“Merger Announcements and Insider Trading Activity in India: An Empirical Investigation”

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MERGER ANNOUNCEMENTS AND INSIDER TRADING ACTIVITY IN INDIA: AN EMPIRICAL INVESTIGATION

Manish Agarwal, Harminder Singh[1]

Abstract

Insider trading activity is investigated prior to merger announcement in Indian capital market. An attempt is made to check it out whether trading takes place on the basis of asymmetric and private information. For examining the behaviour of stock prices a modified market model is used to estimate the parameters for the estimation window. These estimates are used to compute average return and cumulative average returns for the event window, which are measures of abnormal returns. Besides price run-ups, it is also common to see unusually high levels of share trading volume before public announcement of merger. Daily trading volume pattern of the target companies is also investigated. The analysis carried out in this study is based on a sample of 42 companies for which merger announcement date was announced during the period of 1996-1999. Based on the analysis for each company individually, we recommend investigation in six companies for existence of possible insider trading.

Key words: Merger; Asymmetric and private information; Estimation.
JEL Classification: G34, D82, C13.

I. Introduction

The most radical line of reasoning objects to any form of trading that is on the basis of differentials in information. It is argued that unrestricted insider trading will lead to a breakdown of capital markets which are unable to perform their role efficiently. The least restrictive view of insider trading sees insider trading as illegitimate only if it involves a breach of fiduciary duty or at least a breach of trust and confidence[2]. The primary argument against insider trading is that it works to the disadvantage of outside investors who would then exit the marketplace, taking their capital with them. The argument in favor of allowing insider trading is that such trading leads to more informative security prices.

The possible link between insider trading and the publication of inside information has been recognized in Hirshleifer (1971) and Fama and Laffer (1971). Those who possess privileged information have an incentive to take market positions on the basis of their information and then announce their information publicly. This issue is challenging to investigate empirically because isolating trading based on private information is difficult. The prevailing view among policy makers is that the functioning of orderly financial markets requires that such activity be minimized.

With the above as a backdrop, our aim is to empirically investigate the possible existence of insider trading prior to merger announcements in India. The study examines the impact of inside information on trading in advance of planned merger announcements by focusing on the daily stock price movements and volume traded of *target* companies prior to the first public announcement of their proposed mergers. The present paper attempts to examine potential implications of the desire for fairness. Common small investor is afraid of being exploited in the future by better-informed traders. Here regulatory authorities need to protect the small investors. Illegal insider trading costs investors millions of dollars a year by inflating the cost of mergers and acquisitions, according to a Harvard Business School study[3].

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[1] We would like to take this opportunity to acknowledge National Stock Exchange, India. This study is based on the research funded under the NSE Research Initiative. We would like to express our gratitude to the anonymous referees for their valuable suggestions and comments.
[2] Dennert Jurgen, "Insider trading", Kyklos, Vol. 44, Fasc. 2, 181-202.
[3] Bloomberg Business News, New York, October 1996.
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This paper is organized as follows. Section II covers Insider trading and its regulation in India. Literature review is in Section III. The empirical investigation is covered in Section IV. Finally, section V presents the conclusions and policy implications of the study. It also lists the possible areas of extension of the study.

II. Insider Trading and its Regulation in India

Insider trading can occur when a person who possesses material non-public information trades in securities on the basis of such information or communicates such information to others who trade. The person who trades or "tips" such information violates the law if he has a fiduciary duty or other relationship of trust and confidence not to use the information. By Securities and Exchange Board of India (Insider Trading) Regulations (1992): "**insider**" means "any person who, is or was connected with the company or is deemed to have been connected with the company, and who is reasonably expected to have access, by virtue of such connection, to unpublished price sensitive information in respect of securities of the company, or who has received or has had access to such unpublished price sensitive information". To most people it appears rather unjust that some speculators are able to earn profits at the expense of others who just happen to know less about the asset in question.

In case of India, Security and Exchange Board of India (SEBI's) surveillance department is tracking the price and volume movements in the scrips, which have experienced sudden price surges. It has also asked stock exchanges to keep a track of counters witnessing high volatility. SEBI's surveillance aims to check possibilities of insider trading which sometimes manifest through volatility in a particular counter just prior to important announcements of takeovers[1].

III. Literature review

Finnerty (1976) concludes that the occurrence of profitable insider transactions implies that, "trading on inside information is widespread" and that "insiders actually do violate security regulations." Keown and Pinkerton (1981) provide evidence of excess returns earned by investors in acquired firms prior to the first public announcement of planned mergers. As per their view systematic abnormal price movements can be interpreted as prima facie evidence of the market's reaction to information in advance of its public announcements. Many cases of insider trading frauds involved knowledge of an impending takeover, in Meulbroek's (1992) sample of illegal insider trading involves corporate control transactions, Agarwal and Jaffe (1995) examined empirically whether the short-swing rule (Section 16b of the securities Exchange Act)[2] deters managers from trading before mergers.

On the other hand, Seyhun (1986) examining transactions reported to the SEC, finds that corporate insiders earn excess return that are on average small. Elliot, Morse and Richardson (1984) and Givoly & Palmon (1985) analyze the timing and frequency of corporate transactions surrounding news announcements. Both studies conclude that corporate insiders do not trade on inside information. Chakravarty & McConnell (1999) have analyzed the trading activities of a confessed insider trader, and their tests were also unable to distinguish between the price effect of informed trader and uninformed trader. Further, Jarrell and Poulson (1989) assert that legitimate sources such as media speculation concerning the upcoming takeover and the bidder's purchase shares in the target firm, contribute to the target's stock price run-up. Watson and Young (1999) find insider trading occurs surrounding takeover announcements. Buy activity is significant both early in the event window and then again immediately prior to the announcement.

