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BETA FACTOR, SYSTEMATIC RISK AND UNSYSTEMATIC RISK: A STUDY OF PROMINENT COMPANIES OF IT AND BANKING SECTOR

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ABSTRACT

Investment in share market involves high level of risk. This risk is multiplied with the increase in volatility in stock prices. Therefore it is important for an investor to have proper knowledge of the risk and returns attached with various stocks so that a better risk-return trade off can be reached and a wise investment decision can be made. For quite a few years, Indian Stock Markets, driven by domestic as well as foreign institutional investors, have been growing at unprecedented rate and thus have given an opportunity for investors to earn superior returns. But, at the same time, the level of volatility has also been very high and this has increased the risk. Although an investor can construct diversified portfolio for reducing risk, this diversification may not help in dealing with the systematic risk attached with stocks selected in the portfolio. Therefore calculating only total risk of various stocks is not enough, rather one should also know how much of this risk is systematic risk and how much is unsystematic risk. This study aims at finding out the risk attached with the stocks of prominent companies of IT (Information Technology) and Banking Sector and beta factors of these companies. Authors have also found out the systematic and unsystematic risk attached with the shares of these companies.
Key Words: *Risk, Systematic Risk, Unsystematic Risk, Beta Factor, Variance, Co-efficient of determination*

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INTRODUCTION

In simple words, the term investment can be defined as employment of funds in certain assets with the aim of earning additional return or growth in value. For a long period of time equity market has been attracting the investors and with the passage of time it has gained increased importance because of its potential to generate superior returns. Although stocks generate returns at very high rate, investment in equities involves high level of risk as well. This risk further increases with the increase in price fluctuations in the stock market. Therefore, it is important for investors to have proper knowledge of risk & return levels associated with various stocks so that a better risk-return trade off can be created and a wise investment decision can be taken.

For quite a few years the Indian Stock Markets have been a hot seat for investors. Driven by domestic as well as foreign institutional investors, they have been growing at unprecedented rate. But the level of volatility has also been high. This means although the return potential for investors has increased, the risk associated with such investment has also gone up. This situation calls for an in-depth analysis before making an investment in equities so that the risk associated with this investment can be minimized. Calculation and analysis of only total risk (variance) is not enough, rather both the components of risk i.e. systematic risk and unsystematic risk should be analysed.

Risk

The term risk in investment means the possibility that realized returns will be less than expected returns. This risk is measured in terms of variability in returns. Generally, the standard deviation or variance of values of returns is used to denote the total risk of a security. Higher the variability in returns, more will be the risk.

Risk has two components:

1. ***Systematic or Non-diversifiable Risk*:**
It is that portion of total variability in returns which is caused by general factors e.g. economic, political, social and cultural factors affecting the prices of all securities. Nature of this risk is same for all securities and that is why it cannot be reduced by constructing portfolios. That is why it is also known as non-diversifiable risk.
2. ***Unsystematic or Diversifiable Risk***
It is that portion of risk that is caused by the factors which are peculiar to a firm or industry. Such factors affect the prices of the security of a firm or the securities belonging to an industry only i.e. this risk is unique to a firm or

industry. That is why this risk can be reduced to a great extent by constructing well-diversified portfolios and therefore unsystematic risk is also known as diversifiable risk.

Beta (β)

β is an indicator of systematic risk i.e. it measures the non-diversifiable risk associated with a security. β shows how the price of a security responds to market forces. It indicates that a change in the stock market index brings what change in the price of the security. The more responsive is the price of a security to the changes in the market, the higher will be the value of beta. Beta is calculated by relating the returns on a security with the returns of the concerned market.

Value of beta indicates the risk of a security. Higher is the value of beta, more is the risk. The beta for the market is 1.00 and the other betas are viewed in relation to this value. The value of beta can be positive or negative. The positive value of beta indicates direct relationship between the returns of market and returns of security while the negative value of beta reflects an inverse relationship between the two.

Beta for a security is calculated with the help of following formula:

$$\beta = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

Where,

x = return on index
y = return on stock
n = number of data

Co-efficient of Determination

Coefficient of determination is the square of coefficient of correlation (r) between the return on stock and return on index. It indicates that to what extent the variance of stock returns is explained by the variance of index returns.

