Chapter 8

Summary And Conclusions

During the past several decades, controversy surrounded two issues – (i) the extent to which the prices of stocks can be predicted and (ii) the process, which determines the stock prices. This resulted in the development of the concept of efficient market hypothesis, one of the most controversial developments in the modern theory of finance. Developed from the study of behaviour of commodity prices, efficient market hypothesis in its three forms has been extensively tested and critically debated by the professionals and academicians. Though some research has been done on all the three forms of efficient market hypothesis in the developed countries, not much research has been undertaken in the Indian stock market, especially in its semi-strong and strong forms. The present study has attempted to fill in this gap. This study has tested the semi-strong form of efficient market hypothesis by examining the stock price responses to quarterly earnings announcements.

As a background to the study the following aspects have been covered: the fundamental analysis and the technical analysis, the two traditional approaches to describing and predicting stock price behaviour, and the concept of efficient market hypothesis. There is a separate discussion on various developments of the Indian stock market, which is expected to have a bearing on the efficiency of the market.

We have discussed in detail the empirical studies conducted abroad to test the three forms of efficient market hypothesis viz., weak form, semi-strong form, and strong form. For facilitating smooth discussion and review, the studies are classified under different heads depending upon the techniques and the information used for the study. In order to provide a theoretical framework within which empirical studies are undertaken, Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT) and the Market Model, which describe the process that generates security prices, and beta (β) which is the sole measure of risk according to CAPM are discussed in brief. There is also a separate discussion on the empirical studies on all three forms of efficient market hypothesis conducted on the Indian stock market.

The study covers the earnings announcements of 17 quarters, from June 2000 to June 2004. The sample for the study consisted of the companies, which were listed on the Bombay Stock Exchange and had foreign holdings of more than 20 percent.
Selection of the sample has primarily been guided by the criteria, which is discussed in detail in chapter five. Though initially the sample size was 317 companies having foreign holdings of 20 percent or more, at the end only 156 companies met the selection criteria and considered as sample size. However, care is taken to have a wide representation of all the important industries, companies with low and high price earnings ratios, both big and small companies on the basis of market capitalisation as well as companies included in the indices like BSE sensex, BSE 100 and BSE 200. Of the 156 companies, 62 companies (39.73 percent) belong to A group, 91 companies (58.32 percent) belong to B-1 group, and 3 companies (1.96 percent) belong to B-2 group.

According to the requirements three sets of data are used in this study. The first set of data consists of quarterly earnings announcement made by the sample companies. This includes the dates on which the Board of Directors meets and approves quarterly financial results of the company. The second set of data consists of daily-adjusted closing prices of the stocks selected for the study from January 1, 1997 to October 21, 2004. Daily-adjusted closing prices are used in the study as these are assumed to reflect the consensus of the market participants regarding price of the stock at the end of the trading. The third set consists of the BSE-200 index of ordinary share prices compiled and published by the Bombay Stock Exchange on daily basis with 1989-90 as the base year.

In the present study two variables - net profit and net sales - are taken as a base for the classification of companies into different portfolios. The method used for the classification of companies into portfolio consists of dividing the companies into two portfolios on the basis of percentage changes (compared to the same quarter in the previous year) in quarterly earnings (net profit) and net sales. On the above basis we constructed three portfolios. The first portfolio includes firms with positive percentage change in net earnings (net profit) and net sales, “good news” portfolio. The second portfolio contains firms with negative percentage change in net earnings (net profit) and net sales, “bad news” portfolio. The third is the overall portfolio, which includes all the firms selected as sample for the study. In this process the same company may not be included in the same portfolio for all the quarters. If in the subsequent quarters the sign of percentage changes in net profit and net sales of the company changes, it is included in the appropriate portfolio. The same procedure is followed for all the quarters throughout the study. In other words, the portfolio to
which a particular stock in a particular quarter belongs depends upon the sign of its percentage changes in net profit and net sales in that quarter.

Choosing between the alternative models for assessing the market efficiency is a difficult task. While selecting the model among alternative models, the relative merits and deficiency of each model is to be considered. In this study, market model developed by Sharpe (1963) and subsequently used by many researchers is used to calculate expected returns. We used both raw returns and log returns.

