CHAPTER – 3
RESEARCH METHODOLOGY

This chapter deals with research methodology used for the study. It lists the hypotheses set for the study, sample selected, sources of data collection and scope of the study. It further discusses event study methodology (Brown & Warner, 1980, 1985) and operating performance benchmark methodology (Barber and Lyon, 1996) used in the study.

The main objective of the study is to examine the impact of mergers on shareholders’ wealth. Short term as well as long term approach has been used to study the wealth impact of mergers. Under short term market reaction approach abnormal returns to acquirer as well as target firms around the merger announcement have been examined. For long term impact operating performance of the companies involved in mergers has been compared with operating performance of benchmark firm during pre merger as well as post merger period.

3.1 HYPOTHESES OF THE STUDY

A large part of literature has discussed the informational efficiency of markets towards publicly available information. Studies that have examined the impact of major corporate announcements on share prices include Joy et al (1977) Joy et al. (1977) studied the adjustment of stock prices to announcements of changes in quarterly earnings and found that the market adjusts slowly to the information contained in quarterly earning reports. Dodd (1980) examined daily market reaction to announcement and subsequent acceptance or rejection of merger proposals and reported positive market reaction to the first public announcement of merger proposal and subsequent positive reaction to approval of completed proposals and negative reaction to cancelled proposals.

Kalay and Loewenstein (1986) investigated the information content in the timing of dividend announcements and concluded that there was negative market reaction around late announcements and positive reaction around the announcements, which were made early or on time.
Masulis and Korwar (1986) examined stock price adjustments to announcements of underwritten common stock price offerings during the period 1963-1980. And reported negative announcement effects. Healy and Palepu (1988) studied information content of dividend policy changes by US companies and they found that firms that initiate dividend payments have positive earning changes and those omitting dividend have negative earning changes around the announcement. Based on review of these studies the hypotheses of the proposed study are:

H₀₁  The abnormal returns (residuals) to the acquirer firms around merger announcement are equal to zero
H₀₂  The abnormal returns (residuals) to the target firms around merger announcement are equal to zero
H₀₃  The average abnormal returns (AAR) to the acquirer firms around merger announcement are equal to zero
H₀₄  The average abnormal returns (AAR) to the target firms around merger announcement are equal to zero
H₀₅  The cumulative average abnormal returns (CAAR) to the acquirer firms around merger announcement are equal to zero
H₀₆  The cumulative average abnormal returns (CAAR) to the target firms around merger announcement are equal to zero

For assessing the profitability of mergers, numbers of studies have focused on operating performance before and after the event, which is based on accounting measures. Operating performance studies include Healy et al (1992); Sharma and Ho (1994) and Rao and P J (2005). Healy et al (1992) examined cash flow returns to acquiring companies during pre-merger and post-merger period and reported improvement in cash flows after mergers. Sharma and Ho (1994) analysed Australian mergers following Healy et al (1992). He measured accrual as well cash flow indicators for 3 years before and 3 years after acquisition but reported no significant improvement in profitability of companies after mergers. Parrino and Harris (1999) examined post-acquisition operating performance of 197 mergers of U S during the period 1982 – 1987 using operating cash flows for 5 years before and 5 years after and found that merged companies reported improvement in industry
adjusted operating cash flows. Based on these studies the hypotheses of the study are:

- \( H_{01} \) – The average profit margin adjusted for control firm is equal to zero
- \( H_{02} \) – The average return on capital employed adjusted for control firm is equal to zero
- \( H_{03} \) – The average adjusted return on net worth adjusted for control firm is equal to zero
- \( H_{04} \) – The average cash flow return on sales adjusted for control firm is equal to zero
- \( H_{05} \) – The average cash flow return on net worth adjusted for control firm is equal to zero
- \( H_{06} \) – The average cash flow return on assets adjusted for control firm is equal to zero
- \( H_{07} \) – The median profit margin adjusted for control firm is equal to zero
- \( H_{08} \) – The median return on capital employed adjusted for control firm is equal to zero
- \( H_{09} \) – The median return on net worth adjusted for control firm is equal to zero
- \( H_{10} \) – The median cash flow return on sales adjusted for control firm is equal to zero
- \( H_{11} \) – The median cash flow return on net worth adjusted for control firm is equal to zero
- \( H_{12} \) – The median cash flow return on assets adjusted for control firm is equal to zero
- \( H_{13} \) – There is no difference between pre merger and post merger operating performance of companies.