BRIEF REVIEW OF LITERATURE

Many researchers have conducted different studies related to risk associated with securities. Some important studies are as follows:

Francis (1986) in his study revealed that investors should notice the easily observable warnings of a firm's failure in order to avoid risk of losses due to bankruptcy of the firm. Preethi Singh (1986) in her study mentioned that risk is an integral part of any

investment decision and investor should understand and measure the risk attached to the investment while taking such decision. According to her most investors are "risk averse" and thus will try to take minimum risk. The additional risk will only be taken with the expectation of higher return.

Scott and Edward (1990) analyzed the important risks of owning shares and how these risks can be minimized. According to them financial risks can be minimized by investors by sticking to shares of companies that employ small amounts of debt. For reducing business risk investors should select shares of firms that are diversified in several unrelated industries and for ensuring some degree of liquidity investors should restrict investment in stocks having a history of adequate trading volume. Mandell (1992) revealed that the nature of market risk is global i.e. these risks affect the entire investment market. Market risk is the systemic risk that affects all securities simultaneously and it cannot be reduced through diversification. Stocks of all companies including the well-managed companies face market risk. He also mentioned that market risk is influenced by factors like economic conditions, political events, mass psychological factors, etc and these factors cannot be predicted accurately.

Carter Randal (1992) in his study emphasized that to be successful investors should never be pessimists. He insisted that patient investors have consistently made money in the equities market irrespective of the fact that there was major economic crisis almost every year. He emphasized that investing in the stock market should be an un-emotional endeavour and concluded that investors should own a stock only if they believe it would perform well. Jain (1992) gave specific tips for buying and selling of shares. He advised that investors should buy shares of fast growing sector of the economy and also should diversify their investment amongst number of growth companies operating in different sectors. For selling of shares he suggested that investor should sell the shares the moment company has or almost reached the peak of its growth.

Yasaswy (1993) mentioned in his study that 'turnaround stocks' have potential for big profits because of being underpriced but at the same time involves higher risk. So, investors should consider both the aspects and accordingly take the decision to invest in such stocks. Yasaswy J. N. (1993) evaluated the risks involved in different categories of stocks. Risk is lowest in defensive stocks followed by growth stocks where the risk is medium while the cyclical stocks involve higher risks. Accordingly the return also varies for these stocks. Cyclical stocks provide higher reward compared to the Growth stocks while the returns are relatively lower but steady for Defensive stocks.

Damodar (1993) suggested that 'Derivatives' especially 'futures' has become an indispensable tool to reduce the risk inherent in their portfolios for short term i.e.,

for a year or less. They have low cost and are easily available which makes them suitable for frequent and short term trading to manage risk, more effectively. Mitra (2000) observed that sharp volatility has become a feature of the capital market worldwide, resulting in frequent, sharp, downward corrections. In this scenario it is difficult for investors to have long term time horizon for investment.

Reo (2001) studied the various risks which the Indian corporate face and the corporate risk management policies to deal with them. He suggested that the corporates should focus on their primary business risks and hedge risks arising from commodity price movements. For corporate those have volatile cash flows and high operational risk it is more appropriate to take on less market risks. Un-hedged financial risk should be taken by corporate which is exposed to a relatively lower business risk.
Jaiswal (2001) in his study evaluated the implications of 'Equity Risk Premium'. He emphasized that investor look for a certain level of return for assuming the 'risk of equities volatile return' which can be measured through the equity risk premium. Equity risk premium is the sum of the dividend yield and earnings growth less current bond annual yield. He observed that the risk premium have drastically increased towards the end of the last decade. He argued that the equity investments are not for the weak hearted, as the equity holders cannot escape the impact of the movements in the capital market

OBJECTIVES OF STUDY

This study has been conducted keeping in mind the following objectives:

1. To calculate the β-coefficient of the stocks of prominent companies of IT & Banking Sector.
2. To find out the risk associated (expressed in terms of variance) with the stocks of these companies.
3. To find out the systematic risk and unsystematic risk attached associated the stock of these companies.
4. To find out the corresponding coefficients of determination i.e. to what extent the variability of stock returns is explained by the variability of stock returns.

