ANALYSIS OF SYSTEMATIC RISK OF EQUITY SHARES OF SELECTED COMPANIES IN INFORMATION TECHNOLOGY INDUSTRY

Research Project Report

Submitted to the Punjab Agricultural University
in the partial fulfilment of the requirements
for the degree of

MASTER OF BUSINESS ADMINISTRATION
in
FINANCIAL MANAGEMENT
(Minor Subject : Economics)

By

Sumit Kumar
(L-2003-BS-30-MBA)

Department of Business Management
College of Basic Sciences and Humanities
PUNJAB AGRICULTURAL UNIVERSITY
LUDHIANA-141 004
2005

ANALYSIS OF SYSTEMATIC RISK OF EQUITY SHARES OF SELECTED COMPANIES IN INFORMATION TECHNOLOGY INDUSTRY.

Research Project Report

Submitted to the Punjab Agricultural University
in partial fulfillment of the requirements
for the degree of

MASTER OF BUSINESS ADMINISTRATION
in
FINANCIAL MANAGEMENT
(Minor Subject: Economics)

By

Sumit Kumar
(L-2003-BS-30-MBA)

Department of Business Management
College of Basic Sciences and Humanities
PUNJAB AGRICULTURAL UNIVERSITY
LUDHIANA-141004

2005

CERTIFICATE I

This is to certify that the thesis entitled, "Analysis of systematic risk of equity shares of selected companies in Information Technology Industry" submitted for the degree of Master of Business Administration in the subject of Financial Management (Minor subject: Economics) of the Punjab Agricultural University, Ludhiana is a bonafide research work carried out by Sumit Kumar (L-2003-BS-30-MBA) under my supervision and that no part of this thesis has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

(Dr. Y.P.Sachdeva)
Major Advisor
Associate Professor
Dept. of Business Management
Punjab Agricultural University
Ludhiana-141004.

CERTIFICATE II

This is to certify that the thesis entitled, "Analysis of systematic risk of equity shares of selected companies in Information Technology Industry" submitted by Sumit Kumar (L-2003-BS-30-MBA) to the Punjab Agricultural University, Ludhiana, in partial fulfillment of the requirements for the degree of Master of Business Administration in the subject of Financial Management (Minor subject: Economics) has been approved by the student's Advisory Committee along with the Head of the Department after an oral examination on the same.

14/3

(Dr. S.K.Singla)
Head of the Department

14/3/06

(Dr. Y. P. Sachdeva)
Major Advisor

4/4

(Dr. Darshan Singh)
Dean Post-Graduate Studies

ACKNOWLEDGEMENT

It is difficult to acknowledge so precious a debt as that of learning as it is the only debt that is difficult to repay, except through gratitude.

It is with great pleasure that I acknowledge my sincere gratitude and profound thanks to my learned guide Dr. Y.P. Sachdeva, Associate Professor, Department of Business Management, P.A.U. under whose guidance I had the privilege to work. His encouragement, patience and constructive guidance through incisive criticisms at various stages helped me to complete this study successfully.

It is my profound privilege to express my sincere thanks to the members of my advisory committee – Dr. Sandeep Kapur, Mrs. Gagandeep Banga and Dr. K.K. Jain for going through the study critically and suggesting improvements for its betterment.

I am especially thankful to all the teaching and non-teaching staff of the department for their time, support and co-operation. My heart brims with gratitude and words at my command are inadequate to acknowledge my caring Parents, Family members and Friends as I find them as my ever replenishing source of strength, encouragement, love and support.

Sumit Kumar

SUMIT KUMAR

Title of the Thesis	: Analysis of systematic risk of equity shares of selected companies in Information Technology Industry
Name of the student and Admission No.	: Sumit Kumar L-2003-BS-30-MBA
Major Subject	: Financial Management
Minor Subject	: Economics
Name and Designation Of Major Advisor	: Dr. Y.P. Sachdeva Associate Professor of Business Management
Degree to be Awarded	: M.B.A.
Year of award of Degree	: 2005
Total Pages in Thesis	: 40 + Vita
Name of University	: Punjab Agricultural University, Ludhiana.

ABSTRACT

The researcher has tried to find the systematic risk of selected companies, listed on Bombay Stock Exchange, in Information Technology Industry. Required rate of return for the given companies has also been calculated to study the impact of beta on the return of various companies during the period from 2000 to 2003. The Beta estimation showed that risk of the industry remained more than that of the market as beta remained more than 1 during most of the times. Comparison of return of Information Technology Industry with that of market indicated that returns in the IT industry were fluctuating but remained lower than that of the market. Returns were even than not compensating for the risk.

Key words: Systematic Risk, Required Rate of Return, Capital Asset Pricing Model (CAPM).

Sachdeva 18/7/05

Signature of the Major Advisor

Sumit Kumar

Signature of the Student

CONTENTS

CHAPTER I

INTRODUCTION

Investment decisions are based on an important presumption that investors are rational and hence prefer certainty to uncertainty. They are risk averse which implies that they are not willing to take risk just for the sake of risk. They would take risk if they have adequate compensation in lieu thereof. There are different levels of risk associated with different expectations of returns. Higher the risk higher the return expected by the investors holding a portfolio of shares. Basic investment decision is based on 'trade off' between risk and return.

Risk is the outcome of uncertainty in predicting the future events that are affected by external and internal factors. The external factors are termed as the sources of systematic risk, whereas the internal factors are considered to be the source of unsystematic risk. Systematic risk will affect the securities in the market whereas unsystematic risk is security specific.

Systematic risk therefore, refers to the variability in the returns due to factors affecting the prices of all the securities. The sources of systematic risk are economic, political and sociological changes that are called tangible factors. Intangible factors refer to the market psychology. The tangible factors affect the whole market and will cause the prices of almost all individual securities to move together in the same manner. The recent examples of political instability after the Kargil war in 1999 and Tehlka.com exposure, stock market scam of 2001 and parliamentary elections of 2004 are few examples of systematic risk. Another major factor of systematic risk in India is success/failure of monsoon. The extent of variation which can be explained by market index is referred to as systematic risk. Unsystematic risk is that portion of total risk which cannot be explained by the market index and is unique to a firm or industry. Unsystematic risk is also called avoidable risk or diversifiable risk, as it is possible to eliminate it or diversify it to a considerable extent by choosing an appropriate portfolio of securities. Some of the sources of unsystematic risk are consumer preferences, labor strikes and management capabilities. These factors are independent of factors affecting stock market. The portion of the risk which cannot be diversified is referred to as beta-*the systematic risk (Sanyal, 2004).*

Market is usually affected by tangible (real) events, but when large number of investors starts acting collectively, it may lead to overreaction culminating in excessive pressure on the market. In such cases the price moves significantly away from the fundamental values. The major tangible factors leading to systematic risk are variability in interest rate and inflation whereas business and financial risks are major source of unsystematic risk.

Returns from a security have also been determined by Single Index Model developed by Markowitz. The Markowitz model is extremely demanding in its data needs for generating the desired efficient portfolio. It requires N (N+3)/2 estimates (N expected returns + N variances of returns + N*(N-1)/2 unique covariance of returns). Because of this limitation the single index model with less input of data requirements has emerged. The Single Estimate model requires 3N+2 estimates (estimates of alpha for each stock, estimates of beta for each stock, estimates of variances for each stock, estimates of expected return on market index and an estimate of variance of returns on the market index) to use the Markowitz optimization framework.

The single index model assumes that co-movement between stocks is due to movement in the index. The basic equation underlying the single index model is:

$R_i = a_i + ß * R_m$ where

R_j = Return on the ith stock

a_i = Component of securities that is independent of market performance

ß = coefficient that measures expected changes in R_i given changes in R_m

R_m = rate of return on market index.

The term a_i in the above equation is usually broken down into 2 elements a_i, which is the expected value of a_i, and e_i, which is the random element of a_i. The single index model equation therefore becomes:

$$R = a_i + ß * R_m + e_i$$

Single index model has been criticized because of the assumption that stock prices move together on because of co-movement with the market. Many researches have found out that there are influences beyond the market, like industry-related factors, that causes securities to move together. Empirical evidences however proved that more complete model have not consistently outperform single index model in terms of their ability to predict ex-ante (future) co- variances between stock returns (Dutt,2003).

Shares having beta less than one are defensive. One percent increase (decrease) in the market return is likely to be accompanied by less than one percent increase (decrease) in the share's rate of return. The investors are thus defended to some extent against the occurrence of major downfall in the market return. Shares with individual beta values greater than one are said to be more aggressive or risky as one percent increase (decrease) in the market return is likely to be accompanied by relatively greater increase (decrease) in the share's rate of return. A beta of one implies a level of riskiness equivalent to the market risk, as every one percent returns on the market is associated with one percent opportunity return on the share. Beta can also be negatively reflecting that share prices can rise when market falls and vice versa, though this is normally unusual, unless the capital market itself is topsy-turvy, or some fundamental changes have taken place in the company, or due to insider trading speculation.

To determine systemic risk, beta needs to be computed. In fact, beta is determined through the slope of characteristic line, which is 'the line of best fit'. This line is drawn through the scattered points on the stock returns' and 'market return'.

Even though beta determination procedures seem to be quite simple' yet it is beset with several practical problems. One such problem relates to fixing the length of beta estimation period, which may be one, two or three years or more, casting doubts on the rationality of the period. Further, whether, its calculations should be based on annual return data or on series of weekly or monthly data. Then, there are many shares, which are not regularly traded on the stock exchanges and as such their price quotations remain unchanged even during boom or depression period even though the whole market moves up or down. Thus, ill traded shares confound the confusion further. Again, if two assets differ with respect to their risk, how much will they differ in terms of price investors are willing to pay and the rate of return they expect to get there from? How does Sharpe's Capital Asset Pricing Model (CAPM) specify the exact relationship between the expected return and beta? How far, CAPM is effective, under Indian conditions, to determine the value of selected equity shares, cost of equity (k_e) and expected return on equity, particularly during the times of global slowdown and terrorism.

Though the literature on the subject provides answers to some of these questions, yet they need to be determined empirically in our context. A number of studies have been conducted in the area of security valuation; still there are very few empirical studies in India directly related to study of systematic risk. It may be due to this reason that determining whether the security is undervalued, overvalued or is in equilibrium is highly suspect and controversial.

1.1 Objectives of the study

The present study has been undertaken to find reasonable explanation to some of the above issues/ questions. It aims at analyzing empirically the systematic risk for a specified period in respect of selected industry. More specifically the main objectives of the study are:

1. To determine the systematic risk associated with the equity shares of selected companies in Information Technology Industry.

