

Paper type Research paper

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1. Introduction and theoretical background

In India, a multitude of brokerage houses and analyst firms disseminate their stock recommendations through print and electronic media. Information is critical in the efficient functioning of stock markets and informed players are paid for providing it, including brokerage houses (Liu *et al.*, 1990). They employ analysts who provide recommendations based on public information, along with the expert's insight and perspective. These "Research Analysts" play a critical role in the market by providing three kinds of output: earnings forecasts, stock recommendations and target prices (Hall and Tacon, 2010). Their ability to issue recommendations is driven by many factors, including level of analyst coverage, analysts experience, the reputation of the brokerage house, their marketing ability and the number of industries or companies followed (Stickel, 1995). Analysts' recommendations, which attempt to forecast relative stock prices, typically are made in two ways: they anticipate changes in company fundamentals or they react to news or company specific announcements (Womack, 1996; Barber *et al.*, 2001). As per a Report by the SEC (Securities and Exchange Commission) [1], they contribute to market efficiency through the dissemination of their research reports and this may influence the price of a company's stock by influencing the demand for it (Stickel, 1995). A typical research report contains the stock recommendation, current market price, estimated target price (12-month horizon), estimated values for financial statements and key financial ratios along with a recommendation history. Other features include disclosures, compensation of analysts, conflict of interest and target audience. Around the world, analysts work for banks and brokerage houses (sell-side) as well as institutional investment firms like mutual funds and insurance companies (buy-side) (Chakrabarti, 2004). Typically, they make "buy, hold, sell" type recommendations. However, their usage differs from a global perspective, with a variety of terms – strong buy, accumulate, over-perform or under-perform and neutral.

Traditional financial market theory is largely based on the assumption of efficient markets, i.e. returns are over time consistent with that of the market on a risk-adjusted basis (Fama, 1970). A definition of market efficiency as stated by Malkiel (1989, p.127) states that:

> A capital market is said to be efficient if it fully and correctly reflects all relevant information in determining security prices. Formally, the market is said to be efficient with respect to some information set, Ω_t, if security prices would be unaffected by revealing that information to all participants. Moreover, efficiency with respect to an information set, Ω_t, implies that it is impossible to make economic profits by trading on the basis of Ω_t.

It is vital to identify the information set and whether it can be exploited to derive above average risk-adjusted returns. The three forms of market efficiency discussed in the literature are based on the information set used to test it. This paper tests the semi-strong form of the efficient market hypothesis (EMH), which states that security prices adjust rapidly to the release of all public information. If analysts' recommendations are publicly available, there is a low likelihood of earning abnormal returns as the information is already public and incorporated into market prices as soon as it released. However, Stickel (1986) asserts that even if investment advice is based entirely on public information, investors believe that it could affect prices and therefore returns, considering the benefits outweigh the cost of acquiring the information. As the Indian financial markets have advanced with increased retail participation and technological disruption, the role of research analysts has become increasingly important. The legal framework governing Research Analysts comes under the purview of the SEBI (Research Analysts) Regulations, 2014, which specifies their registration and conduct. The Regulations define the criteria for a Research Analyst, including primary responsibilities of providing a recommendation in the research report,

giving price targets and other content, disclosure of material information and the potential areas of conflict of interest that might affect their conduct.

Keeping the theoretical and legal framework in the background, the current study aims to examine evidence on the presence and timing of abnormal returns. The objective is to offer insight on the impact of analysts' recommendations on stock market returns, using a sample of 36 recommendations for companies listed on the S&P BSE 100. The paper is divided into seven sections. Section 1 provides the introduction and theoretical context. Section 2 reviews the relevant literature. Section 3 describes the sample and research design. Section 4 presents the findings of the study. Section 5 discusses the findings and its limitations. Section 6 presents directions for future research and Section 7 concludes.

2. Literature review

All the empirical research on the theory of efficient markets has focused on whether market prices "fully reflect" subsets of available information (Fama, 1970). The empirical tests for the EMH are divided into three types depending on the information subset being tested. The weak form hypothesis assumes that all historical information (past prices and volume) is reflected in the market prices of stocks, the semi-strong form states that all publicly available information is impounded in security prices while the strong form encompasses the above two and states that all public and private information is reflected in security prices. The semi-strong form has widely been tested using the event-study methodology which was popularized after Fama *et al.*'s (1969) study on stock splits. Further, several kinds of corporate news events *such as mergers and acquisitions, stock splits, earnings and dividend announcements* were studied (Peterson, 1989).

Several studies have examined the impact of analyst recommendations on abnormal stock returns. Alfred Cowles (1933) undertook the earliest investigation of professional investment advice by studying 36 forecasters between 1928 and 1932 with the conclusion that markets were efficient and recommendations could not earn excess returns. However, Grossman and Stiglitz (1980) argued that when information is very inexpensive, then equilibrium exists and the market price will reveal most of the informed traders' information. The consensus is that because information is costly, prices cannot perfectly reflect the information which is available, because if it did, those who spent resources to obtain it would receive no compensation. Thus, they pointed out the fundamental conflict between market efficiency and the incentives to acquire information.

