

Return and Risk Analysis of Indian Information Technology Sector Stocks

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The Indian capital market has been witnessing an unprecedented growth with the back of soaring Sensex and also the magnificent performance of India Inc. Stock market has become the most desirable investment option for both the Indian and foreign investors. Return and risk are inseparable in most of the investments, and it is important to determine how much risk is appropriate to attain the required rate of return from investing in any stock under consideration. In this paper, an attempt has been made to study the return and risk element of investing in the shares of Indian Information Technology Industry. The Information Technology industry stocks constitute around 14% of Nifty, and play a vital role in the movement of the market indices. India is now emerging as a major credible information technology outsourcing center creating huge opportunities as well as challenges to the investors. Although the stock markets are positive towards the IT stocks, they are also affected by the national and international events. The average daily returns of the six companies studied in this paper were lower than the daily mean return of the indices. The volatilities of the stock returns over the study period were much higher than that of the indices. The β values of the securities show that except CMC and Moser Baer, the other four securities were very aggressive. The unsystematic risks of the IT stocks were much higher than the systematic risk.

Return and risk are inseparable in most of the investments, and it is important to determine how much risk is appropriate to attain the required rate of return by investing in any stock that an investor might be considering. Even though every investment involves risk, it is higher in equity investments. Every investor in stock market puts his money in anticipation of returns, in terms of price appreciation and dividend with minimized risk. The risk is composed of systematic risk (market risk) and unsystematic risk (company-specific). Systematic risk includes currency, inflation, foreign investment, political and regulatory measures, interest rate, economic, and terrorist risks. Even bad weather risk can affect certain market sectors such as retailers, agriculture, forest products, insurance, airlines and tourism. Systematic risk can not be eliminated by diversification within a given market. It captures the reaction of individual stocks or portfolios to general market swings. In case of unsystematic risks, the factors are specific, unique and related to a particular industry or company.

In this paper, an attempt has been made to study the return and risk element of investing in the shares of Indian Information Technology Industry. The Information Technology (IT) industry stocks constitute around 14% of Nifty, and they play a vital role in the movement of the market indices. The IT stocks have a competitive edge over other stocks and have established their dominance in the market. The growth of IT sector has led to tremendous pay-offs in terms of wealth creation in the Indian stock market.

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A number of prestigious and profitable IT companies—Infosys Technologies, Wipro, Satyam Computers, CMC, Moser Baer and Polaris and so on have evoked the unfailing interest in the portfolios of the Indian and foreign investors. They have created a profound impact on the stock index movements and thereby have propelled the stock market to new heights. Now, India is emerging as a major and credible IT outsourcing center and has created huge opportunities as well as challenges to the investors. Even though the stock markets have been positive towards the IT stocks, they too are affected by the national and international events.

Data and Methodology

The daily open, close, high and low prices of NSE Nifty, Nifty Junior and their IT sector components Infosys Technologies, Wipro, Satyam Computers, CMC, Moser Baer and Polaris and NSE IT index for the period 1999-00 to 2006-07 have been used in the study. The daily open, high, low and close prices of stocks and indices were taken from the official website of National Stock Exchange of India Limited. The Company Polaris was listed only on November 24, 1999 and the prices were taken for the study only from that date.

Logarithmic returns were calculated using the following form:

$$r_t = 100 (\log p_t - \log p_{t-1})$$

where r_t is the return on the share price or the index price on day t , p_t is the closing value of the stock or the index on day t and p_{t-1} is the closing value of the stock or index on the previous day when the exchange was open.

The interday and intraday volatility were calculated for individual stocks and Nifty and Nifty Junior. Volatility is related to, but not exactly the same as risk. While risk is associated with undesirable outcome, volatility as a measure strictly for uncertainty could be due to positive outcome. The intraday volatility was measured by the widely used (Parkinson, 1980) Estimator:

$$= k \sqrt{1/n \sum \ln(H_t / L_t)^2}$$

where $k = 0.601$, H_t = Intraday high, and L_t = Intraday low

The intraday volatility was calculated by the standard deviation of daily opening prices or daily closing prices.

$$\sigma = \sqrt{(1/n - 1) \sum (r_t - r)^2}$$

where r_t = open to open return or close to close return and r = mean returns of open to open or close to close

The calculated volatilities were presented in percentages.

' β ' values of individual stocks were calculated every year for a period of eight years. ' β ' is essentially a comparison between the movement of individual stocks and the movement of the market as a whole.