We have used a two-stage approach to test the stock price responses to quarterly earnings announcement. The first stage consists of estimation of parameters like alpha, beta based on the ex-post returns on stocks and market index, and expected returns on each of the stocks based on the market model. In the second stage these estimated parameters are used to calculate abnormal returns around the event day. In this study, the date of quarterly earnings announcement is defined as day 0 or event day. If event day is a non-trading day then the immediate following trading day is considered as event day. Pre-announcement period includes 30 trading days prior to the earnings announcement date, i.e., days -30 to -1. Post announcement period includes 30 trading days after the earnings announcement i.e., days +1 to +30. Thus we have taken the event window of 61 trading days (including day 0 as the event day). The estimated abnormal returns are averaged across securities to calculate average abnormal returns (AARs) and average abnormal returns are then cumulated over time in order to ascertain cumulative average abnormal returns (CAARs).

Similarly, the reliability of estimation of returns, which is required to compute alpha and beta, is affected by differencing interval used for the estimation. The choices are between daily, weekly, monthly and yearly intervals since stock prices are reported at the end of the day, week, month and year. Therefore, the choice is between using shorter and longer differencing intervals. The shorter the differencing intervals more will be the number of observations within a particular estimation period. Therefore, we used, daily interval since within the shortest estimation period, this will provide more observations. Further, the long period beta may not be suitable for estimating the returns. In this study, 750 daily returns are used within an estimation period of approximately three years. The larger the numbers of observations in the estimation of parameters lesser is likely to be the standard error of the estimate. In case the number of returns for any company is less than 750, those numbers of daily returns, as available, are used for estimating the parameters of the market model.
Moreover, to minimise the problems associated with non-stationarity of beta over time, beta was re-estimated each quarter for all the stocks in the portfolio, which was used, by Ball (1972), Mandelker (1974) and Bathke and Lorek (1984).

In this study we used ‘trade-to-trade’ method to estimate reliable beta for infrequently traded stocks even though the problem arose in less number of cases/occasions. This method is considered better than aggregated co-efficients method because in aggregated co-efficients method it is difficult to decide an appropriate number of leads and lags to be included in the model. Further, according to Marsh (1979) “although this method (aggregate co-efficient method) is suitable for beta estimation, the use of trade-to-trade returns is effectively the only way of handling the non-trading problem in the second stage of the two-stage methodology” (p 847) Two-stage methodology is the methodology used by Fama, Fisher, Jensen and Roll (1969) The first stage consists of estimation of parameters like alpha, beta, etc depending on the particular form of the model being used. In the second stage, these estimated parameters are used to calculate abnormal returns around the event. Therefore, we used ‘trade-to-trade’ method in this study.

If markets are efficient, the average abnormal returns and cumulative average abnormal returns should be close to zero. Therefore, parametric t test at 5 percent level of significance with appropriate degrees of freedom was used to test the null hypothesis of no significant abnormal returns after the event day. The conclusions are based on the results of t values for AARs and CAARs for the event window.

In this study we also used non-parametric runs test and sign test. The runs test is used to test the null hypothesis that AARs occur randomly. The sign test is used to test that there is no significant difference in the number of positive and negative AARs. Both the tests are used at 5 percent level of significance.

In this study not only empirical results on stock price responses to quarterly earnings announcements of good news, bad news and overall portfolios are discussed quarter by quarter but also they are presented and discussed on the seasonal basis in detail. The purpose of this analysis is to ascertain and compare how stock prices respond to earnings on quarterly basis and also for the same quarter of different years.

8.1 Empirical Results of the Study

The results of the empirical investigations as discussed in chapters six and seven are summarised in this chapter on the basis of portfolios.
8.1.1 Good News portfolio

The good news portfolio includes firms with positive percentage change in net earnings (net profit) and net sales. The results of good news portfolio are analysed for thirteen quarters from June 2001 to June 2004.

1. The analyses of the AARs reveals that AARs occur during the pre- and the post quarterly earnings announcement periods. Out of thirteen quarters studied, for nine quarters AARs are positive for the majority of the days and for the remaining four quarters AARs are negative for the majority of the days under both-market model with raw returns and market model with log returns.

2. The AARs are not statistically significant at 5% level for the majority of days for all the thirteen quarters. This suggests that on the basis of AARs Indian stock market is efficient.

3. The CAARs are positive for the majority of the days for nine and ten quarters out of thirteen quarter under market model with raw returns and market model with log returns respectively. Under both the models out of thirteen quarters for three quarters i.e., September 2001, March 2002 and March 2004 CAARs are positive for the entire event window whereas during the quarter September 2002 CAARs are negative for all the 61 days.