2. To determine the required rate of return for the selected shares using Capital Asset Pricing Model (CAPM).

CHAPTER II

REVIEW OF LITERATURE

In this chapter, an attempt has been made to present in brief, a review of related studies carried out in India and abroad to have a proper perspective of the subject. It gives a brief view of the findings of other researchers.

Berger and Bodie (1979) found that single most important behavioral implication of the proposition for an individual engaged in 'winner-take-all' contest was that he would not tend to diversify portfolio, even if he was risk averse. As in the value line contest, on is constrained to select a portfolio of, say, 25 stocks. Based on the above premise, the contestants would try to choose stocks, which are very highly positively correlated, so as to approximate a single stock as close as possible.

Bowman (1979) has shown that there is theoretical relationship between the systematic risk and the firm's leverage and accounting variables. He also demonstrated that systemic risk was not a function of earning variability, growth, and size or dividend policy. His findings are based on the capital asset pricing model as well as additional assumption that corporations can also borrow and lend at the risk-free interest rate. However many of these assumptions are violated in real world.

Fuller and Kerr (1981) suggest that pure play techniques can used in conjunction with the capital asset pricing model to determine the cost of equity capital for the divisions of a multidivisional firm. Since the beta of a firm is unobservable in the marketplace, a proxy beta derived from a publicly traded firm whose operations are as similar as possible to the division in question is used as the measure of division's systematic risk. To provide empirical support for using the pure play technique, a sample of multidivisional firms and pure plays associated with each division are examined. It is shown that approximately weighted average of the betas of pure-play firms closely approximates the beta of multidivisional firm.

Jacob and Pettit (1988) state that in a capital market risk free security have no volatility, so it has zero beta. If beta is more than 1, it means security returns fluctuate more than the market return. Since beta measures the relative volatility of a security's return in relation to market's return it should be measured in terms of the security's and market's covariance and market's variance.

Srinivasan (1988) conducted an empirical test to access the relevance of CAPM in Indian stock market. The results show that in spite of the potential of CAPM, its immediate feasibility is low in India. The study also gave possible reasons for the noted discrepancies. It was concluded that with the innovation in the capital market and the economic rationality in decision-making, the empirical line was expected to be close to CAPM line in the long run.

Ferson (1989) studied the behavior of risk in asset pricing model; the information obtained conditional co variances of return with "Marginal Utility". Later he studied the impact of multi beta pricing models with the variation in expected return. This allowed a model to incorporate expected returns and conditional betas in a unified manner.

Giovannini and Jorion (1989) attempt to determine whether the fluctuation of first and second moments- which are observed for many assets – are consistent with the Sharpe- Linter- Mossin capital asset pricing model. They tested the mean- variance model under several different assumptions about the time version of the conditional second moments of returns, using weekly data for the five year period, that include returns on portfolio composed of dollar. Deutsche mark, sterling and Swiss frank assets together with the U.S. stock market. The result indicates that estimated conditional variances cannot explain the observed time variation of risk premium.

Gregory (1990) points out that it is the systematic risk of each business activity that is measured by beta and suggests that, although not perfect, it offers a simple, useful and practically applicable approach to investment appraisal in the risky environments. It would therefore be unfortunate, he feels, to reject it too readily.

Obaidullah (1991) compared the raw return and risk adjusted return to lowest P/E and the highest P/E portfolio. Two measures of risk, total risk and systematic risk were considered. He discovered that the lowest P/E portfolio performed better than the highest P/E portfolio.

Broca (1993) states that the concept of risk plays a crucial role in contemporary finance theories. He further illustrate, through his research paper, that market risk is not static rather, continually evolves to reflect changed conditions or important political-economic events.

Roy (1994) found that on average individual mutual funds did not perform better than a normal portfolio. But perhaps due to limitations of capital and technical knowledge mutual funds might offer safer opportunity to an individual investor, although their performance could be below average.

Cope (1995) states that betting is similar to investment in stock market. When stock market is dull betting provides alternative investment opportunities. With a view to reduce the risk better go for 'spread bets' by spreading the investment. Spread bets were found to be closer representatives of stock market.

Harvey (1995) specifies that a number of researchers have documented low correlations between emerging equity market returns and industrial market returns. However a little is known about the risk exposure of equity investments in emerging markets. The possibility of choosing a global portfolio with higher expected return is eliminated due to the constraints such as prohibition on short selling in markets, maximum position limit for each market or group of markets and limits on the portfolio exposure on certain sources of risk. It is, therefore essential to measure not only the global risk exposure of international markets, but also the estimated risk exposure in portfolio formation.

Patherya (1995) studied the variation in the share price which according to him depends on the market risk. The market risk of a share measured by its beta gives the sensitivity of movements in the share price to the movement in the market. His suggestion was that in anticipation of bull market and with a view to outperform competition, the portfolio should be switched into shares with highest beta. On the contrary, in case of bear market, portfolio may be shifted to shares of lower beta to retard its process of erosion.

Shaw (1995) concluded that diversification in a portfolio beyond ten to twelve assets did not generally reduce risk, since systematic risk present therein could not be reduced by diversification.

Dutt (1998) states that the value of common stock refers to the intrinsic value of the stock, which is justified for a share, when the primary factors of value are considered. In other words it ids the real worth of the stock as distinguished from the current market price of the stock It is the subjective value in the sense that the analyst must apply his individual background and skills to determine it and estimates of intrinsic value vary from one analyst to other. He gives an overview of the different approaches to valuation of common stock. More specifically it covers Technical analysis, Fundamental analysis, CAPM and Option pricing.

Chawla (2001) says that investors while analyzing securities are concerned with the return expected from holding a security and the corresponding risk associated with it. Risk may be defined as the standard deviations of the returns. Risk is associated with the chance that actual return from an investment will be lower than the expected return. Investors will select the securities that maximize the expected return with the constraint of the risk tolerance. The selection process will, thus, result in finding out that investment alternative which minimizes the risk for a given level of return or maximizes the return for a given level of risk.

Parasuraman (2002) states that there are certain fallacies in taking the cost of capital of the firm as the benchmark when the firm has many projects. The riskier projects results in taking the beta of the firm upwards and this will result in weighted average cost of capital getting higher. Consequently the firm will approve of only riskier projects (those having higher beta and higher return), to the exclusion of low risk low return project.

Dutt (2003) reveals that the CAPM model breaks up the riskiness of each security into two components-the market related risk which cannot be diversified called systematic risk measured by the beta coefficient and another component which can be eliminated through diversification called systematic risk.

Pandey (2003) states that the basic investment decision is based on 'trade off' *between risk and return. Total risk consists of Unsystematic risk and systematic risk.* Unsystematic risk is the risk associated with investment in individual security that can, however be eliminated through diversification without any cost. There is no premium paid for it so it will have no influence on the return of individual security. Systematic risk or market related risk of investments that is non-diversifiable or can't be reduced. Market will pay premium for the systematic risk, since it is non diversifiable.

Bhatnagar (2004) says that small investors want to limit risk while gaining sustainable returns. Derivatives offer a hedge against risk. Derivatives manage risk by transferring it to someone willing to take it. In the bargain one can enhance returns over a longer run.

Dutta (2004) locates the significantly probable factors (internal and external factors) that can affect share price and share valuation. The relative importance of these factors has also been assessed by a perception survey of various players in the market.

Gleason (2004) states that risk is the outcome of uncertainty in predicting the future events that are affected by external and internal factors. The external factors are termed as the sources of systematic risk, whereas the internal factors are considered to be the source of unsystematic risk. Systematic risk will affect the securities in the market whereas unsystematic risk is security specific.

Sanyal (2004) reveals that the extent of variation, which can be explained by market index, is referred to as systematic risk. Unsystematic risk is that portion of total risk, which cannot be explained by the market index and is unique to a firm or industry. Unsystematic risk is also called avoidable risk or diversifiable risk, as it is possible to eliminate it or diversify it to a considerable extent by choosing an appropriate portfolio of securities. Some of the sources of unsystematic risk are consumer preferences, labor strikes and management capabilities. These factors are independent of factors affecting stock market. The portion of the risk, which cannot be diversified, is referred to as beta-the systematic risk.

Parate and Muthukumar (2005) state that it has been largely seen that many mutual funds were benchmarking against broader indices like Sensex and Nifty, while its portfolio include significant amount of mid cap and small cap stocks. More mutual fund money is benchmarked against the BSE Sensex than anything else. SEBI made benchmarking compulsory for mutual funds in April'02. This was done as a measure to provide objective analysis of the performance of the mutual funds schemes to investors, so, in every half yearly result, mutual funds were made to compulsory disclose performance of their schemes along with its benchmark.

All the above studies show that a part of the risk arises on account of economy-wide fluctuations and tendency of individuals securities to move together with change in the market. This part of the risk cannot be reduced through diversification and is called the systematic risk or market risk it is also specified that a number of researches had documented the low correlations between emerging equity returns and industrial market returns. However a little is known about the risk exposures of equity investment in emerging markets. The possibility of choosing a global portfolio with higher expected return is eliminated due to constraints such as prohibition of short selling in many markets, maximum position limits for each market or group of markets, and limits on the portfolio exposure on certain sources of risk. It is, therefore, essential to not only measure global risk exposure of international markets, but also the estimated risk exposure in portfolio formation. Various risk factors representing the systematic risk present in the global market are: the world market equity return, the return on foreign currency index, a change in the price of oil, growth in world industrial production and the world inflation rate. Only a handful of emerging markets were found to have a beta against the world market portfolio that exceeds unity. Diversification in portfolio beyond ten to twelve assets did not generally reduce systematic risk present therein as this systematic risk cannot be reduced by diversification. Investors while analyzing securities are concerned with the return expected from holding a security and the corresponding risk associated with it. Risk may be defined as the standard deviations of the returns. Risk is associated with the chance that the actual return from an investment will be lower than the expected return. Investors will select the securities that maximize the expected return within the constraint of their risk tolerance. There are certain fallacies in taking the cost of capital of the firm as the benchmark measure when the firm has many projects. The riskier projects will result in taking the firm Beta upwards and this will result in the weighted - average cost of capital getting higher. Consequently, the firm will ultimately approve of only the riskier projects (those having the higher beta and higher return under CAPM), to the exclusion of low risk low return project.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the research methodology of the present study. The methodology includes the scope of study, sample design, source and method of collection of data and the use of tools and the techniques of analysis. The limitations of the study are also described briefly so that the findings of the study are understood in their proper prospective.