In spite of the evidence that in general suggests that insiders be informed, it is still debatable whether outsiders can profit from knowing what insiders are doing. In a more recent study, Bettis, Vickrey and Vickrey (1997) show that outside investors can earn abnormal profits, net of

[1] "Watchdog out to sniff insider trading on takeover front". The Economic Times, March 18th 1998.

[2] Section 16 of the 1934 Act of Securities Exchange Commission of USA requires certain corporate insiders, in particular officers, directors and 10 percent owners of any class of equity securities, to report their registered equity holding in the companies stocks to the SEC. Section 16 also requires corporate insiders to return to the issuer any profit earned on holding periods of less than six months; and to refrain from short sales.

transaction costs, by analyzing publicly available information about large insider transactions by top executives. Moreover, Manne (1966) and Carlton & Fischel (1983) assert that insider trading fosters efficient capital markets by improving the accuracy of stock prices. Specifically, insider trading promotes quick price discovery, which mitigates the incentive for many individuals to collect the same information.

The inference that insider trading creates significant price revisions observed on insider trading days is premature without a better understanding of the mechanism by which inside information becomes incorporated into stock price. Besides price runups, it is also common to see unusually high levels of share trading volume before announcements of merger and acquisition activity. Hence, one possibility is that the insider trading volume signals the presence of an informed trader. Keown and Pinkerton (1981) find a significant volume pattern prior to the merger announcement apart from a significant build up in the cumulative average return. Easley and O'Hara (1987) present a model where informed traders prefer to trade large amounts. Pound and Zeckhauser (1990) show that takeover rumors published in the "Heard on the street" column of the Wall Street Journal often mention unusual price and volume behaviour for the stock in question.

IV. Empirical Investigation

The Sample

Examination of *daily* closing stock price and *daily* trading volume pattern of the selected *target* companies is done to infer the presence of insider trading. This analysis has been done for 165 trading days surrounding the merger announcement date, including the date of announcement. This covers 150 trading days prior to the announcement and 15 days on and after the announcement.

In order to carry out the analysis a database on merger[1] announcements has been constructed for the four-year period of 1996-1999. The primary source of merger announcement is the news item as it appears in the national dailies viz., Economic Times, Business Standard, Business Line etc. We consulted the news-clippings from the library of the Institute of Studies in Industrial Development (ISID), New Delhi where these are compiled on a regular basis. The choice of the period is based on the available evidence[2] relating to merger activity in the country, which suggests that the incidence of mergers have surged in the second-half of 1990s as compared to the first half. This exercise gave us names of **139** target companies with their respective date of merger announcement.

Further, for each of these companies we obtained data on stock prices and trading volume from CMIE-PROWESS, WWW.INDIAINFOLINE.COM and WWW.BSE-INDIA.COM. However data on these variables were available for **99** of the selected companies. Of these, in case of thirty-two companies there were no data available for ten days immediately preceding the announcement date. Given that the investigation carried out in this study emphasizes the behaviour of stock prices and trading volume immediately prior to the merger announcement, these thirty-two companies were deleted from the sample. This reduced the number of companies to **67**.

The announcement date is one when the target company is first publicly disclosed as a possible merger candidate. Some public announcements are made after the market closes and some are made before. Importantly, in the latter case, market reaction takes place a day before the merger news appears in the national dailies. Hence, in this case we might *incorrectly* interpret the market reaction a day before the news appeared in the national dailies as existence of "abnormal return" based on trading on non-public information. Thus, in order to eliminate this bias the announcement date is defined as a range covering the date when the news appeared in the national dailies and the immediately preceding day, if it is a trading day. In this case, stock price for day '0' i.e. the announcement date is calculated by taking a simple average of prices on the day when the news appears in the national dailies and on the immediately preceding day, if it is a trading day.

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[1] We have considered cases of merger as defined by the Companies Act, 1956 where the approval of a high court is required.

[2] Database on Mergers in India compiled at the Centre for Development Economics, Delhi School of Economics, Delhi.

Methodology using Stock Prices

In the context of analysis based on stock prices, systematic abnormal price movements can be interpreted as prima facie evidence of the market's reaction to information in advance of its public announcement. To this effect, abnormal returns occurring prior to the merger announcement have been calculated by making use of residual analysis.

For each of the sample securities daily rates of return are calculated as

$$R_{jt} = \ln(P_{jt}) - \ln(P_{jt\text{-}1}),$$

where P_{jt} = closing price for security j on day t.

For each security, adjustment in the stock price is made for any bonus issue on the ex-bonus date. The stock return on the ex-bonus date is derived by the actual price prevailing on that date *minus* the theoretical price, worked out on the basis of bonus ratio.

The following market model is used to estimate abnormal returns for each stock j:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt} \qquad t = -150, \ldots, -51, \qquad (1)$$

where α_j, β_j = the intercept and slope respectively of the linear relationship between the return of stock j and the returns of the BSE Sensex;

R_{jt} = the return on stock j on day t;

R_{mt} = the return on the BSE (30 scrips) index on day t;

ε_{jt} = the unsystematic component of firm j's return.

For the purpose of our study we have calculated returns on the market index by taking the BSE Sensex[1] as the market benchmark. Further, for the study "*estimation window*" covers the period from 150 trading days prior to the announcement to 51 trading days before the announcement date thus giving us a total of 100 observations for estimation purposes. The parameters of the model have been estimated for a period away from the period surrounding the announcement in order to avoid bias in the estimation of the parameters due to the event itself. The model has been estimated for companies with at least 50 observations available for the estimation window. This reduced the number of companies from 67 to **61**.