The current literature review synthesizes information which studies the impact on stock prices and the impact on abnormal returns. In the international context, especially studies conducted in developed economies, such as the USA, the impact of analyst recommendations on stock prices has been significant in many cases. Stoffels (1966) studied the effect of recommendations made by investment advisory services on the short-term price of a stock. Over a five-year period (1959–1963), the initial hypothesis that a recommendation by an investment advisory service has a noticeable effect on the price of the stock recommended, was supported. The effect was observable through the third and fourth days following the recommendation. Similarly, Davies and Canes (1978) and Bjerring *et al.* (1983) found a significant effect on prices following the recommendation indicating that investors receive something of value. In addition, the latter categorizes stocks into "recommeded," "speculative" and "representative" lists and finds that stocks with positive recommendations have higher abnormal returns. In the following decade (1990–2000), the analyst recommedation literature is replete with research supporting a significant effect on stock prices and abnormal returns earned as a result of the recommendation. Liu *et al.* (1990) examine a large sample of Buy and Sell recommendations published in the Wall Street

Journal (WSJ) to determine the impact on stock prices and returns. Both effects were found to be significant; however, the significant excess returns were limited to the day of the event and two days prior. Beneish (1991), using a large sample of Buy and Sell recommendations reported in the WSJ, found a similar effect on abnormal returns. Barber and Loeffler (1993), also studied recommendations from the WSJ and concluded that abnormal returns accrued on two days succeeding the recommendation with an increase in trading volume. The underlying theme connecting several studies in this period was the temporary effect on abnormal returns which appeared on the date of their publication, or prior to it. The positive abnormal returns do not sustain beyond the publication of the recommendation as revealed by Walker and Hatfield (1996). Ferreira and Smith (1999) studied the Small Stock Focus (SSF) columnn of the WSJ and found that it focussed on stocks with large price changes and they earned abnormal returns prior to the recommendation date. However, Womack (1996) found a significant post-recommendation price drift associated with Buy and Sell recommendations alongwith higher excess returns earned by small capitalization firms. In the 2000s, the focus shifted to consensus recommendations, the presence of transaction costs and revisions in recommendations. Barber *et al.* (2001) studied the profitability of investment strategies using a very large sample of consensus recommendations. The findings indicate insignificant abnormal returns in the presence of transaction costs. However, Loh and Stulz (2011) found that recommendations away from the consensus were more influential and significantly impacted stock prices. Further, Jegadeesh *et al.* (2004) examined analyst recommendation revisions in G7 countries and found a significant impact of the revisions on stock prices on the day of the revision. Another study on 13 emerging markets carried out by Moshirian *et al.* (2009) examined the Buy and Hold Abnormal Returns (BHARs) over a nine-year period and found a significant impact on stock price. Excess returns were earned because of informational asymmetries. Apart from market capitalization being a factor, Roszkowski and Richie (2016) investigated excess returns for a large sample and found evidence for market inefficiency. Specifically, stocks with positive momentum effects were recommended and abnormal returns were found to be higher following the day of the recommendation suggesting herding behavior in the market.

With regard to Indian studies examining analyst recommendations, a study by Chakrabarti (2004) uses a very large sample examining over 2,000 recommendations; it finds investment value for investors over different time periods, especially in the "Strong Buy" and "Strong Sell" category. Excess returns were investigated on the same day, after three days, a week and a month-long and three-month horizon. Buys had greater investment value than sell recommendations. However, a similar study executed by Gupta *et al.* (2008) using recommendations from the *Economic Times* does not find evidence of significant abnormal returns for the same time periods. Similarly, Choudhary and Bajaj's (2011) examination of analyst recommendations also signals market efficiency and no significant excess returns. In a departure from previous studies, Sayed and Chaklader (2014) studied target price accuracy using a large sample of Buy ratings between 2007 and 2011. It was found that Buy recommendations did have investment value reaching their targets with 57.6% accuracy for a year-long time horizon. Arun *et al.* (2016) corroborate the evidence of Buy recommendations having more investment value (positive returns for up to 3 months) than sell recommendations by examining a large sample collected from brokerage houses and journalists. Short-term AARs for Buy recommendations (by journalists) were positive, however, not significant over a 28-day period. In a recent study conducted in the Indian context, Moulya and Mallikarjunappa (2020) find evidence for market efficiency as revealed by insignificant abnormal returns on the event day. Their study does not find any evidence of a significant impact on the market prices of firms. Another important result is the delay in

market price reaction following the event. With regard to the cumulative average abnormal returns (CAARs), they found negative returns following Buy recommendations in the short term, specifically an event window of 20 days. Further, in a unique study conducted by Chatterjee *et al.* (2020), the the time to payoff is modeled using survival analysis and event study methodology and target prices are reached in about 43% of technical calls within 30 days.

To summarize, the literature reviewed does not arrive at a consensus view about market efficiency. Many studies in the international context find evidence of excess returns especially for Buy recommendations on the event day and a few days prior. In addition, most of these studies report a significant effect on stock prices following the recommendation (Liu, *et al.*, 1990; Beneish, 1991; Barber and Loeffler, 1993). However, a few studies find a post-recommendation drift in stock prices and abnormal returns in the long term, contributing to the debate concerning market efficiency (Womack, 1996). Some studies also examine analyst recommendation revisions alongwith consensus recommendations and their impact on stock returns (Barber *et al.*, 2001). Others associate recommendations with market capitalization and level of analyst coverage. Very few studies investigate target price accuracy (Sayed and Chaklader, 2014). The major objective here is to test if the market is efficient in the semi-strong form in the short-term by testing whether there are any excess returns surrounding the event. The next section describes the data used and the research design.