3.1. Scope of study

The present investigation relates to the measurement of systematic risk in scripts of different companies in terms of beta coefficient, which measures the shares relative volatility with that of market, and the required rate of return or the cost of capital, depending upon the risk as described by the capital asset pricing model. Obviously, for this purpose equity shares of the listed companies that are actively traded can only be considered.

There are thousands of companies registered on various stock exchanges like Bombay Stock Exchange (BSE). All these companies could not be included in the study due to non-availability of data in many cases. Moreover, with a view to complete the research project within the stipulated time commensurate with the constraint of time and resources at the disposal of the researcher, only a manageable number of companies are studied.

The Bombay Stock Exchange (BSE) is the premier stock exchange of the country having the largest number of listed companies and the largest turnover (Parate and Muthukumar, 2005). Moreover information about the companies listed in BSE is more easily available on the Internet and in the newspapers.

In view of the above facts, the scope of the study was restricted to the companies listed in Bombay Stock Exchange (BSE) under Information Technology Industry. IT industry was chosen because it was one of the booming industries during that time.

3.2. Sample Design

Researches have shown that a sample of randomly selected 20 or more companies make good representation for the market and their return tend to approximate the market rate of return (Fuller and Kerr, 1981). It is, however, important to ensure that the company share must be traded and their quotations are readily available. In view of these facts 20 companies were selected, for which required data for 3 year period, was available.

Strict compliance of the criterion restricted the choice of large number of listed companies for which either data was not completely available or their shares were not being actively traded. Only 49 companies qualified for the present study. Out of these qualified companies, 20 companies were selected, by using simple random sampling. For each of the selected companies beta was determined for the period from 2000-01 to 2002-03 taking each year independently, combining last two years, i.e. 2001-03 and finally combining all the three years together. This resulted in 5 beta coefficients for each company and 100 betas for 20 companies under study.

As regards choice of the market index we have taken Bombay Stock Exchange Sensitivity Index (Sensex) consisting of 30 companies to represent the market rate of return.

3.3. Data Collection

This is an empirical study, entirely based on the secondary data, which has been taken from the 'The Economic Times' newspaper. Data was collected for each month of three-year period from 2000 to 2003, based on market price per share (Monthly high and low prices).

There are certain technical factors, which may generally influence and distort the structure of share prices. To minimize the distortion of the technical factors, the structure of average share prices over the cross section period has been considered, because the influence of technical factors get considerably ironed out in the process of averaging. Hence average share price was used as the dependent variable. The best average price measure for this purpose would have been the weighted average prices (weights being the number of shares traded) in all the transactions (Share trading and Futures & Option trading) during the financial year of a company. But the calculation for such a measure involves a lot of information not readily available. So a simple measure of average price was used by taking the arithmetic average of the highest monthly price and the lowest monthly price over each of the financial years of the company under study. This measure is apparently better than the average annual high and low, which is regarded as quite satisfactory as supported by the empirical studies (Harvey, 1995).

Thus, the arithmetic averages of monthly maximum and minimum share prices were calculated for all the years so as to reach at the average market prices of equity shares in different years. The par value of equity shares in most the cases was Rs. 10 per share.

3.4. Data Analysis

Single index Model describes the beta as a slope of characteristic line which is obtained by fitting the line between return of various security and some basic underlying factor, this factor may be the level of stock market as a whole, gross national product GNP, or any other factor thought to be the most important single influence on the returns from security. As pointed out earlier, we have taken data of Sensex as market price, which acts as indicator of market return to determine the value of beta.

Statistically, the line of best fit is obtained by simple Linear Regression or Ordinary Least Square Method (OLS). Percentages return from market as well a share was calculated from monthly averages of Sensex and share price respectively. For the first year, out of 12 averages, monthly returns could be calculated only for 11 observations for the first year, 12 observations for each of the next 2 years, 23 observations and 35 observations for two years (2001-03) and 3 years (2000-03) respectively (c.f. Appendix 1).

3.5. Limitations of the study

The present study suffers from certain limitations and constraints. Some of the limitations are as under:

(1) Due to time constraints, the scope of the study was restricted to 1 out of 20 odd industries. The sample of 20 companies from the IT industry, selected by using stratified sampling from BSE A, B1 and B2 categories, was not fully represented due to non availability of required data for large majority of companies listed under each category classification. Therefore conclusions drawn are subject to limitations of small sample.

(2) The sample of securities in the study consisted of only those shares whose prices were available in The Economic Times newspaper. Regular trading of securities is essential for incorporation of information on prices. However, there were a number of securities, which though listed on BSE, were poorly traded. Hence the inference drawn may not be properly generalized.

(3) The use of average of the highest and lowest prices over the month as a measure of the value of firm's security is not entirely satisfactory. Average figures arrived at by using the high and low values for each of the thirty days would have been better measure the value of a firm's security. Unfortunately such detailed data on price movements was not easily available.

Thus, the conceptual controversies, different approaches towards the problem, the changing accounting periods and policies, comparative narrow information system made the task for the researcher difficult. However, in spite of these limitations, an attempt has been made to meet the objectives of the study by using the available data in the best possible manner.

CHAPTER IV

RESULTS AND DISCUSSION

All investment instruments have a combination of reward and risk. Both are closely linked in the sense that the higher risk is closely accompanied by a higher expected return on investment, because the investor would like to be compensated for taking additional risk. Using the CAPM methodology, the risk in security investment falls in two categories, viz., unsystematic and systematic risk. Unsystematic risk, also known as diversifiable risk, represents the portion of total risk that can be minimized through diversification. These are the factors that cause this risk to vary from firm to firm, as they are unique to each firm. A well-diversified portfolio is able to minimize this risk to a larger extent.

Systematic or non - diversifiable risk, on the other hand, is the risk embedded which remains in the state of flux. It is attributable to factors that affect all firms. Illustrative sources of such risk are interest rate, inflation, govt. policy, state of economy and the capital market etc. As unsystematic risk can be eliminated by the investor, through diversification, the systematic risk is the only relevant risk which is of concern to the investor or security analyst. With a view to measure systematic risk, we generally take beta coefficient, which is the measure of shares relative volatility with that of market.

In this chapter, we propose to analyze the systematic risk expressed in terms of beta coefficient of selected companies, the required rate of return or cost of capital depending upon the risk as described by the Capital Asset Pricing Model, and finally the relative importance of CAPM in the Indian situation, particularly in the context of present state of Indian stock market.

The discussion in this chapter has been divided in the following three sections:

I. Systematic risk of sample companies.

II. Required rate of return of sample companies.

4.1. Systematic Risk

Systematic risk is the non-diversifiable risk inherent in the system, as mentioned earlier it may be determined by the beta coefficient. Beta has been determined by regressing the individual security return against the return of stock market as a whole over a period of 3 years from April 2000 to march 2003. The Bombay Stock Exchange Sensitivity Index (Sensex) consisting of 30 companies has been taken as a surrogate of market index for this study (Parate and Muthukumar, 2005).

4.1.1. Systematic risk in the Information Technology Industry

Systematic risk in terms of beta coefficients for Information Technology industry for three-year period has been presented in Table 4.1. It shows that for IT industry beta varies from 1.5402 in 2000-01 to 2.3648 in 2001-02 to 1.2826 in 2002-03. Average beta for 3-year period (2000-03) has been estimated at 1.8602.

Theoretically, value of beta for around 20 companies should tend to 1, as unsystematic risk is diversified (Gleason, 2004). In our case it is not so. It is simply

Table 4.1 : Systematic risk (Beta) of sample companies in Information Technology Industry

S.No	Name of the company	2000-01	2001-02	(YEAR) 2002-03	2001-03	2000-03
1	Crest Animation Studios Ltd	1.4252	1.6505	0.2265	1.3268	1.3743
2	Cybertech Systems & Software Ltd	0.9568	-0.1056	-1.3957	-0.4950	0.2181
3	DSQ Software Ltd	2.9800	2.3890	4.4725	2.8556	2.8030
4	HCL Infosystems Ltd	1.4260	3.2286	0.7498	2.6150	2.0790
5	Hexaware	1.8887	-0.6592	2.3377	0.0532	0.8822
6	Hughes Software Systems Ltd	1.3624	2.3581	2.4363	2.3763	1.9100
7	Infosys Technologies Ltd	1.0446	2.2086	1.2199	1.9516	1.5526
8	Libord infotech ltd.	-0.0737	-0.8794	0.6372	-0.5064	-0.2464
9	Mastek Ltd	0.9125	3.5770	1.1908	3.0079	2.2450
10	MPhasis BFL Ltd	1.9070	3.1512	1.0970	2.6672	2.3646
11	NIIT Ltd	1.1042	2.7124	1.9367	2.4946	1.8477
12	Polaris Software Lab Ltd	1.0507	3.4731	0.3797	2.7223	2.0240
13	Satyam Computer Services Ltd	1.7338	1.8182	1.6889	1.7987	1.7549
14	Silverline Technologies Ltd	2.2583	3.4610	3.6107	3.5305	2.9189
15	Sonata Software Ltd	1.5428	1.7102	1.0631	1.5388	1.5601
16	Tata Infotech Ltd	1.3471	2.8863	1.4109	2.5225	2.0207
17	Trigyn Technologies Ltd	2.6343	4.1441	2.1786	3.7215	3.2451
18	VisualSoft Technologies Ltd	1.4559	3.8204	0.9241	3.0968	2.4150
19	Wipro Ltd	2.0994	2.8551	1.3245	2.4832	2.2729
20	Xo Infotech Ltd	1.7477	3.4968	-1.8364	2.1837	1.9625
	INDUSTRY	**1.5402**	**2.3648**	**1.2826**	**2.0972**	**1.8602**

Table 4.2: Comparison of individual companies beta with IT industry beta.

Number of companies having beta	2000-01	2001-02	2002-03	2001-03	2000-03
Less than industry beta	11 (55)	8 (40)	11(55)	7 (35)	8 (40)
More than industry beta	9 (45)	12 (60)	9 (45)	13 (65)	12 (60)

Figures in parenthesis indicate percentages

because the sample is not fully diversified, as all the companies belong to the same industry. Moreover, we have taken Sensex, which includes a cross section of 30 companies from different industries as a surrogate for the market rate of return; the individual industry market beta may or may not tend to be 1. The calculated industry beta will, therefore, be a good indicator of the systematic risk of the industry as a whole.

It may, therefore be observed that the three year period from 2000-03, 60% of the companies in the information technology industry have beta more than the industry average. This indicates that whenever market moves, 60% of the companies having beta more than that of the industry, moves faster than the industry in both the directions.

Further it is found that the number of companies having beta greater than that of industry are fluctuating between 45% in 2000-01 to 45% in 2002-03.