The ' β ' coefficient was calculated by using the following formula:

$$R_i = \alpha + \beta_i R_m + e_i$$

where R_i = Estimated return on the stock,

α_i = Estimated return when the market return is zero,

β_i = Measure of stock's sensitivity to the market index, and

R_m = Return on the market index

Stocks can be classified as defensive, average and aggressive on the basis of their β value (Exhibit 1).

Exhibit 1: Classification of Stocks on the Basis of β Value		
Classification	β	Degree of Risk
Aggressive Stock	Greater than one	More risky than the market
Defensive Stock	Less than one	Less risky than the market
Average Stock	Exactly one	Equally risky as the market

The year-wise Systematic Risk (SR) and Unsystematic Risk (USR) were calculated for every stock for a period of eight years using variance of the security return and R^2 value;

$$SR = \sigma^2 \cdot R^2$$

$$USR = \sigma^2 (1 - R^2)$$

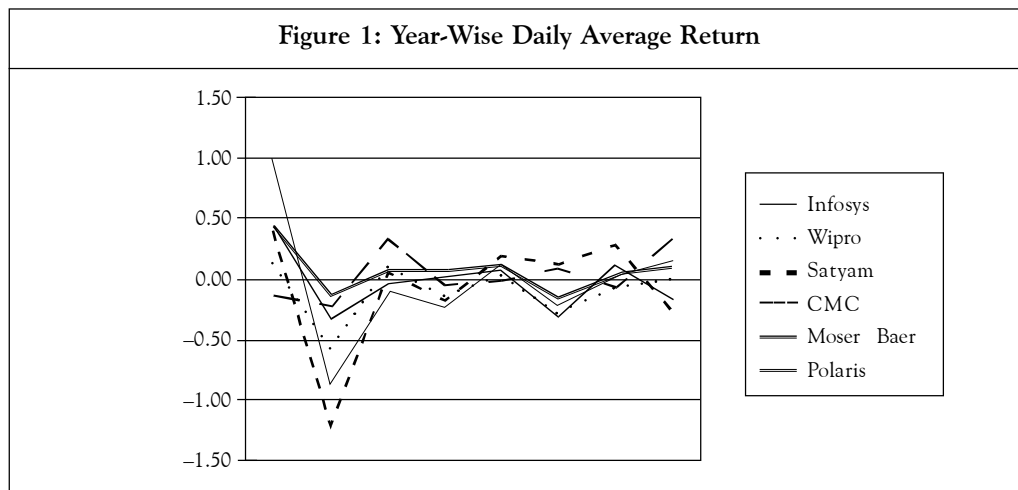
Results and Discussions

Returns

The observation of the data given in the Table 1 reveals that the negative returns in the NSE IT index was heavier than the Nifty and Nifty Junior. In the initial period the

Table 1: Average Daily Return									
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris	Nifty	Nifty Junior	NSE IT
1999-2000	0.44	0.13	0.40	-0.13	0.44	0.99	0.14	0.23	0.60
2000-01	-0.31	-0.57	-1.18	-0.22	-0.12	-0.81	-0.11	-0.33	-0.53
2001-02	-0.03	0.10	0.05	0.33	0.07	-0.08	-0.01	-0.01	0.02
2002-03	0.03	-0.13	-0.16	-0.03	0.07	-0.20	-0.06	-0.09	-0.09
2003-04	0.08	0.04	0.20	0.00	0.11	0.14	0.23	0.39	0.10
2004-05	-0.31	-0.28	0.13	0.09	-0.15	-0.19	0.05	0.09	-0.75
2005-06	0.11	-0.07	0.29	-0.06	0.04	0.03	0.20	0.16	0.16
2006-07	-0.16	0.00	-0.24	0.33	0.11	0.17	0.05	0.03	0.07
1999-2007	-0.02	-0.10	-0.06	0.04	0.05	-0.08	0.06	0.06	0.05

NSE IT index yielded much higher return than the other indices. However, in the course of time it has waned (Figure 1). This may be due to the rise in the old cyclical and Fast Moving Consumer Goods (FMCG) stocks. The manufacturing and construction companies in the Nifty and Nifty Junior also yielded large returns. The huge inflow of foreign institutional investment raised the Nifty and Nifty junior stocks to new heights.