Modification of the market model

Most of the stocks comprising our sample were found to be infrequently traded[2] during the period under study. In such a situation the market model can be adapted to handle these unequal length periods and a weighting scheme introduced to avoid heteroscedasticity (Marsh, 1979). Thus, the parameters for stock j are estimated from the multiple regression,

$$R_{js}(t_s - t_{s-1})^{-\frac{1}{2}} = \alpha_j (t_s - t_{s-1})^{-\frac{1}{2}} + \beta_j R_{ms}(t_s - t_{s-1})^{-\frac{1}{2}} + v_s, \qquad (2)$$

where returns are measured from trading day (s-1) to trading day (s) throughout the estimation interval t_s = -150, …, -51.

Diagnostic Tests

We assessed the quality of the estimation results along the dimensions of serial correlation (through ARMA), heteroscedasticity (through White's test for detecting heteroscedasticity), stability of parameters of the modified market model (through Chow's break-point test), Autoregressive conditional heteroscedasticity (through ARCH LM test)[3]. These diagnostic tests were car-

[1] BSE SENSEX is a "Market Capitalization-Weighted" index of 30 component stocks representing a sample of large, well-established and financially sound companies. It is the benchmark index of the Indian Capital market and one, which has the longest social memory. In fact, the SENSEX is considered to be the pulse of Indian stock markets.

[2] A particular stock is defined as infrequently traded if no trading is done in this stock even though the market is open as suggested by the existence of data on BSE Sensex for this day.

[3] Details of these tests are available on request from the author.

ried out for all the sixty-one companies. In case of nineteen companies, estimate of beta was found to be insignificant.

Analysis of Results

Analysis of companies at different levels

Of the forty-two companies finally selected, two companies are BIFR declared companies[1] and the merger announcement was made as part of their rehabilitation package. Further, of the forty non-BIFR companies, twenty-eight are cases of group merger i.e. where the acquirer and acquired belong to the same business group. Given this, the empirical investigation given below has been carried out separately for the following:

- **Set A** comprising 40 companies (excluding two BIFR companies);
- **Set B** comprising 28 Group merger cases and 12 Non-group companies.

Finally, we have also categorized each of the 42 companies individually based on their pattern of stock price and trading volume.

Analysis based on Stock Prices

For the purpose of our analysis, average residuals and cumulative residuals have been computed. The estimated abnormal return for each security for day t is used to compute the average residual for day t, denoted by $\overline{\varepsilon}_t$. This is defined as the simple arithmetic mean of the estimated abnormal return for all securities for day t. These average residuals are computed for out-of-sample i.e. for t = -50 to + 14. The average residuals so calculated would be the basis for examining unusual price movements prior to the announcement date.

Further, the cumulative average residual (CAR), defined as the sum of previous daily average residuals has also been determined for each trading day of the study as

$$CAR_t = \overline{\varepsilon}_t + CAR_{t-1} \qquad \text{t = - 50, …, + 14.} \qquad (3)$$

If there were no unusual price movements prior to the announcement date, one would expect both the average residual $\overline{\varepsilon}_t$ and cumulative average residual CAR_t to fluctuate randomly about zero. However, if there is leakage of and trading on possible inside information just prior to the announcement date, this should show up in the form of *positive* daily average residuals as *t* approaches zero and a corresponding build up in CAR_t (Keown & Pinkerton, 1981).

Analysis based on volume pattern

Here, we examine whether the daily average volume calculated for a month (-20 to -1 trading days) prior to merger announcement and two weeks (-10 to -1 trading days) prior to the merger announcement gives any signal of presence of any possible insider trading. In order to carry out the analysis we use the following two benchmarks for average volume in *normal* days:

Daily average volume calculated for the **third month** (-60 to -41 trading days) prior to the announcement date. This benchmark can be thought of as normal daily average volume in the sense of short term.

Daily average volume calculated for the **estimation period** (-150 to -51 trading days) prior to the announcement date. In like manner as the above benchmark, this might be considered as normal daily average volume in the sense of long term.

The daily average volume for each of the company is compared with these two benchmarks and the percentage of companies showing a higher volume is ascertained. Further, we also determine the percentage of higher volume for each of the companies. For our study, we have defined as "significant", if the daily average volume is higher by 100% or more when compared with a particular benchmark.

Analysis for Set A comprising 40 companies

Figure 1 shows the pattern of CAR and AR from days -100 to +10 relative to the announcement date. The buildup in CAR begins from day -43 relative to the date of announcement.

[1] Registered by the Board for Industrial and Financial Reconstruction (BIFR) for revival/rehabilitation.

From this day onwards, an increasing trend in the CAR is observed, though with occasional dips. However, from day -12 onwards the buildup in CAR is more perceptible as after this day the dip in the curve is less pronounced than that observed before day -12. Further in order to find the announcement effect, we portioned the period from day -50 to +1 into various sub-periods and compute the proportion of total build up in CAR during this period as accounted by various sub-periods.

It is observed that about 37% of the total buildup in CAR is accounted by the ten days immediately preceding the date of announcement, which is significant at the 5% level of significance. Also, a little less than half of the total announcement effect is accounted by the month immediately preceding the announcement, which is also significant at the 5% level of significance.

The results suggest that there exist significant abnormal returns prior to the merger announcement, beginning approximately one month before the announcement date. Further, this inference becomes more pronounced when the ten-day period immediately preceding the announcement date is considered.

For further investigation, we investigate the volume pattern during these two sub-periods of the selected forty companies. The volume pattern for these two sub-periods is compared with the two benchmarks of daily average volume pertaining to normal days. This is presented in Tables 4 and 5 respectively.

Our results show that 40-45% of the sample companies show a higher volume as compared to the two benchmarks. Further, the number of companies showing significant volume also range from nine (22.5%) to fourteen (35%) in case of one month prior to the event.

The investigation carried out thus far suggests that that there is evidence of substantial trading beginning about a month immediately preceding the date of announcement. Further, this increase in trading volume is more perceptible during the ten days immediately preceding the announcement date. However, before making any inference about the presence of trading on non-public information one needs to look at the immediate response of the market to the news of merger announcement. If the news of merger announcement is received as a surprise by the market and there exists substantial trading prior to the announcement, then there is strong evidence for trading based on non-public information. Given this, we study the CAR and trading volume on the day of announcement and a day after.