Some of the companies have negative betas, which indicates that they move in different direction from that of market, i.e., if market goes up, they go down and vice-versa. Probably this is because of some speculation in these shares.

A comparison of direction of beta movement of information technology companies (Table 4.3) indicates that, in the year 2000-01 95% of the companies had positive beta, which decreases to 85% in 2001-02 and then rises to 90% in 2002-03. Overall, for three-year period (2000-03) it came out to be 95%, which shows IT industry, was more volatile than the Sensex.

Table 4.3: Classification of companies on the basis of beta sign : Information technology Industry

(N=20)

No. of companies having	2000-01	2001-02	2002-03	2001-03	2000-03
Positive beta	19 (95)	17 (85)	18 (90)	18 (90)	19 (95)
(a) Beta >1	17 (85)	17 (85)	13 (65)	17 (85)	17 (85)
(b) Beta <1	2 (10)	0 (0)	5 (25)	1 (5)	2 (10)
Negative beta	1 (5)	3 (15)	2 (10)	2 (10)	1 (5)

Figures in parenthesis indicate percentages..

To analyze further we split up the companies having positive beta into those having beta greater than 1 and those having beta less than 1. It was observed that in the year 2000-01, 85% companies were having beta greater than 1, which remained constant in 2001-02 and then reduced to 65% in 2002-03. On an average, over 3 years, 60% of the companies were having beta greater than industrial beta, showing higher systematic risk in IT industry.

4.2 Required Rate of Return

Capital Asset Pricing Model has been used all over the world to determine the price of asset in accordance with the degree of risk involved. Hence, in this model the required rate of return depends on the component of risk involved in a given investment. Conceptually it is equal to the sum of risk-free rate of return, which in present case has been taken to be the rate of return on bonds of 364 days T-bills, and the risk premium determined with the help of beta coefficient of sample companies.

Theoretically, all required rate of return are supposed to be positive, but most of them have come out to be negative. To analyze the reason for this we observed the risk free rate of return (R_f) and market rate of return (R_m) as shown in (Table 4.4) and (Fig. 4.1), and found Rf to be decreasing continuously from .0967 to .0589 from 2000-01 to 2002-03. Deeper analysis showed decreasing global rate of interest to be responsible for the decreasing R_f, as does during this period RBI has also decreased its bank rate.

To analyze this strange behavior in the market rate of return (R_m), Sensex (Fig. 4.2) and market return (Fig 4.3) were observed over period of study which indicated that market has been in the falling spree ever since global slowdown in the global IT companies sales which further impacted by September11, 2001 attack on US World Trade twin towers. Impacting Indian tech firms the most on the assessment that software firms would see a sharp drop in business from US market.

During 2002-03 markets were down again leading to negative market returns due to host of reasons which include withdrawal of FII's, following global (fall in US and

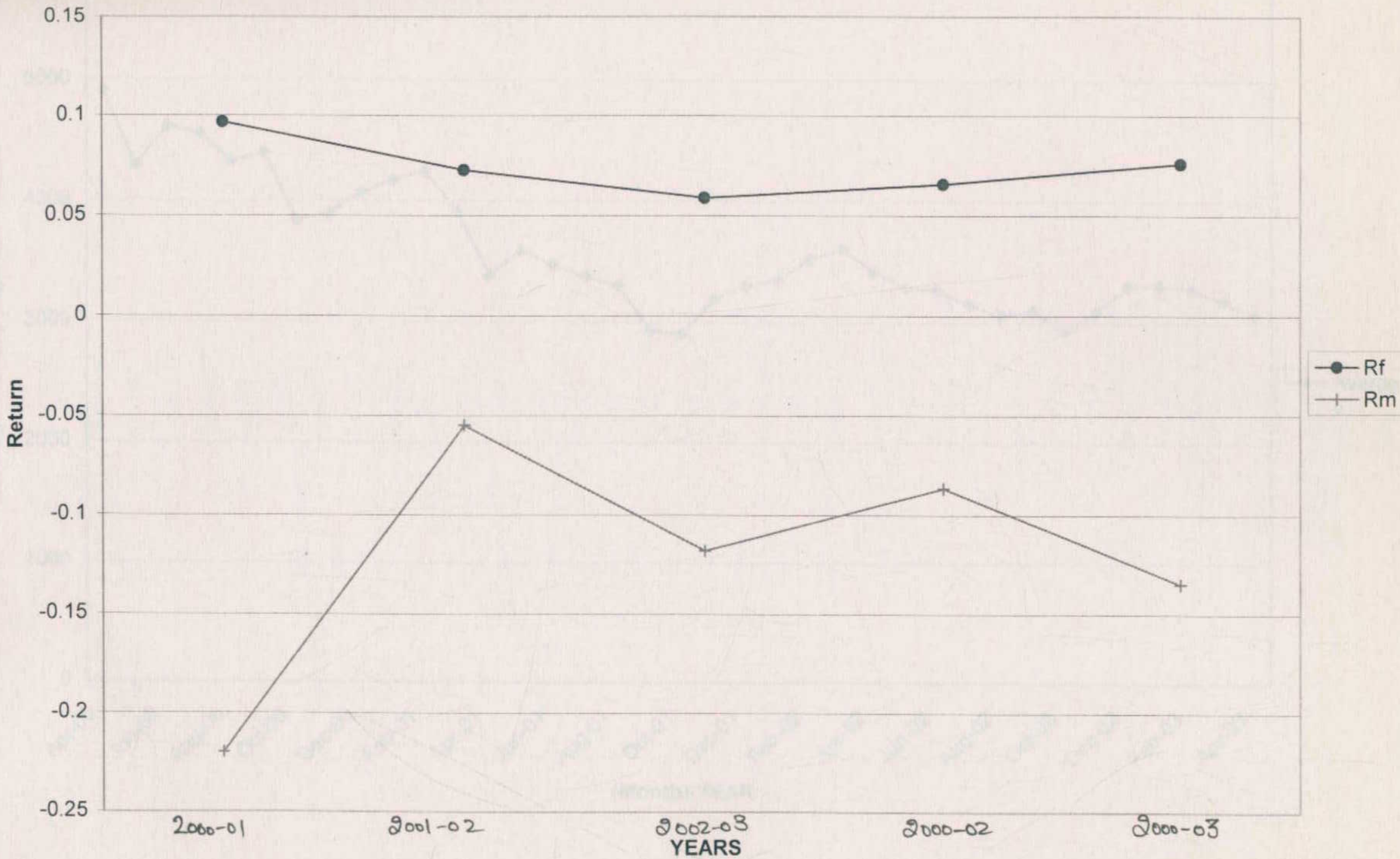

Fig 4.1 Relationship between Risk free rate of return (R_f) and Market rate of return (R_m)

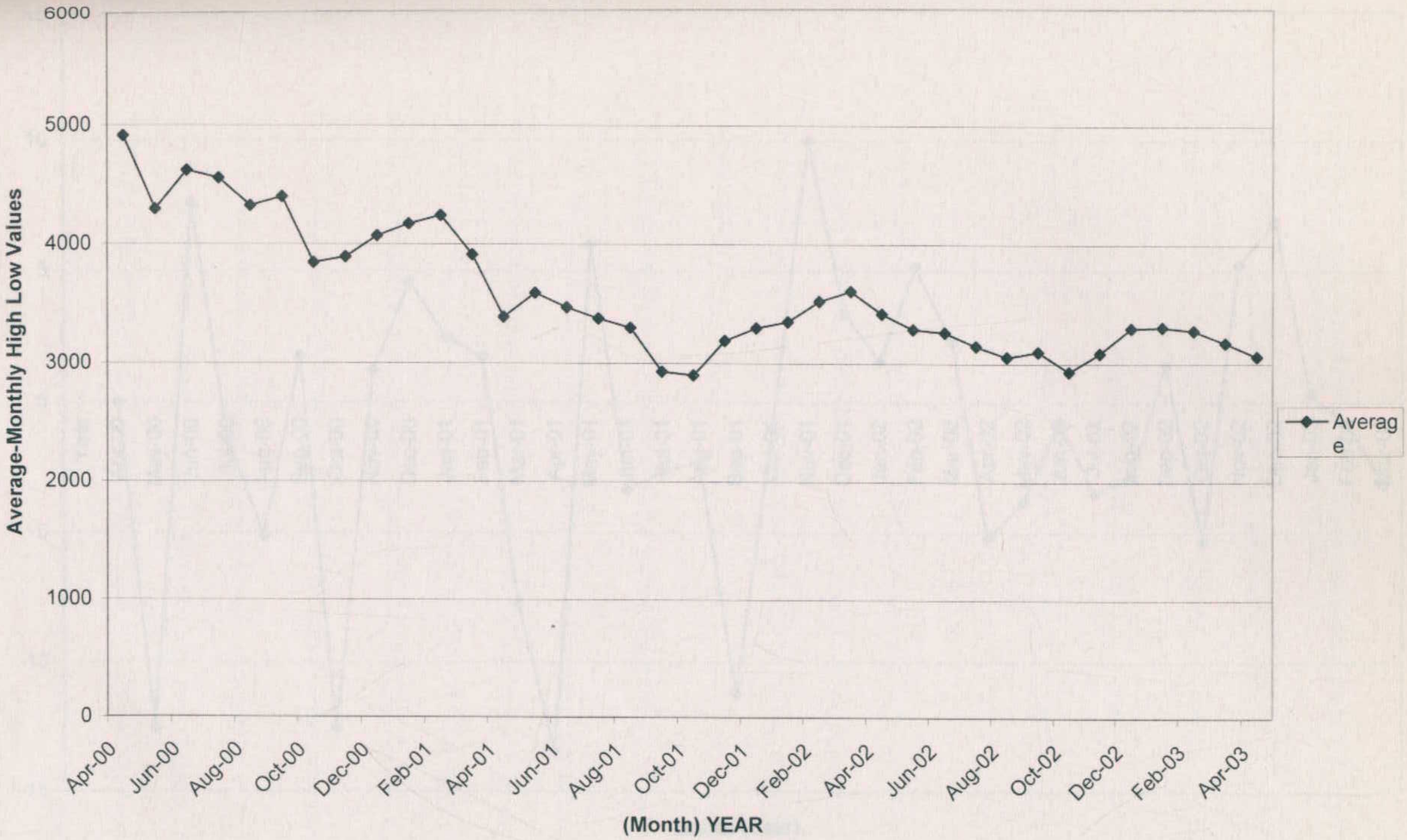

Fig 4.2 Bombay Stock Exchange Sensitivity Index (Sensex)