### 3.2 SAMPLE SELECTION

For short-run market reaction, the sample has been drawn from population of 350 merger announcements made by listed companies during
the period April 1, 2000 – March 31, 2006\(^1\). The procedure of sample selection is as follows:

i) All the merger announcements available at prowess database during the period April 2000- March 2006 have been taken.

ii) Announcements for which share price data is available for target as well as acquirer firms for at least 1 year before the announcement are included in the sample.

iii) Multiple merger announcements made by same acquirer company have been treated separately.

In all 37 merger announcements comprising 35 acquirer and 41 target firms form the sample (Annexure – I).

For assessing long-run post merger performance 29 mergers completed during the period 1998-2003 have been studied\(^2\) (Annexure-II). The procedure of sample selection is as follows:

i) All the mergers for which high court approval date is available at prowess database have been taken.

ii) Companies for which accounting data is available for at least 3 years before and 3 years after the year of merger is available have been include. This reduced the sample to 22 companies.

iii) The companies for which accounting data is available even for 2 years after the merger have also been included. This increased the number of companies to 29.

3.3 SOURCES OF DATA

The main sources of secondary data have been Prowess database provided by Center for Monitoring Indian Economy (CMIE) and ISI Emerging Markets corporate database. The websites of companies under study, RBI, Ministry of Finance, Govt. of India and SEBI has also been referred to.

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1. A large number of market driven mergers are taken place during this period. Moreover, no such study relating to market reaction around merger announcement has been done during this period.

2. The choice of period depend upon the availability of accounting data as 3 years data before as well as after the merger is required for analysis of operating performance of companies. Hence mergers completed only upto year 2003 have been included in the sample.
3.4 TOOLS OF ANALYSIS

3.4.1 Event Study Methodology

Event Study methodology is widely used methodology in the area of finance. Efficient market hypothesis forms the theoretical base for this methodology. Event study is used to study the efficiency of markets in its semi-strong form. The main purpose of the event study is to assess the extent to which security price around the time of the event is abnormal (Brown and Warner, 1980). As one of the objectives of the study is to examine abnormal returns to acquirer and target companies around merger announcements, event study methodology has been used.

3.4.1.1 Defining the Event Date

Event date is the day when the event is announced or the information is made public by the management about the decision taken by the management. The day when the event is occurred is considered as day 0. In this study the merger announcement date has been taken as event day.

3.4.1.2 Window Period and Clean Period

Window period is the period around the announcement starting from one day prior to the announcement i.e. day -1 when daily share price data is used. In case of monthly data it starts from one month prior to the month in which announcement is made. In the present study daily share price data has been used. The length of the window period varies from 5 day window (day -5 to day +5) to as long as 40 day window (day-40 to day+40). In this study 40 day window period has been taken.

Clean period data is the data when there is no effect of announcement on the share prices. The clean period data is used to estimate the predicted returns on share price. The clean period in this study consists of 200 days starting from day -41 to day -241. The share price returns during the clean period are regressed with return on market portfolio to get estimated returns for window period.
3.4.1.3 Estimating Abnormal Returns

The abnormal returns for a given security have been measured through three different methods:

a) Market model
b) Market adjusted method
c) Mean adjusted method

Under market model, expected returns have been estimated taking clean period (-41 to -240 days) share price data. Abnormal return for a particular security is measured as difference between actual return and expected.

\[ AR_{it} = R_{it} - E(R_{it}), \]

where,

\[ AR_{it} = \text{abnormal return on security i for day t} \]
\[ R_{it} = \text{actual return on security i for day t} \]
\[ E(R_{it}) = \text{expected return on security i for day t} \]

To measure the expected returns, the following market model has been used:

\[ E(R_{it}) = a_i + \beta_i R_{mt} + \epsilon_{it}, \text{ for } i = 1 \ldots N. \]

Where

\[ a_i = \text{intercept of the regression line} \]
\[ \beta_i = \text{slope of the line representing sensitivity of return on security to market return} \]
\[ R_{mt} = \text{return on market portfolio} \]

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3. Clean period or estimation period is assumed to have no effect of the announcement. Normally estimation period should start around 1 or 2 months prior to the announcement.