CAR and trading volume on day 0 and +1

Table 1 shows that about sixteen percent of the announcement effect takes place on day 0 and +1, which is statistically significant at the one percent level of significance. Further, more than half of the companies show a positive AR on each of these two days with seventy percent of the sample companies showing a positive CAR over this two-day period (Tables 2 and 3). This implies that on the day of announcement and a day after, there are substantial abnormal returns, which are present for most of the companies. Further, the CAR tends to stagnate or decline after day +2. This shows that the buildup in the CAR due to non-public information is exhausted with the news becoming public. Thus, the semi-strong form of market efficiency seems to work.

While studying the immediate reaction of announcement from the volume angle, we compare the daily average volume over these two days with the two benchmarks. It is found that twenty-two (55%) scrips show higher volume as compared to the daily average volume of the estimation period (Table 5) with sixteen (40%) companies turning up a significant volume. Further, when the benchmark is changed to the third month, the number of companies having a higher volume increases to twenty-six (65%) with twenty-one (52.5%) of these showing a significant increase in volume (Table 4).

This shows that in majority of the cases news of a merger comes as a surprise to the market. We conclude that there is strong evidence suggesting presence of possible insider trading about a month prior to the merger announcement. Further, this evidence becomes more perceptible during the ten-day period immediately preceding the merger announcement.

Table 1

CAR – Announcement Effect

Sub-period	-50 to -41	-40 to -31	-30 to -21	-20 to -11	-10 to -1	-20 to -1	0 to +1	-50 to +1
CAR	3.018	4.075	3.507	3.525	**10.97**	14.495	4.722	29.817
Announcement effect (%)	10.12	13.67	11.76	11.82	**36.79***	48.61*	15.84**	

*, ** indicate that the coefficient is significantly different from zero at the 0.05 and 0.01 levels, respectively (see Appendix for details regarding the test statistic used).

Table 2

Percentage of companies with positive AR on each day

Trading days	% positive residuals	Trading days	% positive residuals	Trading days	% positive residuals
-20	41.03	-10	**52.63**	0	**60.00**
-19	**50.00**	-9	**52.94**	1	**56.41**
-18	**51.43**	-8	41.18		
-17	**51.43**	-7	**57.14**		
-16	**54.29**	-6	41.67		
-15	**60.00**	-5	**55.26**		
-14	33.33	-4	**62.50**		
-13	**55.56**	-3	**51.35**		
-12	42.86	-2	**55.88**		
-11	37.84	-1	**67.57**		

Table 3

Percentage of Companies with Positive CAR in each sub-period

Trading days relative to announcement date	Scrips with Positive CAR	Percentage
0 to +1 day	28	70
-10 to -1 days	26	65
-20 to -1 day (One month)	24	60

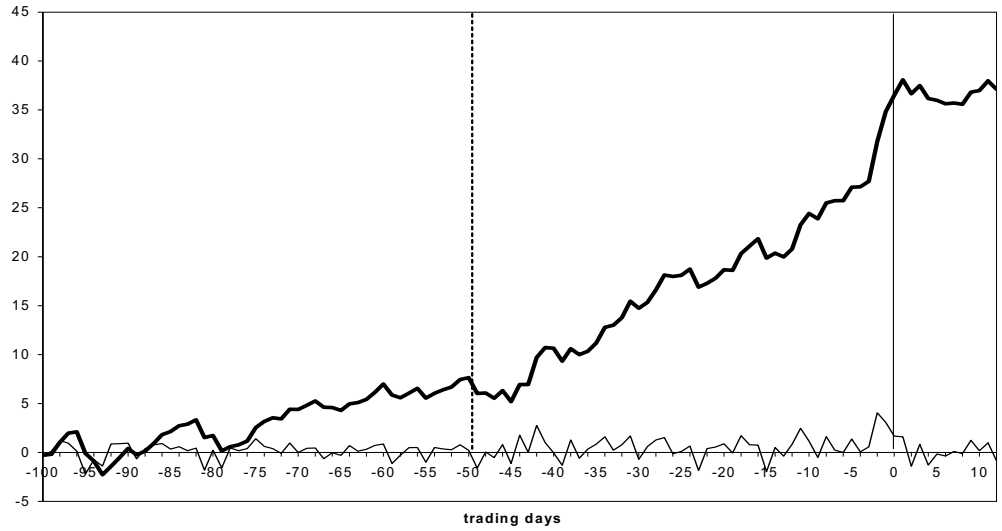

Fig.1. CAR and AR relative to the announcement day (40 Cos.)

Table 4

Distribution of Companies with respect to percentage of volume increase (Benchmark: daily average volume for the third month)

% High of Volume	No. & % of Cos. with higher volume for first month	No. & % of Cos. with higher volume for days –10 to -1	No. & % of Cos. with higher volume for days 0 to +1
0-100%	8 (20%)	10 (25%)	5 (12.5%)
100-500%	8 (20%)	4 (10%)	11 (27.5%)
500-1000%	1 (2.5%)	2 (5%)	3 (7.5%)
> 1000%	5 (12.5%)	5 (12.5%)	7 (17.5%)
Total	22 (55%)	21 (52.5%)	26 (65%)

Table 5

Distribution of Companies with respect to percentage of volume increase (Benchmark: daily average volume for the estimation period)

% High of Volume	No. & % of Cos. with higher volume for first month	No. & % of Cos. with higher volume for days -10 to -1	No. & % of Cos. with higher volume for days 0 to +1
0-100%	8 (20%)	8 (20%)	6 (15%)
100-500%	5 (12.5%)	3 (7.5%)	7 (17.5%)
500-1000%	0	3 (7.5%)	2 (5%)
> 1000%	4 (10%)	4 (10%)	7 (17.5%)
Total	17 (42.5%)	18 (45%)	22 (55%)

Analysis for Set B (Group Merger Cos. vs. Non-Group Cos.)