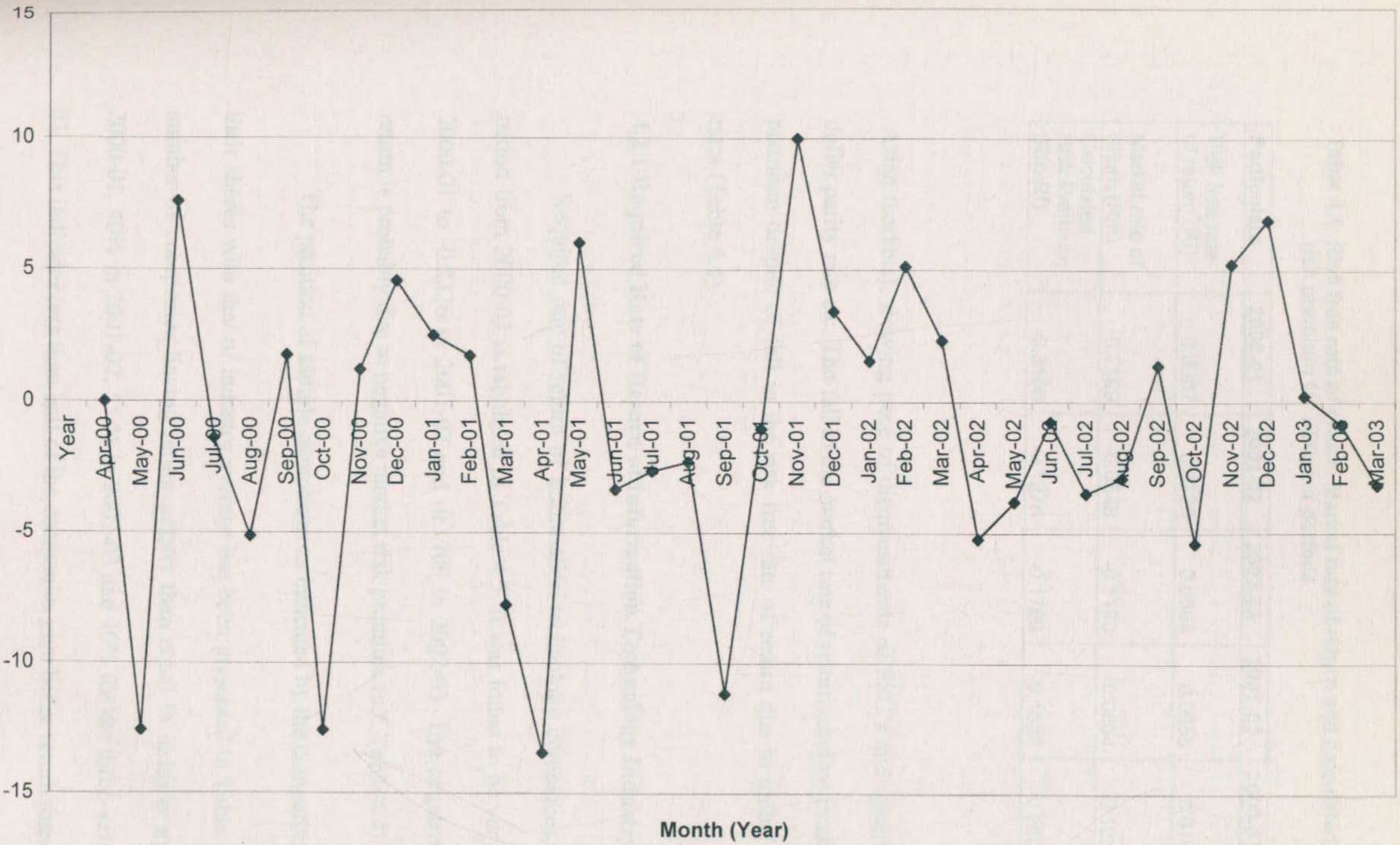

Fig. 4.3 Market Rate of return (Sensex)

Table 4.4: Risk free rate of return, Market rate of return and calculated risk premium for different periods

Particulars	2000-01	2001-02	2002-03	2001-03	2000-03
Risk free rate of return (Rf)	0.0967	0.0728	0.0589	0.0658	0.0761
Market rate of return (Rm)	-0.2199	-0.0548	-0.1180	-0.0864	-0.1283
Calculated Risk Premium (Rm-Rf)	-0.3166	-0.1276	-0.1769	-0.1522	-0.2108

Asian markets), slowing pace of disinvestments of PSU's and uncertainty in the rupee dollar parity rate etc. The fall in the market rate of return resulted in negative market risk premium despite of fall in the risk free rate of return due to global declining interest rates (Table 4.4).

4.2.1 Required Rate of Return of Information Technology Industry

Required rate of return of information technology companies for the three-year period from 2000-03 is tabulated in Table 4.5. It was found to be varying from -0.3958 2000-01 to -0.2326 in 2001-02 and -0.1709 in 2002-03. The negative and low rate of return is probably due to negative market risk premium (c.f. Table 4.4).

The position of sample companies as indicated by the comparison of return on their shares with that of industry average has been presented in Table 4.6. It shows that number of companies having return greater than equal to industry average is 55% in 2000-01, 40% in 2001-02, 55 % in 2002-03 and 40% for the three-year period of 2000-03. This indicates less than half of the companies give better return than the industry.

Table 4.5 : Required rate of return of companies in Information Technology Industry

S.No	Name of the company	2000-01	2001-02	2002-03	2001-03	2000-03
				(YEAR)		
1	**Crest Animation Studios Ltd**	-0.3545	-0.1378	0.01883	-0.1361	-0.2136
2	**Cybertech Systems & Software Ltd**	-0.2062	0.0863	0.30580	0.1411	0.0301
3	**DSQ Software Ltd**	-0.8468	-0.2320	-0.73229	-0.3688	-0.5148
4	**HCL Infosystems Ltd**	-0.3548	-0.3392	-0.07374	-0.3322	-0.3621
5	**Hexaware**	-0.5013	0.1569	-0.35464	0.0577	-0.1099
6	**Hughes Software Systems Ltd**	-0.4313	-0.3009	-0.43097	-0.3617	-0.4026
7	**Infosys Technologies Ltd**	-0.2340	-0.2090	-0.15691	-0.2312	-0.2512
8	**Libord infotech ltd.**	0.1200	0.1850	-0.05381	0.1429	0.1280
9	**Mastek Ltd**	-0.1922	-0.3836	-0.15175	-0.3920	-0.3971
10	**MPhasis BFL Ltd**	-0.5071	-0.3293	-0.135 6	-0.3401	-0.4224
11	**NIIT Ltd**	-0.2529	-0.2733	-0.28370	-0.3139	-0.3134
12	**Polaris Software Lab Ltd**	-0.2360	-0.3704	-0.00826	-0.3485	-0.3506
13	**Satyam Computer Services Ltd**	-0.4522	-0.1592	-0.23986	-0.2080	-0.2938
14	**Silverline Technologies Ltd**	-0.6183	-0.3688	-0.57983	-0.4715	-0.5392
15	**Sonata Software Ltd**	-0.3918	-0.1454	-0.12916	-0.1684	-0.2528
16	**Tata Infotech Ltd**	-0.3298	-0.2955	-0.19069	-0.3181	-0.3499
17	**Trigyn Technologies Ltd**	-0.7373	-0.4560	-0.32649	-0.5006	-0.6080
18	**VisualSoft Technologies Ltd**	-0.3642	-0.4147	-0.10457	-0.4055	-0.4330
19	**Wipro Ltd**	-0.5680	-0.2915	-0.17541	-0.3122	-0.4030
20	**Xo Infotech Ltd**	-0.4566	-0.3734	0.38376	-0.2666	-0.3376
		-0.3958	**-0.2326**	**-0.1709**	**-0.2567**	**-0.3198**

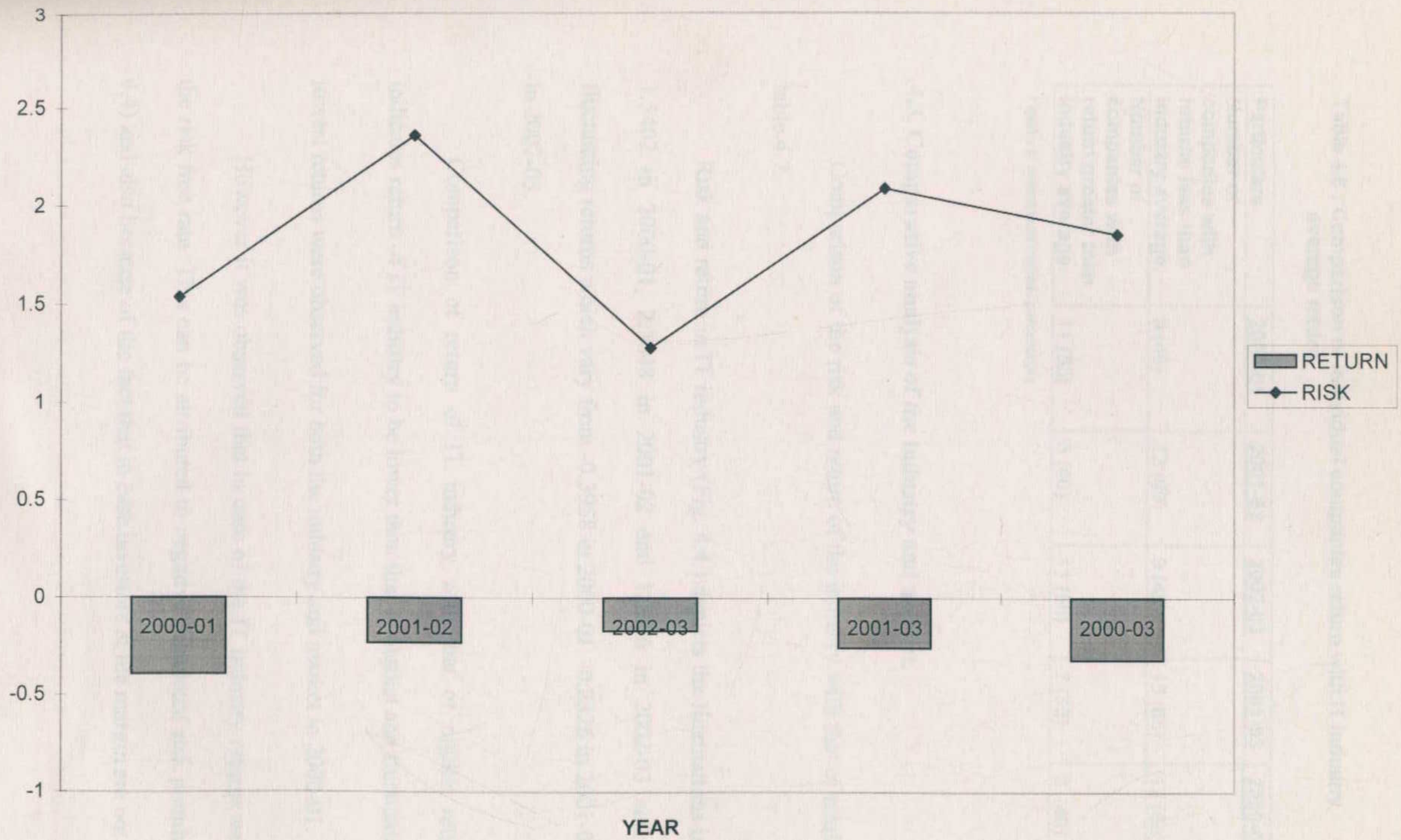

Fig. 4.4 Comparison of Risk and Return of IT Industry.