4. Actual return on security i for day t has been calculated as \( \ln \left( \frac{P_{jt}}{P_{jt-1}} \right) \), where \( \ln \) is natural logarithm, \( P_{jt} \) is adjusted closing price of security i on day t and \( P_{jt-1} \) is adjusted closing price on security i on day t-1. The return estimates measured through natural log are less volatile as compared to traditional percentage method \( \left( \frac{P_{jt} - P_{jt-1}}{P_{jt-1}} \right) \times 100 \), as natural log covers the variation of 2% to 3% in security return originating through market fluctuations.

5. BSE Sensex has been chosen as proxy for market portfolio. SENSEX is a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. The base year of SENSEX is 1978-79 and the base value is 100. SENSEX is scientifically designed index calculated on a ‘free-float market capitalization methodology’ which is a widely followed index construction methodology on which majority of global equity benchmarks are based.
Under market adjusted method abnormal return is estimated as difference between actual return on security and return on market portfolio.

\[ \text{AR}_{it} = \text{R}_{it} - \text{R}_{mt}, \]

where

\[ \text{AR}_{it} = \text{abnormal return on security } i \text{ for day } t \]
\[ \text{R}_{it} = \text{actual return on security } i \text{ for day } t \]
\[ \text{R}_{mt} = \text{return on market portfolio} \]

Under mean adjusted method abnormal return on a given security is measured as difference between actual return and average of clean period returns.

\[ \text{AR}_{it} = \text{R}_{it} - \bar{\text{R}}_{it} \]

Where

\[ \text{AR}_{it} = \text{abnormal return on security } i \text{ for day } t \]
\[ \text{R}_{it} = \text{actual return on security } i \text{ for day } t \]
\[ \bar{\text{R}}_{it} = \text{average of abnormal returns during estimation period} \]

3.4.1.4 Estimating Average Abnormal Returns

\[ \text{AAR}_{t} = \frac{\sum_{i=1}^{N} \text{AR}_{it}}{n} \]

where,

\[ \text{AAR}_{t} = \text{average abnormal returns} \]
\[ N = \text{total number of securities} \]

3.4.1.5 Estimating Cumulative Average Abnormal Returns

Cumulative average abnormal returns have been calculated as:

\[ \text{CAAR}_{t} = \sum_{t=-40}^{40} \text{AAR}_{it} \]

Where \( t \) is window period

3.4.1.6 Statistical Significance of Abnormal Returns

To test the statistical significance of abnormal returns t-test has been used assuming student’s-t distribution. The null hypothesis is average abnormal returns around the merger announcement are equal to zero. The t-statistics has been calculated following Peter Dodd (1980):-
\[ t = \frac{\overline{\text{AAR}}}{S_{\text{AAR}}} \]
\[ S_{\text{AAR}} = \left[ \frac{1}{80} \sum_{t=40}^{40} (\text{AAR}_t - \overline{\text{AAR}})^2 \right]^{1/2} \]

Where
\[ \overline{\text{AAR}} = \frac{\sum_{t=40}^{40} \text{AAR}_t}{N} \]

**Alternative Approach**

An alternative approach has also been applied to test the significance of average abnormal returns.

**Standardized Abnormal Returns:**

Standardized abnormal returns are calculated by dividing the abnormal returns by standard deviation of estimated period abnormal returns

\[ \text{SAR}_t = \frac{\text{AR}_t}{S(\text{AR}_t)} \]

Where
\[ \text{AR}_t = \text{abnormal return for security i at time t} \]
\[ S(\text{AR}_t) = \text{standard deviation of abnormal returns from estimation period} \]

\[ S(\text{AR}_t) = \left( \frac{\sum_{t=11}^{t=211} (\text{AR}_t - \overline{\text{AAR}*})^2}{199} \right)^{1/2} \]

where
\[ \overline{\text{AAR}*} = \frac{\sum_{t=11}^{t=211} \text{AR}_t}{200} \]

To test the statistical significance of abnormal returns of the following z-statistic has been calculated

\[ Z_t = \sum_{t=11}^{N} \frac{\text{SAR}_t}{\sqrt{N}} \]

**Statistical Significance of Cumulative abnormal returns**

\[ Z_T = \sum_{t=40}^{t=40} \frac{\text{SAR}_t}{\sqrt{T*N}} \]
3.4.2 Pre-Merger and Post-Merger Operating Performance

To examine the abnormal operating performance of acquiring companies, a control firm with similar size and similar industry has been used as benchmark. The operating performance of sample firm has been measured from year -3 to year +3.