3. Data and research design

The brokerage analysts' recommendations were sourced from the "recommended action" (Buy) given along with the research reports in the electronic version of Business Standard. Following Mandal and Rao (2010) and Moulya and Mallikarjunappa (2020), a small sample is deployed. While selecting the companies for the final sample, certain selection criteria were used:

- Companies should have been listed on both the BSE and NSE at the time of recommendation.
- The selected companies should have received a buy recommendation from one or multiple brokers in the preceding one year.
- Companies having other concurrent announcements within the respective event window are omitted.
- The sample companies consider only the Buy recommendation and price (to buy) displayed along with the research reports.

After following the selection criteria, a sample consisting of 36 recommendations spanning from 2019–2020 are used.

To test the impact of analyst recommendations on stock returns, the event study methodology is used. Its usage was pioneered by Fama *et al.* (1969) in their study on stock splits. Event studies test market efficiency (Brown and Warner, 1980). Here, the objective is to examine the market's reaction to the publication of recommendations through the observation of security prices and returns around the event. The major purpose is to assess whether security returns around the time of the event have been abnormal, that is, the extent to which returns were different from those which were expected given the model determining normal expected returns (Brown and Warner, 1980).

The methodology of event studies is explained by several authors (Campbell *et al.*, 1997). It is possible to assess the economic impact of analyst recommendations using stock prices over a

relatively short time period. Many texts on the econometrics of financial markets outline sequentially the procedure for carrying out an event study. The following terms are defined – event of interest, specification of the selection criteria, event window, estimation window, estimation procedure, testing procedure, reporting and interpretation of results. The event of interest is the publication of stock recommendations. To estimate parameters for the market model, daily stock prices and market index levels are collected for a period of 89 days prior to recommendation of stocks. The estimation window is used to estimate a model of the stock's returns under "normal" circumstances which stands at 89 days. An event window of 20 days before and 20 days after the recommendation date is used for the purpose of calculating abnormal returns (−20 to +20). The market index used for calculating normal returns is the S&P BSE 100. The post-event window is used to investigate the abnormal return performance following release of recommendations (Figure 1).

The market model has been applied to estimate the expected returns, which is essentially a regression of the stock returns against the returns of the market index (Brown and Warner, 1980, 1985). As discussed by Mackinlay (1997), the normal returns are calculated by way of the market model, where

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where R_{it} and R_{mt} are the returns on security "i" and the market portfolio (S&P BSE 100), respectively, for period t. The error term is the zero mean disturbance term. The α_i and β_i are parameters of the market model obtained from the estimation window.

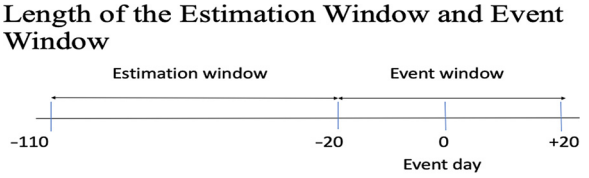
Given the parameter estimates from the market model, the estimated regression equation is:

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$$

The estimates ($\hat{\alpha}_i$, $\hat{\beta}_i$) are the ordinary least squares estimates used to determine the estimated return for each sample security for the 40-day event window period. The daily percentage returns are calculated for the sample stocks and the index i.e. the S&P BSE 100 as

$$R_t = \frac{(P_t - P_{t-1})}{P_{t-1}} \times 100$$

The abnormal returns (ARs) are measured as



Notes: Day 0 is the event day, Day -110 to -21 covers the estimation window (89 trading days), Day -20 to Day +20 is the event window. The first period, Day -20 to Day -1 is the pre-event period and Day 1 to Day 20 is the post-event period

Figure 1.
Event study timeline

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

The AR_{it} is the disturbance term of the market model. It is the difference between the actual and the estimated return and represents the residual that is not explained by the movement in the general level of stock prices. ARs are calculated for each sample security in the event window. The aggregation of ARs can be done along two dimensions: across time and across securities in the sample. The abnormal returns (ARs) are averaged over the number of sample securities to determine average abnormal returns (AARs). This is a cross-sectional average, where

$$AAR_t = \frac{1}{n} \sum_{i=1}^{35} AR_{it}$$

The AARs and CAARs are calculated for the 40-day event window period, for each sample firm where

$$CAAR_t = CAAR_{t-1} + AAR_t$$

The literature on the event study methodology extensively studies the significance of ARs on the event date and in the event window. ARs are normally distributed by the assumption pertaining to the market model; therefore, the *t*-test is used to determine the significance of AARs for each day in the event window. The hypothesis tests for event studies are performed to identify whether the ARs on the event day and during the event window are significantly different from zero (Brown and Warner, 1985).

Therefore, the null hypothesis is formulated as

$$H_0: \mu = 0$$

H_0: The AARs surrounding the date of publication of the recommendation are not significantly different from zero.

This implies that there are no significant AARs within the event window with the alternative hypothesis suggesting the presence of significant AARs within the event window,

$$H_1 : \mu \neq 0$$

Next, a testing framework for the ARs is identified. Literature on event study statistics ranges from parametric to non-parametric tests. Here, parametric tests are used to ascertain the significance of ARs on the event day and in the event window. These tests are used to measure the variance of AARs in different ways.

3.1 Crude dependence adjustment test (Brown and Warner, 1980)

This test is determined as the average of the ARs for each sample firm in the event window divided by the cross-sectional standard deviation of those ARs. Each day's AAR (event window) is divided by the standard deviation of excess returns (in the estimation period) to determine the t-statistic.