Table 4.6 : Comparison of individual companies return with IT industry average return.

Particulars	2000-01	2001-02	2002-03	2001-03	2000-03
Number of companies with returns less than industry average.	9 (45)	12 (60)	9 (45)	13 (65)	12 (60)
Number of companies with return greater than industry average.	11 (55)	8 (40)	11 (55)	7 (35)	8 (40)

Figures in parenthesis indicate percentages.

4.3. Comparative analysis of the industry and market.

Comparison of the risk and return of the industry with that of market is shown in table 4.7.

Risk and return in IT industry (Fig. 4.4.) depicts the fluctuations in the risk from 1.5402 in 2000-01, 2.3648 in 2001-02 and 1.2826 in 2002-03 and negative and fluctuating returns which vary from -0.3958 in 2000-01, -0.2326 in 2001-02 and –0.1709 in 2002-03.

Comparison of return of IT industry with that of market return (Fig. 4.6) indicates return of IT industry to be lower than that of market and fluctuating in nature, lowest returns were observed for both the industry and market in 2000-01.

However it was observed that in case of the IT industry returns were lower than the risk free rate. This can be attributed to negative calculated risk premium (c.f. Table 4.4) and also because of the fact that in case investors at the margin are not been able to

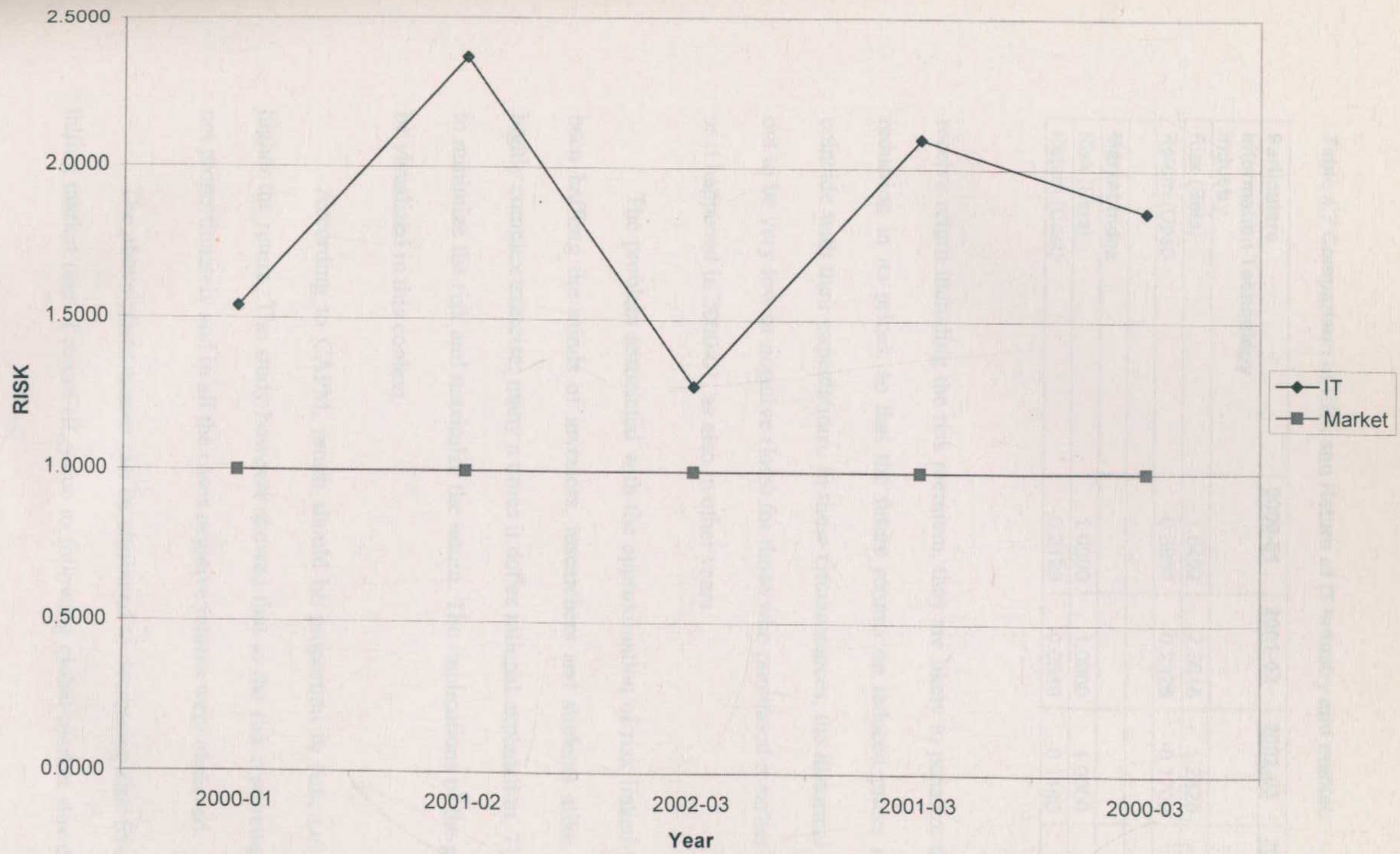

Fig 4.5 Comparison of risk of IT industry with that of market risk.

Table 4.7 Comparison of Risk and Return of IT Industry and market.

Particulars	2000-01	2001-02	2002-03	2001-03	2000-03
Information Technology Industry					
Risk (Beta)	1.5402	2.3648	1.2826	2.0972	1.8602
Return (Cost)	-0.3958	-0.2326	-0.1709	-0.2567	-0.3198
Market Index					
Risk (Beta)	1.0000	1.0000	1.0000	1.0000	1.0000
Return (Cost)	-0.2199	-0.0548	-0.1180	-0.0864	-0.1283

receive return including the risk premium, they are likely to penalize the shares through reduction in its prices, so that the future returns on reduced prices more or less will coincide with their expectations. In these circumstances, the historical return may came out to be very low or negative (loss) for those who purchased it earlier at a higher price, as it happened in 2000-01, as also in other years.

The problem associated with the approximation of risk linked to the scripts has been baffling the minds of investors, researchers and students alike. It is not only a highly complex exercise; many a times it defies rational explanation. The investors want to minimize the risk and maximize the return. The implications of the present study can be visualized in this context.

According to CAPM, return should be proportion to risk, i.e. higher the risk, higher the return. The study however showed that as the risk rose return did move, but not proportionately and in all the cases negative returns were observed.

The above phenomenon can be attributed to decreasing risk free return (R_f) and falling market rate of return (R_m) due to following global market slowdown (fall in US

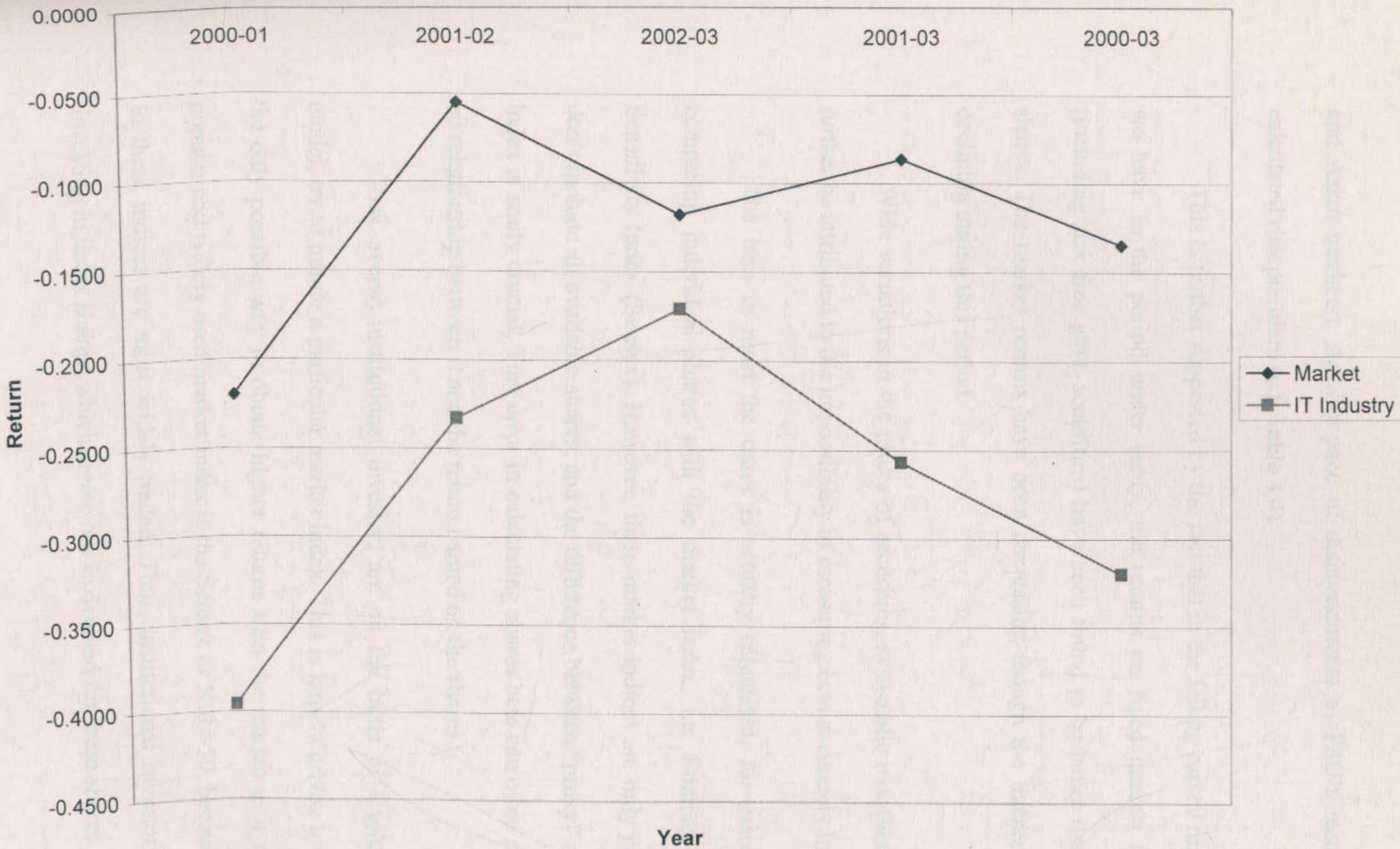

Fig 4.6 Comparison of return of IT Industry with that of market return.

and Asian markets), slowing pace of disinvestments of PSU's resulting in negative calculated risk premium (c.f. Table 4.4).