Given the availability of information such as group merger cases i.e. where the acquirer and acquired company belong to the same business group could be separated, we also made an attempt to do a comparative analysis for group merger companies and non-group merger companies. Figure 2 shows the pattern of cumulative average return for the group companies as well as the non-group companies. As is evident, over a large part of the period considered, CAR for the group companies shows a consistently increasing trend whereas a random pattern is observed for the non-group companies. However, as the period approaches the announcement day, an increasing trend is observed in both cases. Table 6 summarizes the information pertaining to the announcement effect.

Group Merger Companies

Table 7 presents the volume pattern of the group companies vis-à-vis the two benchmarks. Since significant abnormal returns exist for the month immediately preceding the announcement day, we analyze the volume pattern for this period. Our comparison suggests the presence of significant volume increase during the month immediately preceding the announcement day.

Finally, we examine the immediate reaction of the market to the news of merger announcement by analyzing the pattern of CAR (Table 6) and trading volume on days 0 and +1. We have found the presence of significant volume during days 0 and +1.

With this as a backdrop, we conclude that in case of companies belonging to the same business group, there exists evidence for possible insider trading activity during the month immediately preceding the merger announcement date.

Non-Group Merger Companies

For this set of companies, the month immediately preceding the announcement day accounts for over sixty percent of the total buildup in CAR for days -50 to +1. Further, over fifty percent of this buildup takes place during the ten days preceding the announcement day. Importantly, neither was statistically significant at the 5% significance level. Hence, this suggests that there do not exist significant abnormal returns during either the month or ten-day period immediately preceding the announcement day. Further, the immediate response in terms of abnormal returns is also insignificant. Thus, based on the criteria followed in the paper, we cannot infer the presence of insider trading activity in case of non-group companies.

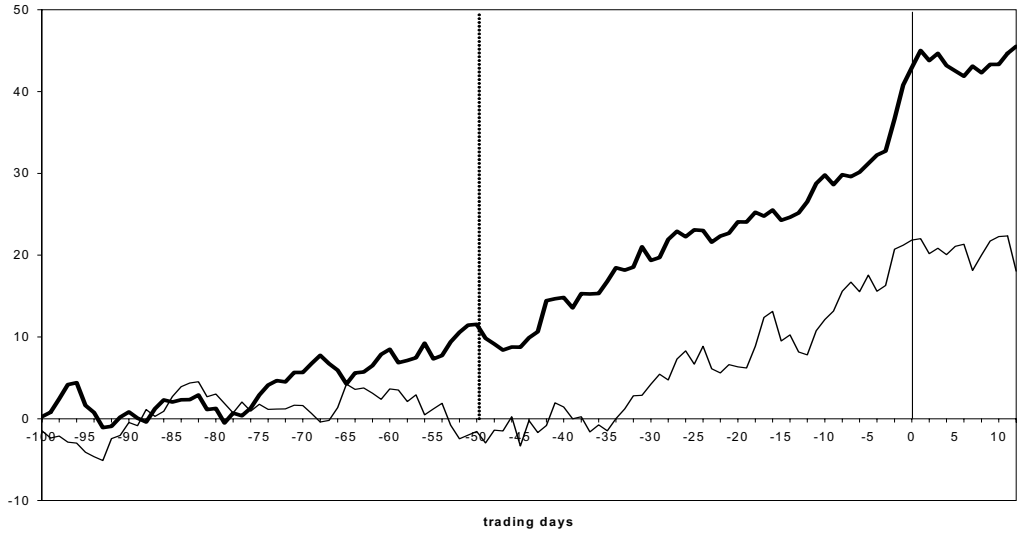

Fig. 2. CAR – Group Cos. vs Non-Group Cos.

Table 6

CAR Announcement Effect – Group Cos. vs Non-Group Cos.

Sub-period	-50 to -41	-40 to -31	-30 to -21	-20 to -11	-10 to -1	-20 to -1	0 to +1	-50 to +1
Group	3.877	4.112	3.792	4.196	10.112	14.308	6.288	32.377
Announcement Effect	11.97	12.70	11.71	12.96	31.23	44.19 *	19.42 **	
Non-Group	1.65	3.626	2.802	2.196	12.92	15.116	1.108	24.302
Announcement Effect	6.79	14.92	11.53	9.04	53.16	62.2	4.56	

*, ** indicate that the coefficient is significantly different from zero at the 0.05 and 0.01 levels, respectively (see Appendix for details regarding the test statistic used).

Table 7

Trading volume pattern for Group and Non-Group companies

GROUP				NON-GROUP			
daily average volume for the estimation period				*daily average volume for the estimation period*			
% high of volume	*1st month*	*Days -10 to -1*	*day 0 to +1*	*% high of volume*	*1st month*	*Days -10 to -1*	*day 0 to +1*
0-100	5 (17.86%)	6 (21.43%)	2 (7.14%)	0-100	3 (25%)	2 (16.67%)	4 (33.33%)
100-500	2 (7.14%)	3 (10.71%)	7 (25%)	100-500	3 (25%)	0	2 (16.67%)
500-1000	0	0	1 (3.57%)	500-1000	0	3 (25%)	1 (8.33%)
>1000	3 (10.71%)	3 (10.71%)	4 (14.29%)	>1000	1 (8.33%)	1 (8.33%)	2 (16.67%)
Total	10 (35.71%)	12 (42.86%)	14 (50%)	Total	7 (58.33%)	6 (50%)	9 (75%)
daily average volume for the 3rd month				*daily average volume for the 3rd month*			
% high of volume	*1st month*	*Days -10 to -1*	*day 0 to +1*	*% high of volume*	*1st month*	*Days -10 to -1*	*day 0 to +1*
0-100	7 (25%)	9 (32.1%)	4 (14.29%)	0-100	1 (8.33%)	1 (8.33%)	1 (8.33%)
100-500	5 (17.86%)	3 (10.71%)	8 (28.57%)	100-500	3 (25%)	1 (8.33%)	4 (33.33%)
500-1000	0	1 (3.57%)	1 (3.57%)	500-1000	1 (8.33%)	1 (8.33%)	1 (8.33%)
>1000	3 (10.71%)	3 (10.71%)	5 (17.86%)	>1000	2 (16.67%)	2 (16.67%)	2 (16.67%)
Total	15 (53.57%)	16 (57.14%)	18 (64.29%)	Total	7 (58.33%)	5 (41.67%)	8 (66.67%)