RESEARCH METHODOLOGY

Sectors Selected for the Study: Information Technology and Banking

Stock Market Selected for the Study: National Stock Exchange (NSE)

Companies Selected for the Study

For the purpose of this study stocks of ten prominent companies of IT sector and ten prominent companies of banking sector listed at National Stock Exchange have been selected. The list of these companies is as follows:

IT Sector	*Banking Sector*
1. HCL Infosystems Ltd	1. Allahabad Bank
2. HCL Technologies Ltd.	2. Axis Bank
3. Infosys Technologies Ltd.	3. Canara Bank
4. KPIT Techonologies Ltd.	4. HDFC Bank
5. MindTree Ltd.	5. ICICI Bank
6. NIIT Technologies Ltd.	6. IDBI Bank
7. Polaris Financial Technologies Ltd.	7. IndusInd Bank
8. TCS Ltd.	8. Kotak Mahindra Bank
9. Tech Mahindra Ltd.	9. Punjab National Bank
10. Wipro Ltd.	10. State Bank of India

Stock Market Index Selected for the Study: CNX NIFTY 50

Time Frame of the Study

Data of two years i.e. from January 01, 2012 to December 31, 2013 have been used for the purpose of calculations and analysis.

Data and Its Source

The study demands secondary data. Weekly (Friday) closing prices of shares of selected companies and corresponding closing values of NIFTY have been collected from the website of National Stock Exchange from January 01, 2012 to December 31, 2013.

Method of Calculation

As mentioned above, for the purpose of this study weekly closing prices (Friday closing) of various stocks at NSE and weekly closing value of NIFTY (Friday closing) for a period of two years (January 01, 2012 to December 31, 2013) have been taken for calculating various required parameters i.e. beta factor, total risk, systematic risk, unsystematic risk, and coefficient of determination etc.

With the help of these weekly closing prices weekly returns were generated for various selected stocks with the help of following formula:

$$y_i = \frac{(P_{i+1} - P_i) * 100}{P_i}$$

Where,

y_i = Weekly return on stock
P_{i+1} = Price of stock on $(i+1)^{th}$ week
P_i = Price of stock on i^{th} week

Similarly, with the help of weekly closing values of NIFTY weekly returns were generated for NIFTY by using following formula:

$$x_i = \frac{(P_{i+1} - P_i) * 100}{P_i}$$

Where

x_i = Weekly return on NIFTY
P_{i+1} = Closing value of NIFTY on $(i+1)^{th}$ week
P_i = Closing value of NIFTY on i^{th} week

Following methodology was used for calculating the required parameters:

i. Beta Factor (β)

β values of selected stocks have been calculated with the help of following formula:

$$\beta = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$$

Where,

x = return on index
y = return on stock
n = number of data

Risk

Variance of weekly returns of each stock (σ_i^2) has been calculated to measure the total risk associated with the stocks.
Similarly, the variance of index (σ_I^2) has been calculated to measure the risk associated with the index.

Systematic Risk

Systematic risk of a given stock has been calculated with the help of following formula:

$$\text{Systematic Risk (SR)} = \beta_i^2 * \sigma_I^2$$

Where

βi = Beta factor of a particular (i^{th}) Stock

σ_I^2 = Variance of NIFTY

Unsystematic Risk

Unsystematic risk of a given stock has been calculated with the help of following formula:

$$\text{Unsystematic Risk (USR)} = \sigma_i^2 - \beta_i^{2*}\sigma_I^2$$

Where

σ_i^2 = Variance of a particular (i^{th}) Stock
βi = Beta factor of a particular (i^{th}) Stock
σ_I^2 = Variance of NIFTY