This is further supported by the fact that in the falling capital market, like the one we have in the period under study, the returns on fixed interest bearing securities (including risk free govt. securities) have been found to be better than those of equity shares. The market returns have been decreasing though the interest rates were also declining during this period.

Wide variations in the prices of securities, systematic risk (beta) and return can further be attributed to the impossibility of measuring beta accurately in such situations.

The beta in most the cases is actually calculated, for practical reasons, by comparing individual shares with the market index, i.e. Bombay Stock exchange Sensitivity Index (Sensex). However, these market indices are only proxies since they don't include all available shares; and the difference between "proxy" and "real" market index is really crucial. Tiny error in calculating shares beta can often mean that there is no relationship between it and the return earned on the shares.

Risk averse institutional investor, are on the basis of Capital Asset Pricing model, try to mimic a particular market index. This is largely driven by CAPM that it is the only possible way to obtain higher returns than the market as a whole. The most popular and widely used market index is the Sensex or Nifty-50, because shares include in these indices are most widely traded. Thus, institutional investors habitually start investing in index shares, which create rise in demand for these shares. Consequently, at the same time, it does not create a corresponding increase in the demand for shares outside the index which remain more or less dormant at least in short-run. Thus shares in the index become more volatile than the other stocks. This explains partially the particular behavior of beta for certain scrips included in the present study. That may also be the reason why the beta for the IT industry, as also for most of the companies, under study have came out to be more than one (market return based on Sensex).

Thus overall comparison of risk return and market price of the industry give clear indication that CAPM does not hold good exactly under Indian conditions, especially when the markets abruptly falling due to slowdown in the global market and other imperfections in the capital market.

CHAPTER V

SUMMARY

This Chapter presents the summary of the findings of the study and their conclusions and implications, followed by suggestions relating to the scope for further research in this and related areas.

The present study critically evaluates the systematic risk (Beta), required rate of return in the information technology industry. The Industry was randomly selected from the list of industries. The sample consisted of 20 companies. These were the companies for which complete data was available. The analysis was done for the accomplishment of the given two objectives:

1. To determine the systematic risk associated with the equity shares of selected companies in Information Technology Industry.
2. To determine the required rate of return for the selected shares using Capital Asset Pricing Model (CAPM).

Systematic return in terms of beta co-efficient for IT industry for three year was found to vary from 1.5402 in 2000-01 to 2.3648 in 2001-02 and 1.2826 in 2002-03. Further, on an average, 85% of the companies were found to have a beta greater than that of industry. Comparison of risk of the industry with that of market indicated that risk of the industry tends to remain high than that of the market and in most of the periods beta remained more than 1.

Required rate of return for Information Technology Industry was found to vary from -.3958 in 2000-01 to –0.2326 in 2001-02 and –0.1709 in 2002-03. On an average, 40% of the companies had required rate of return greater than that of the industry. Comparison of return of the industry with that of market indicated that returns from Information technology Industry remained lower than that of market.

Overall comparison of the industry indicated risk of the industry to be rising and remained higher than that of market. Return of the industry was found to be fluctuating, but were less than that of market. Returns were even than not compensating for the risk. This result may primarily be attributed to negative calculated risk premium (c.f. Table 4.4) , which occurred in spite of declining risk free rate (R_f), which not only remained lower than the market rate of return (R_m), but also showed decreasing trend over time. This paradoxical situation that really existed may be explained by the prevailing market capital situation where global interest rates were declining, as does the domestic risk free rate as depicted by 364-days T-Bills.

While trying to analyze the relevance of CAPM for Indian Capital Market, it was found that risk and return did not move proportionately, i.e. return did not compensate for the risk. As mentioned above this phenomenon was the direct result of negative calculated risk premium. Hence we may conclude that CAPM does not hold good under Indian conditions, especially when the interest rate structure was low (as the interest rates were falling) around the world and share prices are falling due to other imperfections in the market.

5.1. Scope for further research

The present research should be at the best taken as an exploratory research and its findings cannot be generalized due to the speculative behavior of the capital market during the period of study. Thus, with a view to having better approximation of beta (systematic risk) for Indian companies, substantial work needs to be done in this important area of finance for an extended period of time. Some specific areas for further research are listed below:

(i) Large coverage:

In this study only a small sample of an industry has been taken to calculate beta; an attempt should be made to calculate beta in the other industries also.

(ii) Longer period:

This study has been confined to determine the systematic risk over a period of 3 years which seems to be to short a period to smoothen out abnormal rise or fall in the stock prices. A larger period of 5 to ten years can be taken for better results.

(iii) Unsystematic Risk:

In this study focus has been to determine systematic risk but total risk is equal to both systematic risk and unsystematic risk. Therefore, unsystematic risk of various companies / industries can also be targeted through separate studies.

In short, substantial work of diverse nature is still needed to understand the entire gamut of issues connected and associated with the determination of risk. Moreover, further refinement of methodology is needed to compute and analyze the historical beta as well as to facilitate further prediction of beta.

References

Berger P D and Bodie Z (1979) Portfolio selection in a "Winner-Take-All" environment. *J Fin* **34**: 233-36.

Bhatnagar V (2004) Roll and hedge. *Business world* **24**: 66.

Bowman R G (1979) The theoretical relationship between systematic risk and financial (Accounting) variables. *J Fin* **34**: 617-29.

Broca D S (1993) Shifts in the risk structure of Indian stock market: The 1990 scenario. *Decision* **20**: 113-25.

Chawla Deepak (2001) Testing stability of beta in Indian stock market. *Decision* **28** : 1-22.

Cope N (1995) Where bookie meets broker. *Mgmt Today* **5**: 76-78.

Dutt D (1998) Valuation of common stock- an overview. *Char Acctt* **33**: 828-30.

Dutt D (2003) Constructing an optimal portfolio using Sharpe's single index model. *Mgmt Acctt* **38**: 452-55.

Dutta S K (2004) The share price and its valuation. *Mgmt Acctt* **40**: 274-82.

Ferson W E (1989) Changes in expected security returns, risk and the level of interest rates. *J Fin* **44**: 1191-1217.

Fuller R J and Kerr H S (1981) Estimating the divisional cost of capital: An analysis of pure-play technique. *J Fin* **36**: 997-1009.

Giovannini A and Jorion P (1989) The time variation of risk and return in the foreign exchange and stock markets. *J Fin* **44**:307-25.

Gleason J (2004) *Risk: The new management imperative in finance* pp: 6-8 Jaico Publishing House, Mumbai.

Gregory A (1990) The usefulness of beta in the investment appraisal process. *Mgmt Acctg* **68**:42-43.

Harvey C R (1995) The risk exposures of emerging equity markets. *The World Bank Eco Rev* **9**: 19-50.

Jacob N and Pettit R (1988) *Investments* pp:. 223:80 Arcata Graphics, Hilliday, USA.

Obaidullah M (1991) The price/earning ratio anomaly in Indian stock markets. *Decision* **18**:183-89.

Pandey I M (2003) *Financial Management* pp: 351-56 Vikas Publishing House Pvt Ltd, New Delhi.

Parasuraman N R (2002) Ascertaining the divisional beta for project evaluation. *Char Acctt* **51**: 546 - 49.

Parate S and Muthukumar K (2005) MFs benchmark most schemes to sensex. *Econ Times* 26th April **32**: 11.

Patherya M (1995) The distinct character of each stock. *Econ Times* 12th Nov **22**: 9.

Roy S (1994) Analysis, selection and management. *Char Acctt* **53**: 775-78.

Sanyal A C (2004) Kotak Mutual : A new fund opportunity. *Econ Times* 16th Aug **31**: 16.

Shaw J P (1995) Managing Personal Portfolio. *Mgmt Acctt* **30**: 15.

Srinivasan S (1988) Testing of capital asset pricing model in Indian environment. *Decision* **15**: 51-59.

APPENDIX 1

RETURNS BASED ON MONTHLY HIGH LOW AVERAGE PRICES

Year	Sensex	Crest Animation Studios Ltd	Cybertech Systems & Software Ltd	DSQ Software Ltd	HCL Infosystems Ltd
Apr-00					
May-00	-12.59	-24.55	-23.82	-41.96	-25.33
Jun-00	7.58	19.28	-9.58	23.15	13.68
Jul-00	-1.4	-11.00	-21.64	-9.37	-7.47
Aug-00	-5.14	-5.49	-35.01	-24.69	-18.35
Sep-00	1.76	-3.04	-2.66	6.97	10.11
Oct-00	-12.58	-26.35	-27.81	-37.42	-22.97
Nov-00	1.2	-7.34	-8.05	2.82	-10.90
Dec-00	4.56	-15.21	-12.37	3.17	-0.76
Jan-01	2.49	-22.95	-21.12	-11.73	-11.63
Feb-01	1.73	-11.28	-21.96	-1.27	5.95
Mar-01	-7.77	-31.00	-25.58	-37.85	3.05
Apr-01	-13.43	-28.17	-23.18	-60.65	-66.93
May-01	6.01	20.00	-7.34	-0.82	17.00
Jun-01	-3.35	-10.65	-3.32	-23.67	-15.45
Jul-01	-2.65	-5.10	-22.32	-36.41	-20.24
Aug-01	-2.3	-18.92	-19.39	-23.89	17.04
Sep-01	-11.17	-13.79	32.49	11.09	-12.12
Oct-01	-1.04	42.65	-18.31	13.93	-3.23
Nov-01	9.99	16.26	6.82	49.37	31.79
Dec-01	3.43	-1.37	14.42	-5.90	24.87
Jan-02	1.56	7.60	-23.44	-13.68	7.90
Feb-02	5.14	-1.29	-16.88	-17.21	0.12
Mar-02	2.33	-9.60	-17.79	0.17	11.14
Apr-02	-5.23	-11.25	157.62	-8.03	23.02
May-02	-3.8	-8.08	-7.34	-15.12	-11.44
Jun-02	-0.75	-3.55	-3.32	-12.53	-11.15
Jul-02	-3.48	-17.43	-22.32	-23.01	-8.17
Aug-02	-2.89	-4.52	-19.39	-19.89	-0.61
Sep-02	1.39	-16.61	32.49	-5.37	-2.43
Oct-02	-5.39	1.82	-18.31	-28.23	-14.75
Nov-02	5.24	14.29	6.82	19.37	-2.12
Dec-02	6.9	-16.99	14.42	38.25	13.49
Jan-03	0.24	0.39	-23.44	-26.71	-2.84
Feb-03	-0.85	-20.47	-16.88	-18.79	-1.17
Mar-03	-3.18	-5.01	-17.79	-23.14	-10.91

