Investment decisions are based on the risk-return patterns. Appropriate measures of risk and return are of great concern to investors. CAPM, based on market beta, addresses this concern quite well. But, an alternative CAPM can also be thought of. This chapter makes an attempt to construct a model for measuring the corporate profitability performance and identifying the risk category of companies applying accounting beta [$\beta$] based on the CAPM model. A set of corporate firms has been analyzed using the proposed model. Our analytical results indicate that risk-return analysis, applying accounting beta [$\beta$], could serve as a reliable tool for identifying the risk-category of companies and also to measure the corporate profitability performance. Unlike the previous research findings, this study reveals that high-risk is not necessarily associated with high returns and low-risk low returns. The researcher, therefore, intend to suggest that this model would also serve as an effective tool to both the investors and fund managers in classifying and choosing sound corporate firms while taking investment decisions.

7.1 Introduction

Business firms commit funds in physical or real assets to earn a return higher than the one earned on financial assets. But as the business environment keeps changing, returns fluctuate; the higher the fluctuation, the higher is the risk. An important concomitant factor or profitability, i.e. the return is the risk associated therewith.
Risk-return analysis is used to measure the variations in the return behavior of a security or a portfolio of securities in relation to movements in return of a market portfolio, because such variations in security or portfolio are believed to have been induced by the market movements. Market beta [$\beta$] is the most widely accepted measure of the extent to which the return on a security fluctuates with the returns on the market portfolio.

The Capital Asset Pricing Model [CAPM] states that if the earnings of a security are fixed and steady, its risk is zero. If the earnings fluctuate, it is considered risky. The CAPM also states that the expected risk premium on each investment is proportional to its beta [$\beta$], i.e. the systematic risk. In a nutshell, the CAPM model states the differences in the systematic risk. Therefore, the securities with higher systematic risk will offer higher return than the securities with lower systematic risk.

Risk has two components, namely, systematic risk and unsystematic risk. Systematic risk is also called as external risk. It is uncontrollable and affects all investments. The systematic risk is non-diversifiable. The systematic risk is associated with the macro-economic, sociological, political and legal environment of the firm. Risk due to internal environment of a firm is called unsystematic and affects the particular industry. It is caused by factors specific to the industry,
such as employee behavior, management policies, demand for the products of the firm / industry and the like.

7.2 Previous Research

A succinct review of the previous works on risk-return relationship reveals that this relationship has been widely used for various purposes. It has been found out that a few authors have widely used the risk-return relationship to measure the share-price behavior and other stock market related models, analysis and predictions. A few research works have concentrated on testing the significance of relationship between industry concentration and risk-return pattern, price characteristics and risk-return pattern, uncertainty and risk-return pattern, market-structure and risk-return pattern, and growth and risk-return pattern. Apart from these works, a few studies have tested whether CAPM could serve as an appropriate technique to describe risk return relationship. Also, it was noticed that a few works have applied accounting as well as market beta under different circumstances.

Some notable previous research works based on CAPM model are presented in this chapter.

Tinic and West(1986), intending to verify the main implications of CAPM model undertook a research work for the period 1935 – 1982 and tested the relationship between risk and return of common stocks.
Surprisingly, the results did not support the main implications of CAPM developed by Fama and Macbeth (1973). Significant non-linearity was found in the relationship between the risk and return on common stocks for the period 1935 – 1982. Corhay, Hawini and Michel (1987) used Fama and Macbeth’s (1973) methodology to examine the monthly behaviour of CAPM based risk-premia in the common stocks of the US, France and Belgium. They concluded that the patterns of risk-premium seasonality found in the equity markets did not fully coincide with the observed patterns of stock return seasonality in these markets. Amit and Livant (1988) investigated the risk-return trade-off at the level of individual firms with both accounting market based measures of risk. The firms were classified into clusters according to their risk-return characteristics and compared according to diversification strategies, capital measures of risk and return and same operating traits. On analysis, it was noticed that related diversification characterized high-return-high-risk firms and that strategy yielded great market risks and market to book values. On the other hand, low-return-low-risk companies were usually unrelated diversifiers with relatively lower market risks and lower market to book value.

Tan (1991) carried out a test on the risk-return and the Three Moment Capital Asset Pricing Model (TMCAPM). The tests showed that the average return over time on the selected mutual funds appeared to deviate from the predictions of the model. They were generally flatter
than predicted by the TMCAPM implying that trade-offs of risks for return was less than predicted. Cuthert(1994) made a comparative study of the risk-return trade-off among the off shore funds of Western, Asia and Pacific nations. He discovered that five Asian markets, Hong Hong, Indonesia, Malaysia, Philippines and Thailand doubled the investors’ money in twelve months of 1993. Sinha(1994) made a comparative analysis of prospect theory and risk-return association. The results showed that using beta instead of the standard deviation to salvage the positive relationship between risk and return seemed to be ruled out. Bettis and Mahajan(1985) analyzed the risk-return performance of diversified firms. The return measure was 5-year average of the Return on Assets (ROA); risk was measured by the standard deviation of ROA across the same period. Results indicated that, on an average, related diversified firm had outperformed unrelated one, but that was no guarantee of a favourable risk-return performance.