Coefficient of Determination

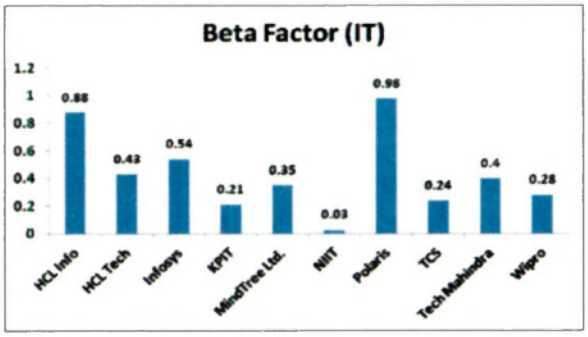
Coefficient of determination is nothing but square of coefficient of correlation (r). Therefore coefficient of determination for a stock has been calculated by squaring the coefficient of correlation between the weekly returns on that particular stock and the weekly returns on NIFTY.

FINDINGS AND OBVERSATIONS

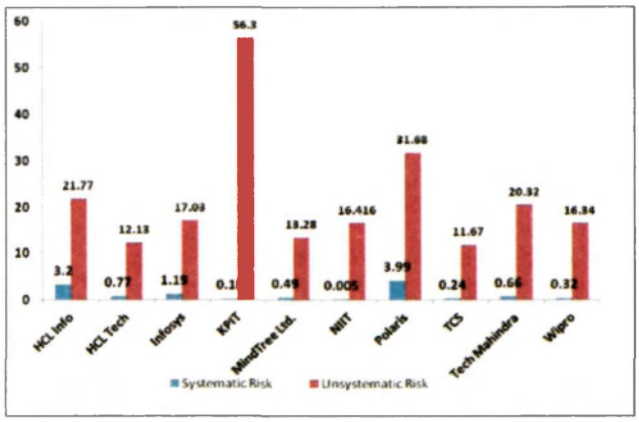
Table 1: Beta Factor, Coefficient of Determination, Systematic Risk, Unsystematic Risk and Total Risk of Stocks IT Companies

Company	Beta Factor	Coefficient of Determination	Systematic Risk	Unsystematic Risk	Total Risk (Variance %)
HCL Infosystems Ltd.	0.88	0.13	3.2	21.77	24.97
HCL Technologies Ltd.	0.43	0.06	0.77	12.13	12.9
Infosys Technologies Ltd.	0.54	0.065	1.19	17.03	18.22
KPIT Technologies Ltd.	0.21	0.003	0.18	56.3	56.48
MindTree Ltd.	0.35	0.036	0.49	13.28	13.77
NIIT Technologies Ltd.	0.03	0.0003	0.005	16.416	16.42
Polaris Financial Technologies Ltd.	0.98	0.11	3.99	31.68	35.67
TCS Ltd.	0.24	0.02	0.24	11.67	11.91
Tech Mahindra Ltd.	0.4	0.03	0.66	20.32	20.98
Wipro Ltd.	0.28	0.019	0.32	16.34	16.66

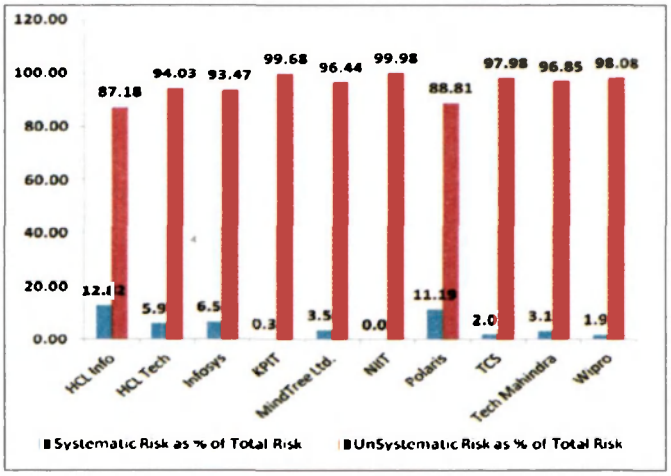
Charts 1.1: Beta Values of IT Stocks:



Charts 1.2: Systematic and Unsystematic Risk of IT Stocks:



Charts 1.3: Systematic and Unsystematic Risk of IT Stocks as Percentage of Total Risk:



It is clear from table 1 and the corresponding charts that in Information Technology sector all the stocks have β less than that of market (market or index's β is) 1. The stock of Polaris Technologies Ltd. has the highest beta value (0.98) followed by HCL Infosystems Ltd.(0.88) and Infosys Technologies Ltd. (0.54). The stock of NIIT Technologies Ltd. has the lowest beta value (0.03) followed by KPIT Technologies Ltd. (0.21) and TCS (0.24). Beta value for NIIT Technologies Ltd. is abnormally low and it indicates that fluctuations in its share prices have very little to do with fluctuations in the corresponding values of NIFTY.