The t-statistic for each day in the event window is

$$t = \frac{\overline{A_t}}{\hat{S}(A_t)}$$

where $A_t = \frac{1}{N} \sum_{i=1}^{n} A_{it}$ for the event window and the denominator is the standard deviation of excess returns in the estimation window:

$$\hat{S}(\overline{A_t}) = \sqrt{\frac{1}{n-1}\sum_{t=-121}^{t=-21}\left(\overline{A_t} - \overline{A}\right)^2}$$

Brown and Warner (1980) specified this test to account for cross-sectional dependence in the excess returns; however, this test assumes that event-induced variance is insignificant. Therefore, other powerful tests were applied to determine the significance of returns. Specifically, Brown and Warner (1985) discuss the issues of event-date clustering (an event which happened for multiple firms on the same day(s) leading to cross-sectional correlation among ARs) and that of event-induced volatility changes that may lead to a rejection of the null hypothesis. These issues led to the development of other test statistics such as the Patell (1976) test which uses standardized residuals (SRs). The same hypotheses are used for the SRs as in the case of AARs. The objective is to determine whether the SRs are not significantly different from zero in the event window.

In case of the CDA *t*-test given by Brown and Warner (1980), it is assumed that security residuals are uncorrelated and event-induced variance is insignificant. By standardizing the event-window ARs, Patell (1976) uses the SR method where the estimated standard deviation of market returns of the estimation period is used to normalize the event window ARs.

The Patell test statistic (t_p) is calculated as in Boehmer *et al.* (1991, p. 269):

$$t_p = \frac{\sum_{i=1}^{N} SR_{iE}}{\sqrt{\sum_{i=1}^{n}\frac{T_i - 2}{T_i - 4}}}$$

where

SR_{iE} = security i's SR on the event day.

$$SR_{iE} = \frac{AR_{iE}}{\hat{S}_i\sqrt{1 + \frac{1}{T_i} + \frac{\left(R_{ME} - \bar{R}_m\right)^2}{\sum_{i=1}^{T}\left(R_{mT} - \bar{R}_m\right)^2}}}$$

where

T_i = number of days in estimation period = 89;

$\overline{R}_m = \frac{1}{T_i}\sum_{T=1}^{T} R_{mT}$, average market return in estimation period;

N = number of firms = 36;

AR_{iE} = security i's AR on the event day;

R_{mT} = market return for each day in the estimation period;

R_{mE} = market return for each day in the event period;

$\overline{R}_m$ = average market return during the estimation period;

$\hat{S}_i$ = security *i*'s estimated standard deviation of AR's during the estimation period.

However, the above test does not account for the cross-correlation of the estimation period residuals. This was solved by applying the adjusted Patell (AP) test developed by Kolari and Pynnönen (2010):

$$t_{AP} = \frac{t_p}{\sqrt{1 + (n-1)\overline{r}}}$$

where

$\overline{r}$ = average of cross-correlation of the estimation period residuals.

Boehmer *et al.* (1991) (hereinafter referred to as the BMP test) developed a test statistic to counter the problem of event-induced volatility changes, known as the BMP test statistic. This test (t_{BMP}) also uses SRs and uses the ordinary cross-sectional technique to arrive at the test statistic:

$$t_{BMP} = \frac{\frac{1}{N}\sum_{i=1}^{N} SR_{iE}}{\sqrt{\frac{1}{N(N-1)}\sum_{i=1}^{N}\left(SR_{iE} - \sum_{i=1}^{N}\frac{SR_{iE}}{N}\right)^2}}$$

Kolari and Pynnönen (2010) developed an adjusted version of the BMP test to arrive at an adjusted BMP test statistic (t_{AB}), which also makes use of the average cross-sectional correlation as in the AP test:

$$t_{AB} = \frac{t_{BMP}}{\sqrt{\frac{1-\bar{r}}{1+(n-1)\bar{r}}}}$$

The next section shows the results for AARs, CAARs and the findings from the various significance tests.

4. Findings

The methodology described above uses several tests to determine the significance of ARs in the event window. Parametric tests assume that individual firm's ARs are normally distributed, whereas non-parametric tests do not rely on such assumptions. Parametric tests are based on the classic *t*-test, namely, the crude dependence adjustment (CDA) test (Brown and Warner, 1980), the SR test or Patell (1976) test, the BMP test (1991) and the adjusted versions of the Patell and BMP tests given by Kolari and Pynnönen (2010).

Table 1 reports the AARs, *t*-test values and CAARs results from applying the CDA *t*-test (Table 2, Figures 2 and 3).

The results from the *t*-test conducted for the AARs show a rejection of the null hypothesis for zero ARs on the event day i.e. Day 0. The significance of AARs is seen at the 1% level. This effect is only limited to the event day and the significant ARs do not extend to the immediately succeeding days. However, on the ninth day, post Day 0, the AARs again become significant suggesting a delayed price reaction, in line with the findings of Moulya and Mallikarjunappa (2020). Womack (1996) and Moshirian *et al.* (2009) also document a post-recommendation price drift in their analyses. An analysis of the AAR values indicates that most of the returns are not significantly different from zero in the entire event window period suggesting semi-strong form efficiency. Another characteristic of the AARs is that the negative AARs turn into positive AARs post the recommendation date. Thus, the null hypothesis of no significant impact on stock market returns (in terms of AARs) is rejected for the event day implying a positive impact of analyst recommendations on stock returns in line with the findings of Walker and Hatfield (1996) and Panchenko (2007). Consistent with the above studies, significant returns do not persist immediately after the event date. It must be noted that largely the market is efficient in its semi-strong form and there is a delayed but significant market reaction to analyst recommendations on the ninth day.