Richard Roll and Stephen A. Ross(1994) examined the relationship between expected return and betas using appropriate samples. They found that there was an exact linear relation between expected return and true betas only when the market portfolio is on the ex-ante mean variance efficient frontier. Jay Shanken (1985), in his research refutes with Dybrig and Ross who suggested multi-beta CAPM concept in the place of APT [Arbitrage Pricing Model] approach. He has stated that the remarkable theoretical contribution of the original APT i.e.
providing an arbitrage basis for the general importance of covariance risk in asset pricing, remains undisturbed despite the new approach of the Dybrig and Ross. Chen (1982), by using Time-varying betas, made an attempt to measure the risk-return relationship in bull and bear markets. The results showed that the down market beta, where investors require a premium for assuming risk was a better measure of portfolio risk than the standard single beta.

Other studies on risk-return relationship gave mixed results. While most of the works concentrated on analyzing the scrip movements, a few studies concentrated on identifying the factors influencing risk-return relationship and a few other factors on testing the validity of CAPM to gauge the risk-return relationship.

7.3 The Present Study

The objective of this study is to analyze the risk-return performance of a set of companies in a particular industry based on the CAPM model, which measures the risk-return performance of investments in relation to share price movements. But, instead of market portfolio based beta $\beta$, industry oriented accounting beta is used in the analysis. Industry-wise beta $\beta$ coefficients are employed in establishing the risk-return relationship. Secondly, we intended to test the soundness and reliability of accounting beta $\beta$ to measure corporate performance and to classify companies based on risk with an inquisitive to check whether this model could be used as yet another
tool to choose the right investment choices among a variety of corporate firms. In addition, it makes an attempt to analyze whether there is any correlation between the beta and the actual return on investment of a company.

The efficiency of the new approach with regard to its ability to identify the right company has been explained and the limitations of the study as perceived by the authors and attempts to justify the circumstances under which various assumptions were made. Finally the summary results of the analysis and conclusion is given.

**7.4 Data Description**

The study is mainly based on secondary data. The data was collected the data on accounting variables from the website. Thirty public limited companies from the Cement Industry were selected and data were collected for the period from April 2000 to March 2004. So, the study period is five years from 2000 to 2004.

Since the samples chosen for the study represented more than 60% of the market capitalization of the population, the samples were considered representative and adequate Annexure-1 gives the distribution of sample companies.
7.5 Methodology

First, values of return on investment (ROI) of all companies have been calculated for the years 2000 through 2004, the study period. Second, annual mean industry ROI has been calculated, using arithmetic mean, for each industry. Third, by considering the Industry ROI as $Y$ and the Company ROI as $X_i$ [ $i = 1, 2, ..., 30$,], we have evaluated the value of $\beta_i$ [ $i = 1, 2, ..., 30$ ] using the regression equation

$$Y = \alpha + \beta_i X_i ; \ i = 1, 2, 3, ..., 30$$

Fourth, the sample companies have been classified into two categories namely, high-risk firms and low-risk firms on the basis of their respective $\beta$ values. Companies with $\beta > |1|$ are taken as high-risk firms and the companies with $\beta < |1|$ are taken as low-risk firms. Fifth, based on the classifications the respective means and the standard deviations have been calculated and t-test has been applied to study the significant difference between the means of the low-risk firm with the high-risk firm. Sixth, the expected return for each company has been calculated taking into account beta value and risk-free rate of return. The risk free rate of return is taken as 10%. During the study period, interest rate faced high volatility in the country and consequently we kept the risk-free rate 10% as those who intend to invest in capital market intentionally take risk.
Each company ROI has been compared with the expected ROI. If the company ROI is greater than or equal to the expected ROI then the firm is considered as a successful firm and if not it is considered as an unsuccessful firm. Based on the classification a Chi-Square analysis has been applied to study the independency of taking risk and the outcome.

7.6 Analytical Results

The t-test regarding the significance difference between the mean ROI of Low-risk and a High-risk firm reveals that the t-calculated 0.1476 is well within the t-table value 2.048 with 28 degrees of freedom and 5% level of significance. This implies that there is no significance difference between the mean ROI of the high-risk and the low-risk firms.