RETURNS BASED ON MONTHLY HIGH LOW AVERAGE PRICES

Year	Hexaware	Hughes Software Systems Ltd	Infosys Technologies Ltd	Libord infotech ltd.	Mastek Ltd
Apr-00					
May-00	-19.68	-14.26	-17.09	17.11	-52.97
Jun-00	16.05	13.28	9.87	24.43	5.95
Jul-00	-4.38	-6.22	-3.56	-27.13	10.60
Aug-00	-25.83	-6.07	-2.01	-8.89	26.90
Sep-00	-4.26	2.03	6.77	-16.46	10.56
Oct-00	-25.99	-24.09	-13.00	-18.25	-25.44
Nov-00	2.43	-0.49	9.96	-12.50	-34.62
Dec-00	-1.32	-21.12	-13.79	2.55	-34.40
Jan-01	-3.48	9.60	-4.83	-49.25	-48.21
Feb-01	-27.16	0.11	-0.18	0.00	-11.92
Mar-01	-45.89	-26.95	-19.33	0.00	-24.12
Apr-01	-17.41	-4.58	-30.78	0.00	-21.11
May-01	-9.05	27.37	14.23	0.00	5.59
Jun-01	146.00	-11.33	-10.47	0.00	0.90
Jul-01	-45.89	-12.60	1.30	-32.35	-19.67
Aug-01	-17.41	-11.24	4.56	113.04	2.27
Sep-01	-9.05	-40.46	-23.12	21.09	-15.83
Oct-01	-13.10	-37.16	-9.14	-32.58	-15.88
Nov-01	-31.63	31.61	31.51	-3.33	87.73
Dec-01	-20.07	13.99	22.22	-33.62	61.32
Jan-02	-22.02	7.36	0.54	-46.75	30.37
Feb-02	-0.92	9.52	-12.05	21.95	8.43
Mar-02	50.29	-8.84	4.37	12.00	11.88
Apr-02	7.67	-14.37	-3.89	-19.64	14.82
May-02	8.02	-7.20	-0.46	-6.67	-11.75
Jun-02	13.36	-13.83	-9.43	47.62	-2.19
Jul-02	-34.94	-14.53	-4.51	37.10	6.23
Aug-02	-7.78	-19.57	2.00	-32.94	7.77
Sep-02	65.35	5.33	7.55	-12.28	13.80
Oct-02	5.10	-9.90	2.70	10.00	-6.04
Nov-02	8.81	15.51	16.60	-25.45	6.84
Dec-02	13.04	18.75	9.02	29.27	17.17
Jan-03	23.64	-14.88	-1.99	4.15	10.09
Feb-03	-0.65	-4.33	-4.87	8.70	5.37
Mar-03	-10.93	10.86	-2.15	-8.33	-4.82

RETURNS BASED ON MONTHLY HIGH LOW AVERAGE PRICES

Year	Mphasis BFL Ltd	NIIT Ltd	Polaris Software Lab Ltd	Satyam Computer Services Ltd	Silverline Technologies Ltd
Apr-00					
May-00	-38.06	-1.23	4.49	-24.84	-34.91
Jun-00	8.76	20.06	-3.27	7.45	35.59
Jul-00	-11.21	-11.10	-18.33	-5.39	-26.01
Aug-00	-1.42	-13.26	-15.70	-9.29	-6.43
Sep-00	4.63	-0.42	9.51	6.94	5.81
Oct-00	-20.77	-11.51	-30.58	-26.00	-20.93
Nov-00	15.28	11.15	3.69	-12.38	-4.19
Dec-00	-4.72	1.85	-0.34	-0.24	-5.52
Jan-01	5.29	-2.89	-4.66	5.49	-18.48
Feb-01	-20.03	-18.20	-2.70	-2.90	-8.09
Mar-01	-30.16	-29.81	-29.80	-25.96	-38.79
Apr-01	-24.44	-41.75	-16.41	-18.81	-39.93
May-01	-5.83	-20.13	38.09	5.53	12.74
Jun-01	14.05	-12.49	-7.95	-18.62	-16.56
Jul-01	-14.69	-28.37	-19.05	-7.32	-27.46
Aug-01	-20.56	-36.69	-29.63	-9.37	-18.39
Sep-01	-21.45	-26.43	-32.64	-7.91	-25.33
Oct-01	-2.48	14.14	-13.88	-1.01	-0.15
Nov-01	60.45	51.30	61.18	31.95	74.35
Dec-01	41.10	8.96	50.26	27.64	13.22
Jan-02	46.96	4.38	9.33	16.25	4.33
Feb-02	26.63	-8.24	-4.84	-0.16	-15.49
Mar-02	10.62	-1.66	2.13	0.18	-0.57
Apr-02	17.73	28.17	7.29	-4.61	-13.81
May-02	-4.73	-14.46	23.54	-9.91	-10.54
Jun-02	-4.39	4.96	0.67	-3.29	-7.32
Jul-02	-14.23	-24.98	-17.37	-1.09	-14.69
Aug-02	-8.09	-25.21	-12.41	-5.65	-26.63
Sep-02	13.56	-2.15	10.77	5.74	-14.69
Oct-02	9.26	-9.40	-9.66	-5.43	-20.23
Nov-02	7.77	11.15	-11.14	18.43	18.55
Dec-02	15.86	21.23	12.55	8.93	31.17
Jan-03	6.93	-9.32	-20.67	-10.51	-33.08
Feb-03	-2.07	-12.90	1.35	-10.86	-25.35
Mar-03	-10.71	-15.04	-9.66	-7.04	-27.99

RETURNS BASED ON MONTHLY HIGH LOW AVERAGE PRICES

Year	Sonata Software Ltd	Tata Infotech Ltd	Trigyn Technologies Ltd	VisualSoft Technologies Ltd	Wipro Ltd	Xo Infotech Ltd
Apr-00						
May-00	-43.39	-26.23	-63.53	-10.10	-46.36	-40.01
Jun-00	10.79	5.79	17.61	4.86	-2.65	31.72
Jul-00	-16.29	-11.77	-19.28	-14.52	12.09	-22.33
Aug-00	2.90	-12.32	-27.62	-21.55	1.24	-1.07
Sep-00	17.55	17.25	25.66	9.45	7.46	17.46
Oct-00	-18.44	-10.35	-27.05	-33.10	-21.92	-1.53
Nov-00	-4.42	8.70	-0.02	-17.65	4.37	4.76
Dec-00	-12.46	-11.24	-15.99	-10.82	8.27	-11.15
Jan-01	-24.30	-8.04	-27.79	-7.17	3.14	-17.89
Feb-01	-19.99	5.96	-27.04	-0.13	-1.04	-15.29
Mar-01	-28.11	-22.56	-36.55	-36.32	-25.87	-32.27
Apr-01	7.68	-37.31	-39.51	-63.13	-40.31	-27.36
May-01	-11.95	52.52	-18.05	-2.69	41.68	18.83
Jun-01	-14.11	1.92	-13.23	-29.35	-9.94	-13.66
Jul-01	-21.27	-23.18	-24.49	-22.47	-11.85	-15.19
Aug-01	-14.89	-8.70	-14.21	16.64	10.91	-39.93
Sep-01	-24.52	-14.20	-13.96	-14.41	-20.22	-4.97
Oct-01	-0.50	-4.18	-2.23	-12.73	-12.67	-9.15
Nov-01	70.38	26.62	125.62	59.01	26.14	117.99
Dec-01	-2.38	29.13	25.01	34.52	31.74	-10.56
Jan-02	-5.18	-5.34	-0.81	-3.60	-1.95	-13.65
Feb-02	-14.45	-0.10	-0.29	20.85	0.21	-7.26
Mar-02	12.57	17.99	14.05	6.66	3.27	-8.76
Apr-02	15.67	46.45	-7.62	21.32	-1.74	38.38
May-02	8.65	-3.56	-24.63	-0.62	-6.60	20.07
Jun-02	3.05	-5.72	-34.16	-0.95	-3.26	-23.10
Jul-02	-12.10	-17.30	2.50	-19.90	-14.84	1.19
Aug-02	-15.67	-19.79	-24.76	-17.70	-9.92	-15.23
Sep-02	-1.22	2.04	-2.92	7.14	15.55	-20.28
Oct-02	0.70	-8.21	-16.53	5.23	2.66	11.56
Nov-02	23.21	8.32	0.00	8.33	9.73	-6.22
Dec-02	7.37	28.61	16.00	11.98	7.47	-1.10
Jan-03	-7.26	3.54	-12.24	-7.13	-7.21	-11.17
Feb-03	-12.66	-10.77	-23.28	-12.06	-8.23	-25.16
Mar-03	-10.42	-10.74	-26.25	-14.18	-3.12	-24.37

VITA

Name of the student	:	Sumit Kumar
Father's name	:	Mr. Raj Kumar Bansal
Mother's name	:	Mrs. Prabha Bansal
Nationality	:	Indian
Date of Birth	:	05.08.1982
Permanent home address	:	58A, B block, Madhuban
Enclave,		
		Back side Aggar Nagar A,
		Ludhiana-141001.

EDUCATIONAL QUALIFICATION

Bachelors Degree

B.Com. (Hons.)

University	:	Panjab University, Chandigarh.
Percentage of marks	:	70.00%
Year of Award	:	2003

Masters Degree

Master of Business Administration (M.B.A.)

University	:	Punjab Agricultural University Ludhiana.
OCPA	:	8.
Title of Master's Thesis	:	Analysis of systematic risk of equity shares of selected companies in Information Technology Industry
Awards/ Fellowships	:	Merit Fellowship during MBA