To overcome the problems of cross-sectional correlation of ARs and event-induced volatility, certain additional tests are used to determine the significance of ARs. These tests, based on SRs, have shown evidence of being superior than non-standardized ARs

Serial number	Date of recommendation	Company name	Price to buy (Rs)
1	22-04-2019	HDFC Bank	2,293
2	25-04-2019	ACC	1,658
3	25-04-2019	Infosys	748
4	13-05-2019	HCL Technologies	1,087
5	13-05-2019	Titan Company	1,132
6	14-05-2019	Larsen and Toubro	1,318
7	24-05-2019	DLF	181
8	24-05-2019	IndusInd Bank	1,599
9	18-06-2019	Dr Reddy's Labs	2,550.6
10	24-06-2019	Axis Bank	771
11	16-07-2019	ICICI Prudential Life Insurance	384
12	5-08-2019	SBI	308
13	9-08-2019	UltraTech Cement	4,233
14	13-08-2019	Reliance Industries	1,162
15	13-08-2019	GAIL (India)	124
16	11-09-2019	Coal India	195
17	15-10-2019	Hindustan Unilever	2,015
18	12-11-2019	Motherson Sumi	134
19	29-11-2019	Tata Motors	161
20	13-12-2019	Marico	331
21	31-12-2019	SBI Life Insurance Co.	988
22	28-01-2020	ICICI Bank	534
23	13-02-2020	JK Cements	1,418
24	28-02-2020	Federal Bank	85
25	3-04-2020	Aurobindo Pharma	392
26	07-04-2020	NTPC	80
27	23-04-2020	Tata Steel	266
28	14-05-2020	Maruti Suzuki	5,035
29	29-05-2020	Sun Pharma (Health Care)	450
30	02-06-2020	Piramal Enterprises Ltd.	915
31	02-06-2020	Voltas	538
32	04-06-2020	Interglobe Aviation	1,023
33	10-06-2020	PI Industries	1,591
34	15-07-2020	Wipro	225
35	27-07-2020	ITC	200
36	26-08-2020	Lupin	970

Table 1.
Sample companies

(Kolari and Pynnönen, 2010). Standardized ARs are defined as "abnormal returns divided by the standard deviation of estimation period residuals corrected by the prediction error" (Kolari and Pynnönen, 2010, p. 3998). The Patell (1976) test uses SRs for all the firms in the event window to determine the significance of returns. This test assumes that the SRs have the same variance. However, it does not account for the cross-correlation of the estimation period residuals. To counter the problem of the volatility effect, Boehmer *et al.* (1991) adjust for the event-induced volatility by estimating the average event-day volatility cross-sectionally with the sample standard deviation. Kolari and Pynnönen (2010) developed the adjusted versions of the Patell test and the BMP test to account for cross-sectional correlation of the SRs in the event window. Table 3 reports the results from all the tests using SRs.

The table reports the results using SRs for the Patell, BMP, AP and adjusted BMP tests. The results using SRs reveal positive and significant returns on the event day (see Table 3). Similar to the results of the classic *t*-test, the Patell and AP tests reject the null hypothesis of

Event window	AAR	CDA t-test	CAAR
−20	−0.852	−2.192008502**	−0.852
−19	−0.220	−0.565090568	−1.072
−18	−0.497	−1.278404799	−1.569
−17	−0.874	−2.248226458**	−2.443
−16	−0.891	−2.29223078	−3.334
−15	−0.383	−0.985573944	−3.717
−14	−0.245	−0.63053163	−3.962
−13	0.366	0.941897356	−4.283
−12	−0.320	−0.824379356	−4.641
−11	−0.359	−0.922688069	−5.000
−10	−0.677	−1.740575337*	−5.677
−9	−0.814	−2.092979884**	−6.490
−8	0.094	0.242766767	−6.396
−7	−0.248	−0.63758001	−6.644
−6	−0.497	−1.278049789	−7.140
−5	−0.432	−1.112378615	−7.573
−4	0.179	0.459716906	−7.394
−3	0.172	0.442850302	−7.222
−2	0.026	0.067266531	−7.196
−1	0.024	0.060734025	−7.172
0	0.824	2.12087517**	−6.348
1	−0.222	−0.569908655	−6.569
2	0.088	0.226885075	−6.481
3	0.037	0.095595098	−6.444
4	0.327	0.840610588	−6.117
5	0.410	1.054866007	−5.707
6	0.358	0.920385095	−5.349
7	0.492	1.265092922	−4.858
8	0.233	0.59864334	−4.625
9	1.233	3.17245081**	−3.392
10	0.313	0.804268444	−3.079
11	0.217	0.557389894	−2.862
12	0.090	0.232453798	−2.772
13	0.096	0.246283625	−2.676
14	0.104	0.26847034	−2.572
15	0.577	1.484497774	−1.995
16	−0.116	−0.299154152	−2.111
17	0.482	1.239135013	−1.629
18	0.291	0.749816915	−1.338
19	1.243	3.198647123***	−0.094
20	0.916	2.357104195**	0.822