4. The analyses of the t-test statistics on CAARs reveals that it is statistically significant at 5% level for more than 86% of the days during the event window. This suggests that stock price responses to quarterly earnings announcements are not instantaneous and provides an opportunity to outperform the market. This contradicts semi strong form of efficient market hypothesis.

5. The results on the seasonal basis show that during the study period for the June and March quarters of all the years CAARs are positive for the majority of the days. For the remaining two quarters i.e., the second and the third quarters CAARs are both positive and negative under both the models.

6. The non-parametric runs test carried out on AARs to test the null hypothesis that AARs occur randomly. The runs test statistics revealed that out of thirteen quarters, for only two quarters i.e., June 2003 and December 2003 they are significant at 5% level. This suggests that for the remaining eleven quarters AARs occur randomly.
7 The non-parametric sign test was carried out to test the null hypothesis that there is no significant difference between the number of positive and negative AARs. The results of the sign test reveal that under market with raw returns for six out of thirteen quarters computed sign test statistics are significant at 5% level whereas, under market with log returns it is significant for five quarters. Therefore, we reject the null hypothesis for these six and five quarters. For the remaining seven quarters under market model with raw returns and for eight quarters under market model with log returns sign test statistics are not statistically significant and we accept the null hypothesis. Therefore, we conclude that there is no significant difference between the numbers of positive and negative AARs.

8.1.2 Bad News Portfolio

The bad news portfolio contains firms with negative percentage change in net earnings (net profit) and net sales compared to the same quarter in the previous year. We analysed the stock price response to quarterly earnings of bad news portfolio for thirteen quarters from June 2001 to June 2004.

1 The AARs exist both before and after the announcement of quarterly earnings. The analyses of the AARs for the thirteen quarters reveal that under both the models AARs are positive for the majority of the days for seven quarters and for the remaining six quarters they are negative. The analyses reveal that the quarterly earnings information is not reflected immediately in the stock prices.

2 The t-test carried out on AARs shows that for all the thirteen quarters computed t-test statistics are not statistically significant at 5% level. This indicates that market is efficient on the basis of AARs.

3 The analyses of the results on the basis of CAARs shows that out of thirteen quarters, for eight and seven quarters under market model with raw returns and market model with log returns respectively have positive CAARs for the majority of the days and remaining quarters have negative CAARs. For the bad news portfolio these are unexpected results. This indicates that stock price responses to quarterly earnings are not in the same direction for the majority of the quarters.

4 The results of t-test carried out on CAARs shows that for more than 52 days out of 61 days computed t-values are statistically significant. This indicates
that CAARs are significantly different from zero for more than 85% of the days. From the analysis we infer that stock price responses to quarterly earnings are delayed which provides an opportunity to outperform the market.

5. The results on the seasonal basis reveal that during the period of the study for all June and March quarters CAARs are positive and during the December quarters they are negative for the majority of the days. In the September quarters AARs are positive and negative for different years.

6. The results of runs test shows that ten out of thirteen quarters have runs test statistics, which are statistically not significant at 5% level, and remaining three quarters have statistically significant runs test statistics. These results indicate that for the ten out of thirteen quarters AARs occur randomly and for the remaining three quarters it is not random. This indicates that there is no trend in the AARs and AARs occur independently.

7. The computed sign test values are less than critical value for nine out of thirteen quarters. This implies that for the remaining four quarters computed sign test values are statistically significant at 5% level. The analysis suggests that for the nine quarters there is no significant difference between the number of positive and negative AARs.

**8.1.3 Overall portfolio**

The overall portfolio consists of all the firms selected as a sample for the study. We analysed results of seventeen quarters for overall portfolio from June 2000 to June 2004.

1. The pattern of AARs shows that AARs occur in the pre-and post announcement periods. Of the seventeen quarters, for ten quarters AARs are positive for the majority of the days and for the remaining seven quarters it is negative.

2. The t-test carried out on AARs reveals that for the majority of the days it is not significant and for the remaining days computed t-values are significant. This indicates that the AARs are not statistically significant from zero for the majority of the days.

3. The analyses of the CAARs shows that out of seventeen quarters, eight and nine quarters under market model with raw returns and market model with log returns respectively have positive CAARs for the majority of the days and for the remaining quarters CAARs are negative. This implies that stock price adjustment
to quarterly earnings is not rapid which contradicts semi-strong form of EMH.