In the year, 2000-01 all the selected IT stocks were in blue. The burst of the bubble in the Silicon Valley, and the slow down in the IT industry in the entire world hit the Indian IT stocks hard. The Y2K problem was also cited as a reason for this. In the year 2003-04 and 2004-05, four out of the selected six companies' returns were not positive. The yield was negative for Infosys Technologies in 2000-01, 2001-02 and 2004-05 and the decline was steeper in 2004-05. It is interesting to note that in the last fiscal year, while the return was negative for the renowned Infosys Technologies, Wipro and Satyam Computers, the CMC, Moser Baer and Polaris have seen a revival in their market performance. Altogether the daily average return of Nifty and Nifty Junior were positive (0.06) for the eight years but the NSE IT index had a negative return during the study period which proved that except for CMC and Moser Baer all the other four companies taken for the study had negative average daily return.

Risk Analysis

The intraday and interday volatility for each company were calculated for every year and also for the whole period of study. Since, the daily open, high and low prices of NSE IT index were available only from August 23, 2003 it is not considered for the risk analysis.

Intraday Volatility

The interplay of demand and supply forces changes minute by minute in the stock market. The changes dominate the decisions of the investors and the brokers. It is essential to know the volatility of the stock prices and indices within a day. The slow down in the IT industry in the year 2000-01 has caused the highest percentage of intraday volatility (Table 2) in the share prices of all the companies. The volatility of share prices in the year 2001-02 were also almost at par with the volatility in the previous year. Although the daily average returns of the companies were negative in the year 2002-03, the intraday volatility of the share prices

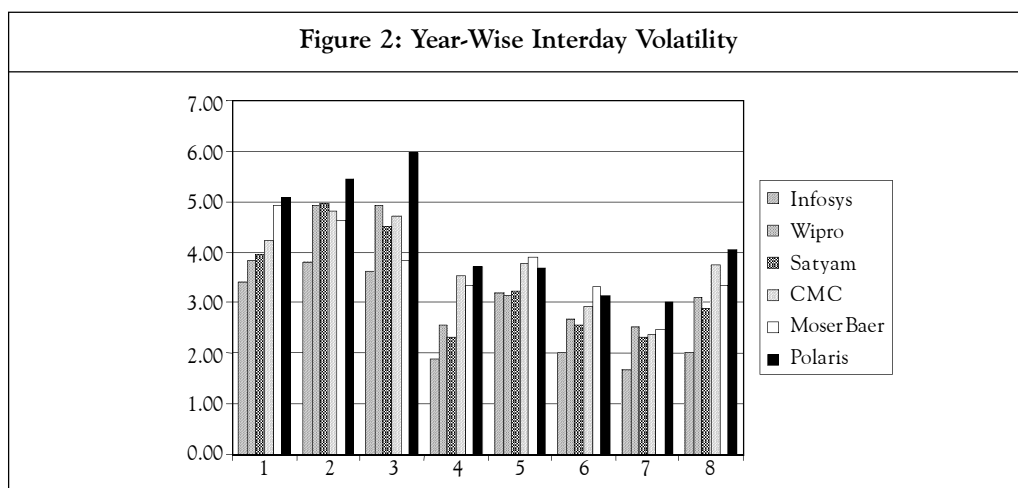
and indices were comparatively lower than that of the three previous years. With positive returns in the share prices, the financial year 2003-04 was a better year for the IT industry than the previous year. Meanwhile, the inconsistent daily returns had made all the IT stocks to experience more than 3% volatility in daily prices. After the not so good 2004-05, along with the magnificent performance of the over all market, the IT industry too performed well in the year 2005-06 which can be witnessed by the lowest intraday volatility in all the IT stocks and indices. The zigzag performance of the share prices in the year 2006-07 resulted in a higher intraday volatility than the previous year.

Table 2: Intraday Volatility								
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris	Nifty	Nifty Junior
1999-2000	3.40	3.82	3.95	4.22	4.93	5.09	1.83	2.29
2000-01	3.80	4.92	4.95	4.81	4.62	5.46	1.90	2.48
2001-02	3.61	4.93	4.51	4.71	3.83	5.96	1.37	1.46
2002-03	1.88	2.56	2.30	3.54	3.34	3.71	0.94	1.13
2003-04	3.20	3.14	3.24	3.78	3.89	3.67	1.39	1.38
2004-05	2.01	2.69	2.55	2.92	3.32	3.15	1.52	1.49
2005-06	1.66	2.52	2.32	2.37	2.48	3.01	1.02	1.02
2006-07	2.00	3.09	2.90	3.73	3.36	4.06	1.70	1.79
1999-2007	2.82	3.58	3.47	3.84	3.79	4.31	1.50	1.70