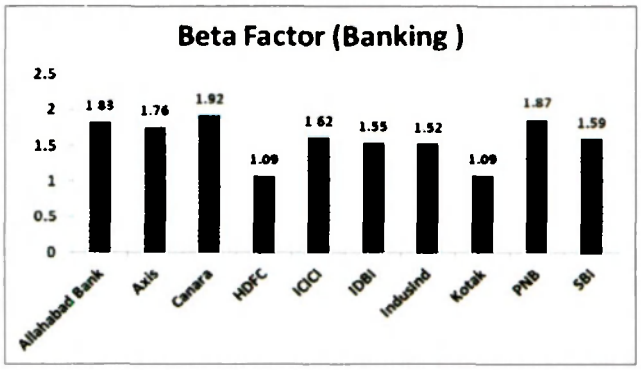
As far as total risk is concerned, share of KPIT Technologies Ltd. has maximum risk (variance- 56.48), followed by Polaris Financial Technologies Ltd. (variance- 35.67) and HCL Infosystems Ltd. (variance- 24.97). TCS Ltd. is the stock with the least risk (variance- 11.91) followed by HCL Technologies Ltd. (variance- 12.9) and MindTree Ltd. (variance- 13.77).

Stocks of all the selected IT companies have very less systematic risk as compared to their unsystematic risk. It is also visible in the values of their coefficients of determination. These values are very low. Share of NIIT Technologies Ltd. has the least value of coefficient of determination (0.0003). It is abnormally low and indicates that only 0.03% of its variance can be explained by the variance of NIFTY. Stock of HCL Infosystems Ltd. has the highest value of coefficient of determination (0.13) among all IT stocks, which is again quite low. It indicates that only 13% of variance of the returns of this stock can be explained by the variance of returns of NIFTY.

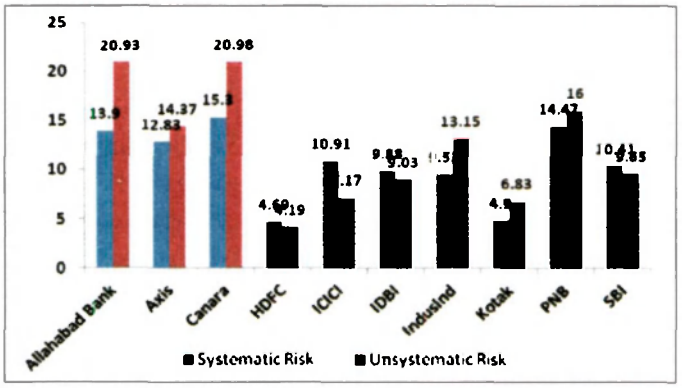
Table 2: Beta Factor, Coefficient of Determination, Systematic Risk, Unsystematic Risk and Total Risk of Stocks of Banks

Company	Beta Factor	Coefficient of Determination	Systematic Risk	Unsystematic Risk	Total Risk (Variance %)
Allahabad Bank	1.83	0.4	13.9	20.93	34.83
Axis Bank	1.76	0.47	12.83	14.37	27.2
Canara Bank	1.92	0.42	15.3	20.98	36.28
HDFC Bank	1.07	0.53	4.69	4.19	8.88
ICICI Bank	1.62	0.6	10.91	7.17	18.08
IDBI Bank	1.55	0.52	9.88	9.03	18.91
IndusInd Bank	1.52	0.42	9.53	13.15	22.68
Kotak Bank	1.09	0.42	4.9	6.83	11.73
Punjab National Bank	1.87	0.47	14.47	16	30.47
State Bank of India	1.59	0.52	10.41	9.65	20.06