For the three quarters i.e., September 2001, March 2002 and March 2003 under both the models CAARs are positive for all the days during the event window whereas during June 2000 and September 2002 quarters they are negative for all the 61 days (100%).

4 The computed t-test values on CAARs reveal that for all the 17 quarters they are significant at 5% level. This shows that the stock price responses to quarterly earnings are delayed which contradicts semi-strong form of efficiency.

5 The results on the seasonal basis reveal that during the study period of four years only for December quarters CAARs are negative for the majority of the days. Of the remaining quarters, for the June quarter CAARs are negative for the majority of the days during the year 2000 and 2001 and for the subsequent three years they are positive. During the September quarters for the first two years i.e., year 2000 and 2001 CAARs are positive for the majority of the days and for the subsequent two years i.e., 2002 and 2003 they are negative. During the March quarter in the year 2001 CAARs are negative for the majority of the days and for the subsequent three years they are positive.

6 The results of runs test reveal that out of seventeen quarters, for five quarters under both the models computed runs test statistics greater than critical value and for the remaining twelve quarters it is not significant at 5% level. The analyses of the results suggest that during five quarters AARs do not occur randomly and for the remaining twelve quarters they do occur randomly.

7 The analyses of the results of sign test indicate that, of the seventeen quarters, for eleven quarters sign test statistics are not significant and for the remaining six quarters they are significant at 5% level. This shows that for more than 2/3 of the total number of quarters there is no significant difference between the number of positive and negative AARs.

8.2 Conclusions

For all the three portfolios under both market model with raw returns and market model with log returns stock price behaviour around quarterly earnings on an average produced abnormal returns in pre-and post-announcement periods. Further, the abnormal returns were found to persist up to 31 trading days subsequent to the quarterly earnings announcement day. This indicates that the stock price adjustment to

However, the results of this study are in contrast to those of Fama, Fisher, Jensen and Roll (1969), Jordan (1973), Charest (1978), Reinganum (1981), Keown and Pinkerton (1981), Patell and Wolfson (1984), Woodruff and Senchack (1988), Barnes and Ma (2002), Narayan Rao (1994) and Srinivasan (1997)

### 8.3 Areas for Further Research

Even though Fama (1991) stated thus:

"It would be presumptuous to suggest where event studies should go in the future. This is a mature industry, with skilled workers and time-tested methods. It continues to expand its base in accounting, macroeconomics, and industrial organisation, with no sign of a let up in finance" (p 1607)

The study of stock price responses to some specific event capable of influencing stock prices provides ample scope for research. The findings of our study should not lead to the conclusion that the Indian stock market is inefficient in semi-strong form to all the events influencing the stock prices. There are a lot of possible price sensitive events on which studies have not been conducted. However, we identified a few most promising areas for research in Indian stock market to be undertaken and leave the task of exploring the same to those interested in this area.

1 This study is based on stocks of those companies having foreign holdings of 20 percent and more. This has naturally resulted in ignoring of stocks of those
companies in which foreign holdings are less than 20 percent or no foreign holdings on a given date even though such companies are significant and playing important role in the Indian stock market. The responses of stocks of those companies around price sensitive event may be studied to examine how it is different from the responses of stocks of companies having 20 percent or more foreign holdings that are taken in this study.

2. The conclusions of this study are based on frequently traded stocks and cannot be extended to infrequently traded stocks. The behaviour of infrequently traded stock prices around price sensitive events may be studied to verify how it is different from the behaviour of stock prices of frequently traded stocks.

3. We feel this research should be extended to analysis of the characteristics of individual firms and/or industries should be undertaken to determine whether firm specific and/or industry specific quarterly earnings expectation models could be developed.

4. In India there are no empirical studies on stock price responses to firm specific events such as mergers and acquisition, expansion or diversification plans, joint ventures and collaborations announcement, etc. Research in this area will make significant contribution to Indian studies in the area.

5. This study and majority of other studies in India are based on the stocks traded on the Bombay Stock Exchange. The study of behaviour of stock prices listed at the NSE is needed to provide a true picture of stock price behaviour in India. The availability of information for these stocks is much more faster than that for the stocks of companies listed on the BSE. Therefore, the comparison of stock price responses to price sensitive events at the NSE vis-à-vis at the Bombay Stock Exchange will help to understand the differences in their responses.

6. Majority of event studies in India studied stock price adjustments to price sensitive events and ignored the adjustment of trading volume. The studies on responses of trading volume to events is important in India, because trading volume may reveal the impact of liquidity in the Indian stock market.