Interday Volatility

The variation in share price returns between the two trading days is called interday volatility. The interday volatility of the overall market and the open to open volatility of the Nifty and Nifty Junior were almost on par with the close to close volatility in all the eight years of the study period. However, the open to open volatility of the share prices slightly varied from the percentages of close to close volatility. In the years 1999-2000 and 2000-2001, both the opening and closing prices were extremely volatile, which can be evidenced from Table 3. In 2002-2003, the interday volatility of all the IT stocks except Moser Baer declined by almost 50% than the three previous years. The higher stock return in daily prices has led the IT stocks to experience higher volatility in 2003-04 than the previous year. In the financial year 2004-05, Infosys Technologies had the highest percentage volatility among the eight years. However, in the same year, Polaris had the lowest volatility in its interday open prices. The continuous existence of bull phase in the year 2005-06 caused almost all the IT sector components in Nifty and Nifty Junior to achieve the lowest volatility in both, open to open and close to close prices. The unpredictable trend in 2006-07 brought both bull and bear phases subsequently. The combination of bull and bear phases produced high volatility in the IT stocks and also in the overall market indices. The comparative analysis of the intraday and interday volatilities of stock returns of the selected companies with the volatilities of index returns, show that the volatilities of the stock returns have always been higher than the volatilities of indices (Figure 2).

Table 3: Interday Volatility									
Company Year		Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris	Nifty	Nifty Junior
1999-2000	O-O	6.12	10.91	7.32	6.66	7.01	7.65	2.05	2.69
	C-C	5.70	10.73	5.92	4.99	5.55	5.82	1.93	2.46
2000-01	O-O	4.91	6.51	11.19	6.48	5.52	8.00	1.98	2.84
	C-C	4.12	5.32	11.09	5.13	4.52	6.75	1.98	2.78
2001-02	O-O	4.14	6.41	6.10	5.86	4.17	7.70	1.45	1.68
	C-C	4.18	4.90	5.11	4.98	3.61	6.72	1.40	1.61
2002-03	O-O	2.60	2.99	3.08	3.88	4.42	4.41	1.00	1.27
	C-C	2.15	2.66	2.62	3.32	2.90	4.07	0.99	1.23
2003-04	O-O	4.08	3.61	3.91	4.70	6.52	4.33	1.45	1.71
	C-C	3.30	3.00	3.41	2.44	5.70	3.80	1.43	1.57
2004-05	O-O	9.01	7.01	2.57	3.33	3.62	3.17	1.65	1.84
	C-C	8.81	7.41	2.14	2.37	2.88	2.92	1.64	1.86
2005-06	O-O	1.85	5.31	2.51	2.73	2.58	3.70	1.04	1.18
	C-C	1.65	4.75	1.99	1.88	2.01	2.89	1.04	1.13
2006-07	O-O	4.54	3.76	5.53	4.44	3.41	4.05	1.80	2.23
	C-C	4.87	2.58	5.07	3.66	2.98	3.79	1.78	2.07
1999-2007	O-O	5.21	6.29	5.97	4.94	4.88	5.47	1.60	2.02
	C-C	4.84	5.79	5.45	3.79	3.97	4.73	1.57	1.93



The ' β ' values of Infosys Technologies, Wipro, and Satyam Computers were greater than one, over the years with one or two exceptions. The ' β ' values were greater than two for Wipro in 2000-01 and 2001-02, and greater than the beta value of other companies' from 2004-05 to 2006-07. While analyzing the ' β ' values for a period of eight

years, CMC had the lowest value (0.63), followed by Moser Baer (0.95) and the other four stocks which were very aggressive (Table 4).