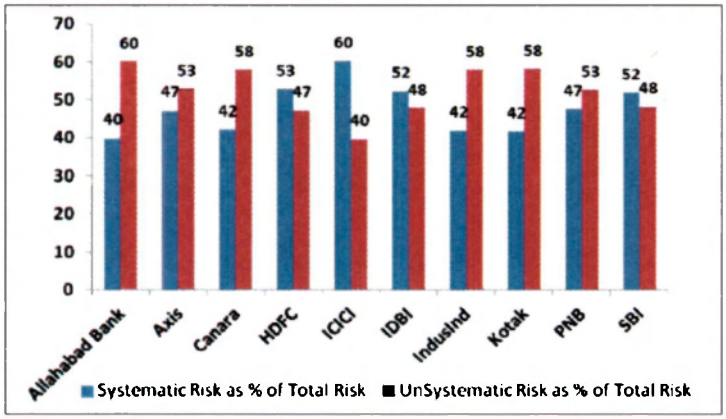
Charts 2.1: Beta Values of Banking Stocks:



Charts 2.2: Systematic and Unsystematic Risk of Banking Stocks:



Charts 2.3: Systematic and Unsystematic Risk of Banking Stocks as Percentage of Total Risk:



It is clear from table 2 and the corresponding charts that in banking sector all the stocks have β more than that of market (market or index's β is) 1. The stock of Canara Bank has the highest beta value (1.92) followed by Punjab National Bank (1.87) and Allahabad Bank (1.83). The stock of HDFC Bank has the lowest beta value (1.07) among all the selected banking stocks followed by Kotak Bank (1.09) and IndusInd Bank (1.52). Contrary to general belief, beta values of stocks of public sector banks are on an average higher than the beta values of stocks of private sector bank. Stock with lowest bet value (HDFC Bank) belongs to private sector while stock with highest beta value (Canara Bank) belongs to public sector.

As far as total risk is concerned, share of Canara Bank has maximum risk (variance- 36.28), followed by Allahabad Bank (variance- 34.83) and Punjab National Bank (variance- 30.47). HDFC Bank is the stock with the least risk (variance- 8.88) followed by Kotak Bank (variance- 11.73) and ICICI Bank (variance- 18.08). Total risk of all stocks of all the selected banks is quite evenly distributed between its two components i.e. systematic risk and unsystematic risk. It is also visible in the values of their coefficients of determination. These values are ranging from 0.4 to 0.6.

Share of ICICI Bank Ltd. has the highest value of coefficient of determination (0.6) followed by HDFC Bank (0.53) and IDBI Bank and State Bank of India (0.52 each)Share of NIIT Technologies Ltd. has the least value of coefficient of determination (0.0003). On the other hand stock of Allahabad Bank has the lowest coefficient of determination (0.40) followed by Canara Bank, IndusInd Bank and Kotak Bank (0.42 each). In general we can say that around half of variance of the returns banking stocks can be explained by the variance of returns on NIFTY.

CONCLUSION

The study reveals that stocks of IT companies have much less values of beta in comparison to the beta values of stocks of banks. Highest value of beta out of all the selected IT stocks is 0.98 which is less than the lowest value of beta (1.07) out of the selected banking stocks. Stocks of all the IT sector companies have very high proportion of unsystematic risk (more than 90% in the case of most of the stocks) in their total risk. It is also reflected in the extremely low value of their coefficients of determination. In other words we can say that majority of the fluctuations in the stocks of IT companies are not because of the fluctuations in market (index). On the other hand, the risk of banking shares is quite evenly distributed between systematic risk and unsystematic risk. It is also reflected in the values of their coefficients of determination which range from 0.4 to 0.6. Out of all the selected companies, the stock of HDFC Bank has least risk (variance- 8.88), while share of KPIT Technologies has maximum risk (56.48). Therefore we can conclude that, assuming other parameters as same, a rational investor would give first preference to HCL Infosystems in IT Sector and Allahabad Bank and HDFC Bank in the Banking Sector as he would adopt the simple equation of minimising risk and maximizing returns.

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