3.4.2.1 Choice of a Benchmark

There are two approaches for choosing a benchmark to compare the operating performance of sample firms with the benchmark-control portfolio approach and control firm approach. The control firm approach (Barber and Lyon, 1990) has been used. To measure the adjusted operating performance, the control firm has been selected from the same industry as that of acquirer firm and having the similar size as that of acquirer firm one year prior to the merger. Total assets have been used as proxy for size.

To select the control firm from same industry, All the firms having same 4 digit NIC code (as given in Prowess) as that of acquirer have been selected. The firms which have undergone merger during the period of the study have been excluded. The company having total assets base within the range of 90% to 110% as that of acquirer has been selected as a benchmark. If there was no company available in this range the limits were increased to 70% to 110%.

3.4.2.2 Performance Indicators

The following performance indicators have been used to measure the operating performance of companies:

i) **Profit Margin** – Profit margin is the measure of profitability of a company. It is calculated by finding net profit after tax as a percentage of sales. It represents company’s ability to control costs.

ii) **Return on Capital Employed** – It is the return that a company realizes from its capital. It is calculated as profit before interest and tax divided
by capital employed. Capital employed is the value of assets that contribute to a company's ability to generate revenue and return on capital employed, therefore, represents the efficiency with which the capital is being utilized to generate revenue.

iii) Return on Net Worth – It measures the return on ownership interest of common shareholders. In other words it is the return on shareholders’ equity. It represents firm’s efficiency in generating profits from every unit of shareholders’ equity. Return on net worth is best used to compare the performance companies in same industry. It is measured as adjusted profit before interest and tax divided by total equity (excluding preference shares).

Cash Flow Indicators

Cash flow is used as an alternate measure of business profits as it is believed that accrual concepts do not represent economic realities. Cash flow can be used to evaluate quality of income generated by accrual accounting e.g. when net income is composed of large noncash items it is considered as low quality.

To overcome the ambiguity regarding the accurate measure of profitability by accrual measures three cash flow measures have been used to gauge the operating performance of merged companies.

i) Cash flow return on Sales- It is measured as cash flow from operations divided by total sales. It shows how much cash is generated for each rupee of sales.

ii) Cash flow return on Net Worth – It is measured as cash flow from operations divided by average net worth. It represents how efficiently a company is generating cash for each unit of shareholders’ equity.

iii) Cash flow return on Assets – It is measured as cash flow from operations divided by average of opening and closing balance of total

6. Capital employed is measured as fixed assets + current assets – current liabilities. Generally we take average capital employed (average of opening and closing Capital employed) as a denominator while calculating return on capital employed. In this analysis also average capital employed has been taken to measure return on capital employed.
assets. It shows how effectively a company is using its assets to generate cash.

3.4.2.3 Measurement of Variables

The measurement and data fields of the performance indicators as per prowess database (given in parentheses) is given as under:

1. Profit Margin = \( \frac{\text{Adjusted Profit after tax (PAT}_\text{nnrt)}}{\text{Net Sales}} \)

2. ROCE = \( \frac{\text{Adjusted Profit before interest and tax (Pbit}_\text{nnrt)}}{\text{Average Capital Employed}} \)

3. RONW = \( \frac{\text{Adjusted Profit before interest and tax (Pbit}_\text{nnrt)}}{\text{Average Net Worth}} \)

4. Cash flow return on sales = \( \frac{\text{Cash flow from operations}}{\text{Net Sales}} \)

5. Cash flow return on Assets = \( \frac{\text{Cash flow from operations}}{\text{Average total assets}} \)

6. Cash flow return on Equity = \( \frac{\text{Cash flow from operations}}{\text{Average Net Worth}} \)

The data for all these variables has been taken from Prowess database. The data fields as given in Prowess are presented in Table 3.1