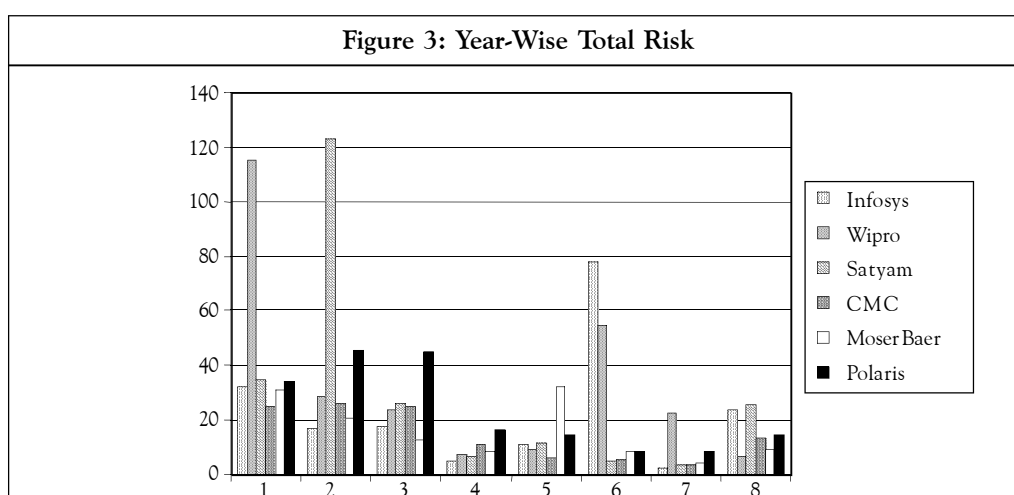
Table 4: Beta Coefficients						
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris
1999-2000	1.05	0.61	1.30	1.22	1.32	-0.48
2000-01	1.62	2.07	1.98	0.98	1.03	0.87
2001-02	2.14	2.27	2.70	0.50	1.24	2.27
2002-03	1.52	1.73	2.05	1.15	0.60	1.50
2003-04	1.28	1.47	1.66	0.55	0.71	1.47
2004-05	0.39	1.11	0.79	0.70	0.82	1.11
2005-06	1.04	1.50	1.24	0.44	0.69	1.36
2006-07	0.96	1.17	1.07	0.68	0.63	1.31
1999-2007	1.21	1.42	1.55	0.63	0.95	1.26

Due to the highest ' β ' value, the systematic risk for Satyam Computers was the highest (5.88) among the companies, and at the same time the lowest ' β ' value of CMC had led to the lowest systematic risk among the stocks during the study period (Table 5). The year-wise risk analysis shows that both Wipro and Satyam Computers had higher systematic and unsystematic risks than the other companies. Moser Baer (12.45) had the lowest unsystematic return in the study period followed by Polaris (Table 6). In case of systematic risk for the eight years of study, CMC had the lowest systematic risk followed by Moser Baer and Infosys Technologies. The highest unsystematic risk of Wipro has led to highest total risk, followed by Satyam Computers (Table 7 and Figure 3).

Table 5: Systematic Risk						
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris
1999-2000	3.96	0.92	6.17	8.93	10.43	0.85
2000-01	10.36	16.79	15.02	7.41	8.16	5.65
2001-02	9.03	10.09	14.29	0.57	3.94	13.17
2002-03	2.27	2.92	4.12	1.97	0.51	3.36
2003-04	3.31	4.40	5.63	0.73	1.10	5.34
2004-05	4.27	3.13	1.68	1.68	2.30	4.29
2005-06	1.15	2.34	1.63	0.24	0.59	2.36
2006-07	2.79	4.33	3.53	1.93	1.67	7.26
1999-2007	3.60	4.93	5.88	1.47	3.39	5.72

Table 6: Unsystematic Risk						
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris
1999-2000	28.53	114.22	28.67	15.95	20.42	33.04
2000-01	6.62	11.57	108.08	18.86	12.28	39.94
2001-02	8.44	13.93	11.79	24.15	9.11	31.94
2002-03	2.37	4.17	2.76	9.03	7.89	13.19
2003-04	7.68	4.63	6.03	5.22	31.31	9.13
2004-05	73.40	51.81	2.90	3.91	5.97	4.27
2005-06	1.56	20.19	2.31	3.29	3.47	5.98
2006-07	21.06	2.31	22.21	11.46	7.20	7.11
1999-2007	19.79	28.62	23.81	12.92	12.45	16.70

Table 7: Total Risk						
Company Year	Infosys Technologies	Wipro	Satyam Computers	CMC	Moser Baer	Polaris
1999-2000	32.49	115.14	34.84	24.88	30.85	33.89
2000-01	16.98	28.36	123.10	26.27	20.44	45.59
2001-02	17.47	24.02	26.08	24.72	13.05	45.11
2002-03	4.64	7.09	6.88	11.00	8.40	16.55
2003-04	10.99	9.03	11.66	5.95	32.41	14.47
2004-05	77.67	54.94	4.58	5.59	8.27	8.56
2005-06	2.71	22.53	3.94	3.53	4.06	8.34
2006-07	23.85	6.64	25.74	13.39	8.87	14.37
1999-2007	23.39	33.55	29.69	14.39	15.84	22.42



Conclusion

The daily average mean returns of the six companies studied in this paper were lower than the daily mean return of the indices. The volatilities of the stock returns over the study period were much higher than that of indices. The β values of the securities show that except CMC and Moser Baer, four other securities were very aggressive. Finally, the unsystematic risk of the IT stocks were much higher than the systematic risk. The IT stocks may not be a safe bet for a risk averse investor but for a risk taker the reward may be hefty in the short run, than in the long run. ♦

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