Analysis for each of the 42 individual companies

The analysis presented in the previous two sections suggests that there exist trading based on non-public information. Given this, in this section we make an attempt to highlight the companies where investigation is required for possible insider trading and companies which do not exhibit insider trading activity. The distribution of companies according to these three categories is given in Table 8.

Category I: Companies where investigation is recommended for the presence of possible insider trading

Under this category we include companies that satisfy *all* the following criteria

- Cumulative Abnormal Return is positive for the sub-periods viz., day -20 to -11 (corresponding to one month prior to announcement) and day -10 to -1. Further, the CAR is higher than the sample mean for either of the two sub-periods. The mean CAR is 14.495 and 10.97 for the first month and ten-day sub-periods respectively (see Table 1).
- Daily average volume calculated for the either of the two sub-periods is significant (higher by at least 100%) when compared with at least one of the benchmarks.
- The immediate response of the market examined for day 0 and +1 is substantial as measured by a positive CAR and significant volume when compared with the two benchmarks.

We select six companies that satisfy all the above criteria. Hence, for all these six companies we recommend investigation by the market regulator for the presence of possible insider trading.

Category II: Companies that do not exhibit insider trading activity

This category includes companies which satisfy *all* the following criteria:

a) the cumulative abnormal return (CAR) is positive and below the sample mean for either of the sub-periods considered; and
b) do not show a higher volume in either of the two sub-periods as compared to the relevant benchmark.

There are *eight* companies that satisfy these criteria.

Category III: Uncertain Cases

Those companies that do not fall in any of the two categories described above. In these cases the CAR and trading volume do not show a pattern which would see them in either of the above categories. In case of companies falling in this category further investigation is required such as they can be included in either category I or category II.

Table 8

Categorization of all the 42 companies based on the criteria proposed

* in a cell indicates that the daily average volume is not higher as compared with the benchmark considered	***Days -20 to -1 (one month)***			***Days -10 to -1***			***Days 0 and +1***		
	CAR	% volume high		CAR	% volume high		CAR	% volume high	
		3rd month	*est. period*		*3rd month*	*est. period*		*3rd month*	*est. period*
1	2	3	4	5	6	7	8	9	10
Investigation recommended for existence of possible insider trading									
IBP Co.	41.93	249	417	29.67	359	579	11.4	858.31	1316.94
Cochin Refineries Balmer Lawrie ltd.	10.34	350	47	14.67	*	*	40.08	4678.57	1470.32
Narmada Cements	107.49	2559	1826	93.58	4731	3399	20.03	1779.58	1261.62
Cheminor Drugs	4.88	2241	1657	20.77	1568	1152	4.01	2726.61	2022.05
Balaji Foods and Feeds ltd.	67.95	1066	2004	64.95	2078	3828	33.03	13375.42	24205.5
TTK Biomed	307.34	408	*	152.40	580	*	49.4	4661.36	426.8
Companies that do not exhibit insider trading activity									
Tuticorin Alkali Chemicals & Fertilisers ltd.	4.34	*	*	-9.87	*	29	10.51	*	*
20th Century Finance Corpn. Ltd.	6.02	*	*	0.44	*	*	10.87	154.38	174.98
Asian Coffee ltd.	-3.95	*	*	4.72	*	0.89	-2.4	-11.89	14.04
Cyanamid Agro	9.68	*	*	2.73	*	*	-2.62	13.27	*
Tata Infotech	0.11	1.35	*	0.35	*	*	10.07	*	*
South India Shipping Corporation ltd.	-13.66	*	*	4.82	*	*	3.75	*	*

Table 8 (continuous)