Notes: The *t*-values are compared to the critical values for a two-tailed test to determine the significance of AARs; *10% level of significance, **5% level of significance, ***1% level of significance and ****0.1% level of significance in two-tailed hypothesis

Table 2.
Results for the impact of Buy recommendations on average abnormal returns (AARs) and CAARs

no significant ARs on the event day. However, this effect disappears post the event day. Prior to the event day, the announcement of stock recommendations does not generate positive ARs for the investors. However, post the event date, positive and significant returns do not occur until the ninth day. A potential explanation for this could be the under-reaction hypothesis as proposed by Shliefer (2000), which states that stocks under-react to the actual news (of the stock recommendation). The evidence is in line with Womack (1996),

Moshirian *et al.* (2009) and Moulya and Mallikarjunappa (2020) who document a post-recommendation price drift leading to positive returns post the recommendation. This effect is in force ranging from four to six weeks after the recommendation (Womack, 1996; Moshirian, *et al.*, 2009). Put simply, the information about the stock recommendation is slowly incorporated into actual stock prices and the effect can last until a month (Figure 4).

Figure 4 displays the market reaction to the Buy recommendations for the selected sample of S&P BSE 100 stocks. The rationale for such results appears to be that there is some value to the analyst recommendations, however there is a lack of conclusive evidence because of the presence of stock characteristics, such as market-to-book ratio and firm size, as documented by Moshirian *et al.* (2009). The occurrence of ARs as a result of the analysts' recommendations requires a longer period to materialize as explained by Womack (1996), Moshirian *et al.* (2009) and in

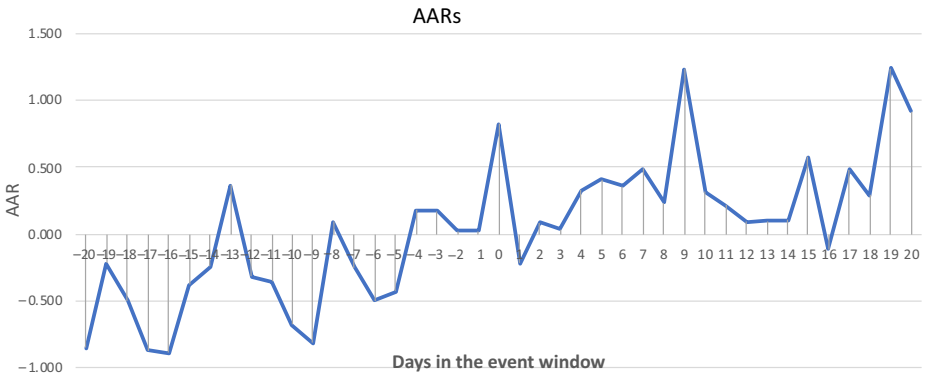


Figure 2. Market reaction to BUY recommendations of S&P BSE 100 stocks on AARs ($n = 36$)

Note: The graph shows that the AARs are negative and significant on the event day (at 1% level). The market reaction changes to positive abnormal returns only in the post-event window

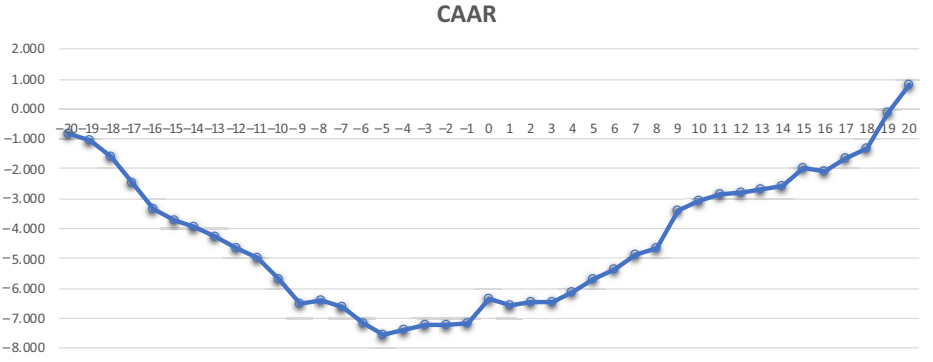


Figure 3. Cumulative average abnormal returns (CAARs) during the event window

Note: The CAARs are largely negative (in the range of -1% to -7%) during the event window. The change happens only during the end of the event window