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Datafield given in Prowess</th>
</tr>
</thead>
<tbody>
<tr>
<td>net_sales</td>
<td>sales – indirect_taxes</td>
</tr>
<tr>
<td>pbit_nnrt</td>
<td>(net_profit + tax + exp_interest + lease_rent – extra_ordinary_inc + extra_ordinary_exp)</td>
</tr>
<tr>
<td>pat_nnrt</td>
<td>(net_profit – extra_ordinary_inc + extra_ordinary_exp)</td>
</tr>
<tr>
<td>net_worth</td>
<td>(equity_capital + pref_capital + reserves – revaluation_reserves – misc_exp_n_w_off)</td>
</tr>
</tbody>
</table>

Contd…
<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Datafield given in Prowess</th>
</tr>
</thead>
<tbody>
<tr>
<td>tot_asset</td>
<td>(total_assets – revaluation_reserves – misc_exp_n_w_off – advance_tax)</td>
</tr>
<tr>
<td>avg_net-worth</td>
<td>((net_worth + prev (net_worth))/2)</td>
</tr>
<tr>
<td>avg_capital_employed</td>
<td>((net_worth + prev (net_worth))/2)</td>
</tr>
<tr>
<td>capital_employed</td>
<td>(equity_capital + pref_capital + reserves – revaluation_reserves – misc_exp_n_w_off + tot_borrowings – short_term_bank_borr – commercial_paper)</td>
</tr>
</tbody>
</table>

3.4.2.4 Design for Computation of Test Variables

Figure 3.1 presents the design for computation of performance variables. The pre-merger performance variables are combined measure of acquirer and target firms. It is weighted average of each of performance indicators of acquirer as well as target firms weights being the total assets of the respective company. This gives the unadjusted figure. The adjusted figures are obtained by subtracting control firms performance indicator from that of combined firm. Hence pre-merger adjusted values are obtained for three years before merger (year-3 to year -1). Similarly post-merger adjusted values are obtained by subtracting control firm’s performance value from those of merged firm for three years after the merger (year+1 to year+3). The year of merger has been excluded from the analysis due to following reasons:

i) The year of merger is affected by one-time merger costs which makes it difficult to compare with other years.

ii) Since mergers have been taken place in different years, so excluding years of merger from analysis facilitates the comparison of pre-merger and post-merger data of all companies in the sample.

iii) Many companies have used purchasing method of accounting which results in reporting the consolidated accounts from the date of mergers hence making it difficult to compare with other companies or industry based benchmark firms.
3.4.2.5 Statistical Significance of Abnormal Operating Performance

To test the null hypothesis, in which mean abnormal performance is equal to zero for a sample of size 'n', we employ the parametric t-test statistic:

\[ t - \text{statistic} = \frac{\bar{AP}}{\left(\sigma(\bar{AP}) / \sqrt{n}\right)} \]

where \( \bar{AP} \) is the sample average and \( \sigma(\bar{AP}) \) is the cross sectional sample standard deviation of abnormal performance for a sample of \( n \) firms. This test statistic follows a student's t-distribution under the null hypothesis if the sample is drawn randomly from a normal distribution.

To test the null hypothesis that median abnormal operating performance is equal to zero, we use a non-parametric test – Wilcoxon's Signed Rank test. The Wilcoxon Matched-Pairs Ranks test is a non-parametric test that is often regarded as being similar to a matched pairs t-test. The Wilcoxon Matched-Pairs Ranks test is used to determine differences between groups of paired data when the data do not meet the rigor associated with a parametric test. Unlike less robust nonparametric tests such as the sign test:

- The Wilcoxon test is used to determine the magnitude of difference between matched groups.
The Wilcoxon test is used to determine more than only the direction of difference. The Z-statistic for this test is measured as follows:

\[ Z = \frac{D - E(D)}{S_D} \]

where

\[ E(D) = \frac{n(n+1)}{4} \]

\[ S_D = \sqrt{\frac{n(n+1)(2n+1)}{24}} \]

- \( d_i \) = Operating performance measure (combined or merged firm) – Operating performance measure (matching firm)

3.4.3 Multiple Regression Analysis

To examine the relationship between post merger operating performance and merger announcement period abnormal returns regression analysis has been used.

**Dependent Variable** - The dependent variable is three years average post merger operating performance. Six performance measures – three accrual variables and three cash flow variables have been employed as dependent variables forming six set of regression equations.