1	2	3	4	5	6	7	8	9	10
Light Metal Industries ltd.	-17.64	*	*	4.61	*	*	37.84	*	*
Krishna Lifestyle Technologies ltd	-21.37	*	*	2.35	*	*	3.17	*	*
Not Certain									
Lloyds Steel	-18.26	1641	235	-4.69	3156	527	1.98	7995.69	1460.94
Modern Terry Towel	-1.14	723	454	-5.95	969	620	-4.63	188.78	94.47
Gujarat Sidhee Cement ltd.	-168.82	20034	1983	-53.18	37408	3781	19.8	6180.77	549.91
VST ltd.	15.9	1987	1096	-14.22	2904	1622	1.7	47	*
Akar Laminators	-29.41	*	170	-5.28	*	192	-13.87	12.61	449.76
BS Refrigerators ltd. (earlier BPL Refrigeration)	6.61	192	87	-22.04	228	110	-11.2	460.96	259.02
Swastik Rubber	-22.18	145	*	-15.71	33.68	*	-4.58	120.18	*
Laser Lamps	-8	148	*	-4.43	63.72	*	9.29	144.38	*
TVS Suzuki ltd.	12.2	326	100	1.47	439	157	1.16	142.09	15.59
Arvind Polycot ltd.	3.87	14	42	-15.32	18	47	22.02	162.45	225.32
Pond's India ltd.	1.35	*	52	1.70	3.66	89	7.01	911.24	1750.29
Grauer & Weil (I)	36.49	43	*	16.29	31	*	3.33	NA	NA
Gujarat Ambuja Cotspin ltd.	24.41	21	*	20.29	43	7.4	4.79	*	*
Maxworth International	23.66	334	92	9.71	*	*	-7.32	*	*
Maxworth Orchards	23.61	334	97	9.74	*	*	-7.37	*	*
Jain Plastics and Chemicals	11.02	43	35	12.82	*	*	3.12	174.51	158.63
Khaitan Electricals	-0.22	44	*	8.37	130	34	-24.96	64.63	-3.94
Mcleod Russel	-8.68	34	*	-25.35	42	*	12.08	172.48	81.11
ITC Classic Finance ltd.	2.11	21	*	8.02	38	*	-39.77	2266.52	537.96
Standard Batteries	15.79	*	*	16.82	9.92	*	-26.05	385.71	133.19
Aarti Industries ltd.	31.74	*	*	30.46	*	1.5	15.97	*	1.05
Rajashree Polyfil ltd.	15.4	*	*	19.86	*	*	4.68	537.95	566.7
Essar Shipping	34.03	*	*	22.18	1.42	37	1.65	*	*
Modern Denim	-21.84	*	*	-20.10	*	*	5.78	179.11	83.07
Arihant Cotsyn ltd.	-39.96	*	*	-7.03	27	*	21.33	*	*
Asian Cables and Industries ltd.	-18.33	*	*	-17.36	*	*	-27.89	67.68	*
HBL Nife Power Systems ltd. (earlier Sab Nife Power Systems ltd.)	-23.96	*	*	-13.23	*	*	8.75	*	*
Modi Xerox ltd.	-36.67	*	*	-14.42	*	*	-3.48	*	*

V. Conclusion, Policy Implications and Future Research

Conclusion

This paper examines the stock price effects and trading volume pattern for the possible existence of informed trading prior to merger announcement. The investigation is based on a database of companies for which merger announcement date has been announced during 1996-2000. The analysis has been done for 150 trading days prior to the announcement and 15 days on and after the announcement date. The analysis is based on the examination of the pattern of stock prices and trading volume of the sample companies. For examining the pattern of stock prices, average residuals (AR) and Cumulative Average Residuals (CAR) have been calculated for the sample. The analysis examines the abnormal returns prior to merger announcement, trading vol-

ume prior to merger announcement and immediate market reaction to the merger news in terms of abnormal returns and trading volume. In case of six companies, our investigation infers possible insider trading.

Policy Implications and Future Research

The results have immediate public policy implications. The analyzed cumulative average return and trading volume pattern provide a base for the argument that stock price run-ups before merger announcement reflect widespread possible insider trading. The finding that informed trading transmits private information has public policy implications for capital-market regulation issues. That insider trading is rampant in Indian markets is no big revelation. In fact, the problem is so deep that it is difficult to find out instances where there has been no abnormal price movement before a major corporate announcement. To be fair, insider trading is difficult to prove. If regulators manage to catch some offenders, they get away with punishment not commensurate with their crime.

This study can also be extended to takeover announcements. One more issue that this work raises for future research is the effect of insiders' behaviour on liquidity. Another possible area for future research concerns the effect of insider trading on the probability of completion of merger.

References

1. Agarwal Anup and Jeffrey F. Jaffe. Does Section 16b deter insider trading by target managers? // Journal of Financial Economics, 1995. – №. 39 – pp. 295-319.
2. Bettis, C., D. Vickrey, and D.W. Vickrey. Mimickers of Corporate Insiders who make large volume trades // Financial Analyst Journal, 1997. – №. 53 – pp. 57-66.
3. Bloomberg Business News, New York, October 1996.
4. Bris, Arturo. Do Insider Trading Laws Work // Yale School of Management, June 2001.
5. Brown, Stephen J., and Jerold B. Warner. Using Daily Stock Returns – The Case of Event Studies // Journal of Financial Economics, 1985. – №. 14 – pp. 3-31.
6. Brown, P. & Foo, M.S. 1998, 'Insider-trading in Australia: evidence from directors' trades'. // Working paper, University of Western Australia.
7. Carlton, D., and D. Fischel. The regulation of insider trading// Stanford Law Review, – №. 35 – pp. 857-895.
8. Chakravarty, Sugato and John J. McConnell. Does Insider Trading Really Move Stock Prices // Journal of Financial & Quantitative Analysis, June 1999. – №. 34(2) – pp. 191-209.
9. Dan Givoly and Dan Palmon. Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence // Journal of Business, 1985. – №. 58 (1) – pp. 69-87.
10. Dewenter Kathryn L. Does the market react differently to domestic and foreign takeover announcements? Evidence from the U.S. chemical and retail industries // Journal of Financial Economics, 1995. – № 37. – pp. 421-441.
11. Dimson, E. Risk Measurement When Shares are Subject to Infrequent Trading // Journal of Financial Economics, 1979. – №. 7. – pp. 197-226.
12. Easley, D., and M. O'Hara. Price, trade size, and information in securities markets // Journal of Financial Economics, 1987. – №. 19. – pp. 69-90.
13. Elliott, John, Dale Morse, and Gordon Richardson. The association between insider trading and information announcement // Rand Journal of Economics, 1984. – №. 15. – pp. 521-536.
14. Enders, W. Applied Econometric Time Series // John Wiley & Sons, Inc.
15. Fama, E.F. Foundation of Finance // New York Basic, 1976.
16. Fama, E.F. and Laffer, A.B. Information and capital markets // Journal of Business, July 1971. – № 44. – pp. 289-98.
17. Fama, E., L. Fisher, M.C. Jensen, and R. Roll. The adjustment of stock prices to new information // International Economic Review, 1969. – № 10. – pp. 1-21.
18. Finnerty, J.E. Insiders and market efficiency // Journal of Finance, September 1976. – № 31. – pp. 1141-48.