Event window	Standardized ARs	Patell Z test	Adjusted Patell	BMP	Adjusted BMP
−20	−0.0975678	−0.570545536	−0.5445686	−0.4546222	−0.4332995
−19	0.13710447	0.801743522	0.76524019	0.73050625	0.69624408
−18	−0.1555487	−0.909599794	−0.8681858	−1.1235923	−1.0708936
−17	−0.2419674	−1.414949007	−1.3505265	−1.4020214	−1.3362639
−16	−0.1332872	−0.779421275	−0.7439343	−0.959634	−0.9146252
−15	−0.0196886	−0.115132524	−0.1098905	−0.0977097	−0.0931269
−14	0.09067678	0.530249109	0.5061069	0.57831307	0.55118905
−13	0.40315901	2.35754627**	2.25020735**	2.23407229**	2.1292899**
−12	−0.1261059	−0.737427242	−0.7038522	−0.8365095	−0.7972755
−11	−0.0554148	−0.324048438	−0.3092945	−0.3342438	−0.3185671
−10	−0.2967657	−1.735392142*	−1.6563799	−2.3254925**	−2.2164224**
−9	−0.2711403	−1.585542714	−1.5133531	−1.6478272	−1.5705409
−8	0.21452606	1.254480492	1.19736408	1.07873281	1.02813813
−7	−0.2030034	−1.187099781	−1.1330512	−1.0032454	−0.9561912
−6	−0.1303672	−0.76234588	−0.7276363	−0.6807182	−0.6487912
−5	−0.2100965	−1.228577645	−1.1726406	−0.9686604	−0.9232283
−4	0.06271715	0.366750065	0.35005196	0.27176752	0.25902109
−3	−1.2497473	−7.308126498***	−6.975388***	−0.9237086	−0.8803848
−2	0.09214487	0.538834028	0.51430095	0.43988248	0.41925113
−1	−0.1968234	−1.150960713	−1.0985576	−0.6366504	−0.6067903
0	0.502586	2.938963872***	2.80515305***	1.44589959	1.37808406
1	−0.2514926	−1.470649103	−1.4036906	−1.1194254	−1.0669222
2	0.06781474	0.396559137	0.37850383	0.40241812	0.38354392
3	−0.0378185	−0.221150353	−0.2110814	−0.303579	−0.2893405
4	−0.022718	−0.132847665	−0.1267991	−0.1029622	−0.098133
5	0.18656232	1.090957372	1.04128616	1.14416118	1.09049777
6	0.06181719	0.361487355	0.34502886	0.36821275	0.35094285
7	0.24102132	1.40941641	1.34524578	1.37086597	1.30656966
8	−0.0225	−0.131573035	−0.1255825	−0.0993728	−0.094712
9	0.48249293	2.821465968***	2.69300482***	1.81199669*	1.72701048*
10	0.04087957	0.239050801	0.22816683	0.18346631	0.17486138
11	−0.0267606	−0.156487523	−0.1493627	−0.1284715	−0.1224459
12	−0.2067661	−1.209102587	−1.1540522	−1.2564148	−1.1974865
13	−0.3614145	−2.113437636**	−2.017213**	−2.0110212**	−1.9167003
14	−0.0839115	−0.490687861	−0.4683469	−0.3941382	−0.3756523
15	0.12741066	0.745057202	0.7111348	0.86323342	0.82274607
16	−0.3123372	−1.826449203*	−1.7432911*	−1.274159	−1.2143984
17	−0.1899295	−1.110647499	−1.0600798	−0.6798224	−0.6479374
18	−0.0718096	−0.41991995	−0.400801	−0.5404587	−0.5151102
19	0.39098715	2.286369109**	2.18227088**	1.91056111*	1.82095204*
20	0.19640947	1.148540435	1.09624747	0.92709622	0.88361359

Table 3.
Event study test statistics using standardized abnormal returns for $n = 36$ companies

Notes: The table shows the significance values of the various event study test statistics (t-values) based on the SR values; *0% level of significance, **5% level of significance, ***1% level of significance and ****0.1% level of significance in two-tailed hypothesis

the under-reaction hypothesis by Shliefer (2000). The delayed positive reaction of the SR values indicates that investors can earn ARs; however, a longer event window may be more appropriate to assess the investment returns. Therefore, the results suggest that analyst recommendations do have some value in the short term. However, the market is largely efficient and other factors such as stock characteristics and market wide factors need to be considered.

5. Discussion of the findings and limitations

Brown and Warner (1985) discuss some issues that might have affected the results of the CDA test. This test estimates the variance of the mean excess return from the estimation period excess returns. Specifically, daily stock return data potentially affects the results of the study because of a number of issues associated with daily data such as non-normality of returns and ARs, the issue of autocorrelation in ARs and event-induced variance in the days surrounding an event. The concern with the CDA test statistic is that the presence of positive cross-sectional dependence especially when the event dates are clustered, and the failure to make an adjustment for it, results in under-estimation of the variance of the mean AR leading to a rejection of the null hypothesis.

Both the traditional *t*-test, i.e. Brown and Warner (1980) and the SR method or the Patell (1976) test, assume that security residuals are uncorrelated and that event-induced variance is insignificant. The advantage of the Patell (1976) test over the traditional one is that it prevents securities with large variances from dominating the test by standardizing the event period residuals. Boehmer *et al.* (1991) developed the standardized cross sectional test also known as the BMP test statistic to overcome the problem of event date clustering. The advantage of this test is that the event period residuals (the SRs) are normalized. However, as Kolari and Pynnönen (2010) point out, event-induced variance increases the rejection rates for the Patell, AP and BMP test statistics. For this reason, Kolari and Pynnönen (2010) developed the adjusted versions of the Patell and BMP test statistics. Only the adjusted BMP test is robust with respect to both cross-correlation and event induced variance.