**Independent Variables** - Independent variables are combined cumulative abnormal returns of acquirer and target firms during different windows. The combined CAR for acquirer and target has been measured as weighted average of acquirer and target CAR, weights being the market capitalization of each company on one day prior to the respective window. To control for industry relatedness and ownership structure dummy variables have been introduced in the model.
<table>
<thead>
<tr>
<th>Objectives of the study</th>
<th>Methodology</th>
<th>Operational Variables/Models</th>
<th>Test statistics</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>To examine the impact of merger announcement on acquirer and target share prices</td>
<td>Event-Study Methodology</td>
<td>Market Model, Mean Adjusted Method, Market Adjusted Method</td>
<td>t-test</td>
<td>Brown and Warner (1980,1985), Asquith (1983),</td>
</tr>
<tr>
<td>To examine the pre and post merger operating performance</td>
<td>Operating performance benchmark methodology</td>
<td>Profit Margin, ROA, ROE, CFFO/Sales, CFFO/Net Worth, CFFO/Total Assets</td>
<td>Paired t-test, Wilcoxon Signed Rank Test</td>
<td>Barber and Lyon (1996), Healy and Palepu (1992)</td>
</tr>
<tr>
<td>To find out the relation between announcement period returns and post merger performance</td>
<td>Regression analysis</td>
<td>CAR , Profit Margin, ROA, ROE, CFFO/Sales, CFFO/Net Worth, CFFO/Total Assets</td>
<td></td>
<td>Healy and Palepu (1992), Sharma and Ho (2002)</td>
</tr>
</tbody>
</table>
The measurement of Combined CAR is given as under:

\[
\text{CAR}_{1\text{day}} = \frac{(\text{CAR}_A \times \text{Market Value}_{A(\text{day}_2)}) + \text{CAR}_T \times \text{Market Value}_{T(\text{day}_2)} + \text{Market Value}_{T(\text{day}_2)} + \text{Market Value}_{T(\text{day}_2)}}{\text{Market Value}_{A(\text{day}_2)} + \text{Market Value}_{T(\text{day}_2)}}
\]

\[
\text{CAR}_{2\text{day}} = \frac{(\text{CAR}_A \times \text{Market Value}_{A(\text{day}_3)}) + \text{CAR}_T \times \text{Market Value}_{T(\text{day}_3)} + \text{Market Value}_{T(\text{day}_3)} + \text{Market Value}_{T(\text{day}_3)}}{\text{Market Value}_{A(\text{day}_3)} + \text{Market Value}_{T(\text{day}_3)}}
\]

\[
\text{CAR}_{5\text{day}} = \frac{(\text{CAR}_A \times \text{Market Value}_{A(\text{day}_6)}) + \text{CAR}_T \times \text{Market Value}_{T(\text{day}_6)} + \text{Market Value}_{A(\text{day}_6)} + \text{Market Value}_{T(\text{day}_6)}}{\text{Market Value}_{A(\text{day}_6)} + \text{Market Value}_{T(\text{day}_6)}}
\]

\[
\text{CAR}_{10\text{day}} = \frac{(\text{CAR}_A \times \text{Market Value}_{A(\text{day}_{11})}) + \text{CAR}_T \times \text{Market Value}_{T(\text{day}_{11})} + \text{Market Value}_{A(\text{day}_{11})} + \text{Market Value}_{T(\text{day}_{11})}}{\text{Market Value}_{A(\text{day}_{11})} + \text{Market Value}_{T(\text{day}_{11})}}
\]

3.4.3.1 Stepwise Regression Method

For regression analysis stepwise regression has been applied. In stepwise regression method, each variable is entered in sequence and its value is assessed. If adding the variable contributes to the model then it is retained, but all other variables in the model are re-tested to see if they still contribute to the model. If they no longer contribute significantly to the model, they are removed.

The regression equation is as follows:

\[ Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \varepsilon_i \]

\( Y \) = Post merger operating performance

\( \alpha \) = Constant term

\( x_1 \) = one day combined CAR

\( x_2 \) = two day combined CAR

\( x_3 \) = five day combined CAR

\( x_4 \) = ten day combined CAR

\( x_5 \) = industry relatedness dummy variable

\( x_6 \) = Ownership dummy variable

\( \varepsilon_i \) = error term

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References


Pawaskar, Vardhana (2001), "Effect of Mergers on Corporate Performance in India", Vikalpa, 26(1), 19-32