Also the Chi-Square test for the independency of the kind of risk taking versus outcome level reveals that the calculated value of the chi-square is 0.04 and the table value of the chi-square is 3.84 with 1 degree of freedom and 5 % level of significance. This implies that the kind of risk taking is independent to the outcome of the companies.

Interpretations of Results

From the above analysis, it is concluded that the general expectation of high return goes with high-risk and low return with low-risk could not be confirmed.
7.7 Results of the test of hypothesis t-test

H_0 : Difference between the mean ROI of high-risk and low-risk company is not significant.

H_1 : Difference between the mean ROI of high-risk and low-risk company is significant.

<table>
<thead>
<tr>
<th>Nature of firms</th>
<th>Mean ROI</th>
<th>Variance ROI</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk</td>
<td>1.56</td>
<td>80.37</td>
<td>28</td>
</tr>
<tr>
<td>High-risk</td>
<td>2.52</td>
<td>2.89</td>
<td>2</td>
</tr>
</tbody>
</table>

SE[Mean] = 6.57; t_{cal} = 0.1476

t_{table} = 2.048 [ 28 degrees of freedom and 5 % level of significance]

0.1476 < 2.048; implies that H_0 is accepted.

Chi-Square test:

H_0 : The risk taking nature and the outcome are independent.

H_1 : The risk taking nature and the outcome are dependent.

<table>
<thead>
<tr>
<th>Nature of firms</th>
<th>Outcome</th>
<th>Success</th>
<th>Non-success</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>High-risk</td>
<td></td>
<td>16</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>17</td>
<td>13</td>
<td>30</td>
</tr>
</tbody>
</table>
Chi-square calculated value = 0.04

Chi-square table value = 3.84

[1 degree of freedom and 5 % level of significance]

0.04 < 3.84; implies that $H_0$ is accepted.

### 7.8 The Model

**Efficiency of the new approach**

This new approach has made an attempt to analyze the risk-return performance of various companies and industries based on the CAPM model. It is unique in the sense that instead of market beta, industry oriented accounting beta has been applied. The first assumption we have made was keeping the risk-free return at 10% and consistently it was applied to all the companies though this rate could have been changed from year to year. (our decision to maintain uniformity at 10% was guided by the fact that bankers used to pay, on an average, 8% interest on all the medium-term fixed deposits during the study period and we have added 2% extra as investors take high risk in capital market’s equity investments ). Secondly, the annual ROI of each company was regressed against the industry mean ROI of the industry. So, the work based its conclusions on accounting beta rather than market beta. Market beta is considered superior, but suffers from certain limitations. For instance the market fluctuates violently during the crowd-like behaviour of investors and also it is too speculative in nature. During the study period, Indian bourses
underwent violent fluctuations. Market price is too fluctuating to serve as a basis for beta computation. So, accounting beta has been used.

Reliability of the new approach

The analytical results have proved that accounting beta, could be applied to identify the risk category of companies and it would be also be a guide to the investors to choose the right company for investment based on their preference or aversion towards risk. This model can also easily identify the companies suffering from unsystematic risk with the help of the mean ROI values among the list of companies in a particular industry. Since two comparisons [one with expected ROI and another with industry mean ROI] are made, the chances for the investing public going wrong in identifying the superior performers are remote.

7.9 Limitations of the study

Before proceeding to the concluding part, we do not, of course, hesitate to admit that this study suffers from certain limitations. These are as follows. Firstly, our findings are based on annual interval data. Half-yearly and quarterly data could have provided better results. Availability of such data, now legally mandatory, was difficult during the study period. Secondly, our assumption to keep the risk-free rate at 10% could be perceived as yet another limitation of the study. But, here again, the medium-term is considered [1 to 3 years]
and bank deposits [which are risk-free] as the benchmark and proceeded with the analysis. Finally, arithmetic mean is used to arrive at both the company ROI and the Industry ROI instead of weighted average since the removal of ‘outliers’ from the distribution ensured normality, it is certain that the results would not get drastically altered.

7.10 Summary and Conclusions

This analytical study examined the risk-return performance of corporate firms in the cement industry based on the CAPM model. In this study, instead of market portfolio based beta, accounting beta [$\beta$] has been used. This study also tested the soundness and reliability of accounting beta measuring corporate profitability performance and the risk category to which the firm belongs so as to extend suggestions to the investors and fund managers to take sound investment decisions.

- The findings, interestingly, are not consistent with the earlier findings that high-return goes with high-risk and low-return with low-risk.
- The test of significance of difference between the means and the independency of the nature of risk and the outcome has not rejected the null hypothesis. Here again, higher return is not accompanied by high-risk.
The current study, which makes an attempt to identify and analyze the performance of corporate firms based on the CAPM, reveals that, among other measures, accounting beta could also be employed as a reliable tool to classify the risk-category of companies and as a guide to investment decisions.