19. Givoly, Dan and Dan Palmon. Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence // Journal of Business, 1985. – № 58 (1) –pp. 69-87.
20. Hirshleifer, J. The private and social value of information and the reward to inventive activity // American Economic Review, September 1971. – № 61. – pp. 561-74.
21. Jarrell, Gregg A and Annette B. Poulsen. Stock Trading before the Announcement of Tender Offers: Insider Trading or Market Anticipation // Journal of Law, Economics & Organization, Fall 1989. – № 5 (2). – pp. 225-48.
22. Jennings, Robert H. and Micheal A. Mazzeo. Stock Price movements around Acquisition Announcements and Management's Response // Journal of Business, 1991. – № 64 (2). – pp. 139-163.
23. Johnston, J. & John DiNardo. Econometric Methods, 4th edition // The Mc Graw-Hill Companies, Inc.
24. Jurgen, Dennert. Insider trading // Kyklos, – №. 44, Fasc. 2, – pp. 181-202.
25. Keown, Arthur J. and John M. Pinkerton. Merger Announcements and Insider Trading Activity: An Empirical Investigation // The Journal of Finance, September 1981. – № 36. – pp. 855-869.
26. Kim, Oliver and Robert E. Verrecchia. Market Reaction to anticipated announcements // Journal of Financial Economics, 1991. – № 30. – pp. 273-309.
27. Lakonishok, Josef and Inmoo Lee. Are Insider Trades Informative // The Review of Financial Studies, Spring 2001. – № 14 (1). – pp. 79-111.
28. Manne, H. Insider Trading and the Stock Market // The Free Press, New York, 1966.
29. Marsh, P. Equity Rights Issues and the Efficiency of the UK Stock Market // The Journal of Finance, September 1979. – № 34 (4). – pp. 839-862.
30. Meulbroek Lisa K. An Empirical Analysis of Illegal Insider trading // The Journal of Finance, December 1992. – № 17 (5).
31. Penman, Stephen H. Insider Trading and the Dissemination of Firm's forecast information // Journal of Business, 1982. – №. 55 (4). – pp. 479-503.
32. Petersen, M., and S. Umlauf. An empirical examination of the intraday behavior of the NYSE specialist // Mimeo, 1990.
33. Pound, John and Richard J. Zeckhauser. Clearly Heard on the Street: The Effect of Takeover Rumors on Stock Prices // Journal of Business, July 1990. – №. 63 (3). – pp. 291-308.
34. Rozeff, Michael S. and Mir A. Zaman. Market Efficiency and Insider Trading: New Evidence // Journal of Business, 1988. №. 61 (1). – pp. 25-44.
35. Schwert, William G. Mark-up Pricing in Mergers and Acquisitions // NBER Working paper series, September 1994, Cambridge.
36. Seyhun, Nejat H. Insider profits, costs of trading and market efficiency // Journal of Financial Economics, 1986. – №. 16. – pp. 189-212.
37. Vijh, Anand M. The Spin-off and Merger Ex-date Effects // The Journal of Finance, June 1994. – № 49 (2). – pp. 581-609.
38. Watson, Iain and Young Annie. A Preliminary Examination of Insider Trading around Takeover Announcements in Australia. // Working paper series, 1999, Accounting and Finance, University of Western Australia.

Other references

1. The Securities and Exchange Board of India Act 1992, (Act No. 15 of 1992) Chapter 6-A, Penalties and Adjudication.
2. "*SEBI, heal thyself*", The Economic Times, 17 October 2001 volume 41 No. 201.
3. "*The Insider Den*", Chartered Financial Analyst, May 2001, 29-31.
4. "*Watchdog out to sniff insider trading on takeover front*" The Economic Times, March 18th 1998

Appendix 1

Number of Companies selected for the present study

Particulars	No. of Cos.
No. of companies for which merger announcement date obtained	139
No of companies for which data on stock prices and trading volume obtained from the sources as mentioned in the text	99
No. of companies left after deleting those for which no data is available for the ten days immediately preceding the announcement date	67
No of companies for which sufficient number of observations available for estimation purposes (i.e. at least 50 observations available)	61
No of companies for which the estimate of the parameter beta was positive and statistically significant	42

Appendix 2

Computation of the test static for hypothesis test over multi-day intervals i.e. for ascertaining the statistical significance of CAR for the various sub-periods (Reference: Brown and Warner, 1985). Let A_{it} denote the excess return (abnormal return) for security 'i' on day't'. This is the difference between the actual return (R_{it}) and the forecasted return $\hat{R}_{it}$. We give the calculation of test statistic pertaining to the hypothetical interval (-5, +5).

Define $A^*_{i,t} = \dfrac{\sum_{t=-5}^{+5} A_{i,t}}{\left(\sum_{t=-5}^{+5} \hat{S}^2(A_{i,t})\right)^{1/2}}$,

where $\hat{S}^2(A_{i,t}) = \left(\sum_{t=-150}^{-51} (A_{i,t} - \overline{A}_i)^2\right) \Big/ 99$;

t = -150 to -51 pertains to the estimation period considered in the paper.

$$\overline{A}_i = \frac{1}{100} \sum_{t=-150}^{-51} A_{i,t}.$$

The test statistic for the hypothetical interval (-5 to +5) is given by

$$\left(\sum_{i=1}^{N_t} A^*_{i,t}\right)(N_t)^{-\frac{1}{2}}.$$

N_t is the number of sample securities during the hypothetical interval (-5 to +5). The test statistic is distributed Student-t under the null hypothesis of zero excess return or no abnormal performance.