Overall, the positive and significant returns on the event day and in the post-event period are evidence of the value of analyst recommendations along with a combination of stock specific characteristics which influences the ARs. In addition, the methodological issues posed by the CDA test (Brown and Warner, 1985) and the Patell (1976) and AP test may be another cause of the rejection of the null hypothesis. On the other hand, the adjusted BMP test statistic shows no significant impact on the SRs on the event day and for much of the entire event window as it is the most powerful, adjusting for event-induced variance and cross-correlation of estimation period ARs. Further, in the post-event window, the occurrence of positive and significant returns on the ninth day indicates that the stock price does not immediately adjust to the event, rather it takes time for the event information to be incorporated in the stock price in line with the under-reaction hypothesis (Shliefer, 2000) and

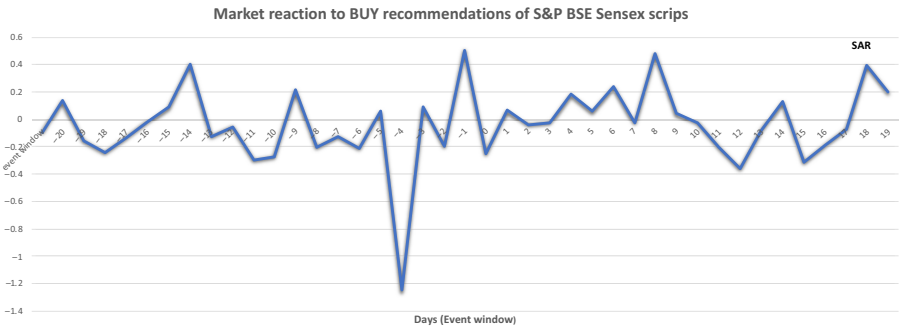


Figure 4.
Market reaction to Buy recommendations of S&P BSE 100 stocks using standardized abnormal returns ($n = 36$)

Note: The graph above shows that the SRs are mostly not significantly different from zero other than being positive and significant on the event day

the post-recommendation price drift documented by Womack (1996), Moshirian *et al.* (2009). Another potential explanation is the timing of recommendations. Panchenko (2007) discusses the issue of recommendation changes as a two-step process where the institutional clients receive the news first and the information is later disseminated to news agencies and then ultimately reaches individual investors. Barber *et al.* (2001) concur with this and find that smaller investors may take time to react to the published recommendation as they gain access to it later. Overall, the results suggest market efficiency in the semi-strong form with marginal positive and significant returns on the event day and later in the event window period.

5.1 Limitations

The research does not consider a large sample along with "Sell" and "Hold" recommendations. Therefore, generalizability is limited to the selected sample. Further, it does not take into account stock specific factors and does not address target price accuracy which determines the value of analyst recommendations too.

6. Future research potential

Future research avenues focus on the need for studying analyst recommendation revisions in the Indian context, target price accuracy, different models for expected returns, controlling for confounding corporate events and using a larger sample size for testing purposes.

First, controlling for confounding corporate events or other economy-wide or industry events is essential to ascertain the real impact of analyst recommendations (Jiang and Kim, 2016). Peterson (1989) recommends great precision in determining the event date so that powerful tests can be applied to determine the significance of returns. Second, it can be observed from the results that only the adjusted BMP test is robust with respect to cross-correlation and event-induced variance. Kolari and Pynnönen (2010) also suggested the "Rank Test" in the presence of event-induced volatility and correlation for single-day event testing. Therefore, a potential avenue for future research could be using the Rank test instead of parametric tests in case of outlier-prone distributions. Third, the future profitability of analysts' recommendations depends on earning forecast accuracy as established in Loh and Mian (2006). They find that the analysts who provide the most accurate earnings forecasts are the ones who make the most profitable recommendations. In addition, Hall and Tacon (2010) examine the future profitability of analysts' recommendations taking into account past forecast accuracy and recommendation profitability. Therefore, it is worthwhile to investigate the association between forecast accuracy and recommendation profitability in the Indian context. Further, assessment of target price accuracy as tested by Chatterjee *et al.* (2020) is a worthwhile research avenue.

7. Conclusions and critical observations

The current study is an attempt in the Indian context to determine the short-term impact of analysts' recommendations on stock returns. It uses several significance tests for a small sample selected from the S&P BSE 100 to determine market efficiency. Although a number of studies report a positive impact of analyst recommendations on stock returns, another stream of the financial literature presents evidence that analyst recommendations do not significantly impact ARs after the influence of company-specific news is considered. There are several significant facts that emerge from the findings. First, other corporate events taking place in the vicinity of the publication of the stock recommendation need to be accounted for in the sample. Second, the impact of other corporate events or stock specific effects may have been incorporated into the closing stock

price after the publication of the Buy recommendation on the 0 day (event day). Third, methodological issues cause the rejection of the null hypothesis in case of two significance tests using standardized ARs (namely, the Patell and AP test). However, the most powerful test which accounts for cross-correlation of ARs and event-induced variance, namely, the adjusted BMP test, detects no significant ARs on the event day, suggesting that the market is efficient in its semi-strong form. However, the *t*-test (CDA test) and the Patell and AP tests do reveal a limited positive impact of analyst recommendations on ARs. The market reaction to analysts' recommendations turns positive nine days after the event date in support of the under-reaction hypothesis (Shliefer, 2000) and post-recommendation price drift documented in Womack (1996), Moshirian *et al.* (2009) and Moulya and Mallikarjunappa (2020). The implications of the study present important evidence for retail investors when following publicly available recommendations. They must not blindly follow analyst recommendations in line with the findings of Moulya and Mallikarjunappa (2020), Walker and Hatfield (1996) and Panchenko (2007) as the market may be influenced by stock characteristics, level of analyst coverage, broader momentum effects, volatility and volumes traded.

Note

1. Analyzing Analyst Recommendations; available at https://www.sec.gov/tm/reportspubs/investor-publications/investorpubsanalystshtm.html (accessed on 25 July 2020).

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