

SOUTH ASIAN JOURNAL OF MANAGEMENT RESEARCH

(SAJMR)

Volume 2 Number 2

July 2010

Contents

Editorial

- Foreign Direct Investment Inflow and Socio Economic
Development: A Review of Theoretical and Empirical Evidence** 65

Muhammad Tahir Mahmood, Muhammad Iqbal Saif and Abdul Rashid Malik

- Shareholder Wealth Gains in Corporate Merger Announcements in
India** 78

R. L. Hyderabad

- Attitudes of Green Consumers Towards Environment-Friendly
Apparels and Food Products: A Comparative Analysis Between
South Asia and UK** 92

Mohammed Shahedul Quader

- Emotional Intelligence – An Effective Intervention for Enhancing
Employee Well-Being** 116

R. Krishnaveni and R. Deepa

- An Analytical Study on Measurement of Risk and Volatility in Equity
Market** 127

B. Mohanty

Book Reviews

- Organizational Behaviour : Concepts Skills and Practices** 136

K. Pradeep Kumar

- Relevance Regained: From Top-Down Control to Bottom-Up
Empowerment** 138

Prof. V.P. Wadkar



**Chh. Shahu Institute of Business
Education and Research (SIBER)**

(An Autonomous Institute)

Kolhapur - 416 004, Maharashtra State, INDIA

SOUTH ASIAN JOURNAL OF MANAGEMENT RESEARCH

(SAJMR)

ISSN 0974-763X

(An International Peer Reviewed Research Journal)

Published by



Chh. Shahu Institute of Business Education & Research (SIBER)
University Road, Kolhapur - 416 004, Maharashtra, India

Contact: 91-231-2535706 / 07 Fax: 91-231-2535708 Website: www.siberindia.co.in, Email: sajmr@siberindia.co.in

■ Patron

Late Dr. A.D. Shinde

■ Editor

Dr. Babu Thomas
SIBER, Kolhapur, India

■ Editorial Board

Dr. Francisco J.L.S. Diniz
CETRAD, Portugal

Dr. R.V. Kulkarni
SIBER, Kolhapur, India

Dr. R.A. Shinde
SIBER, Kolhapur, India

Dr. Paul B. Carr
Regent University, USA

Dr. M.M. Ali
SIBER, Kolhapur, India

Dr. Lal Das
RSSW, Hyderabad, India

Dr. M. Nand Kumar
Goa University, Goa, India

Dr. Babu Zachariah
SIBER, Kolhapur, India

Dr. Gary Owens
CERAR, Australia

Dr. K. Pradeepkumar
SIBER, Kolhapur, India

Dr. R.M. Bhajracharya
Kathmandu University, Nepal

Dr. P.R. Puranik
NMU, Jalgaon, India

Prof. K.R.R. Mahanama
Colombo University, Sri Lanka

Dr. Yogesh B. Patil
SIBER, Kolhapur, India

Dr. Rajendra Naragundkar
IFIM, Bangalore, India

Dr. K.V.M. Varambally
Manipal Institute of Management, India

Dr. R.L. Hyderabad
Karnataka University, India

Dr. B.U. Dhandra
Gulbarga University, India

Editorial Note

Humor has a unique place in literature, particularly in English literature. Mark Twain, a great Humorist, stated that humor is a great thing, the saving thing, the minutes it crops up, all our irritations and resentments slip away and a sunny spirit it takes their place. Humor is the tendency of particular cognitive experience to provoke laughter. Humor is a broad term that refers to anything that people say or do that is perceived as funny and tends to make others laugh, as well as the mental processes that go into both creating and perceiving such as an unusual stimulus and also the affective response involved in the enjoyment of it stated by Rob H. Martain in his book Psychology of Humor.

The etymology of humor began as a Latin word humors means fluids or liquids. It has a medical connotation. Bharata Muni's Natya Shatra contains humor as one of the nine Navarasa in which it is known as 'Hasya'.

Whether we can use humor effectively in day today activities of the Management? The business cartoon caricatured by Scot Adams appeared in the name of Dilbert induces laughter at worker place. Some of his quotations are worth remembering. They are I can only please one person per day. Today is not your day. Tomorrow is not looking either good. Change is good but you go first. Another business cartoon worth remembering is Mario Mirands business cartoons.

Defiantly, humor has a place in practicing management. Humor has become a recognized asset in the work place. It facilitates communication, builds relationship, reduce stress and induces creativity.

Humor at a workplace is often associated with stress. Stressful employee cannot perform effectively. Humor is greatest stress reliever. Godfrey in the Journal of Women's Health Stated that, "Humor is potentially effective means of coping with the anger. Further he stated that, "One must be careful with its use". Sarcastic or hostile humor can incite additional anger.

A sense of humor is apparent among creative people. Research reflects that creativity and humor is associated with each other. Creative people display interest in humor and also capacity in producing original humor thought. Getzeles and Jackson stated that when ranking a series of desirable traits creative students placed a sense of humor second, whereas of the same intelligence but less creativity ranked it lowest among all the desirable traits. When both groups drew pictures of various themes, over half of the creative students made drawings judged as humorous, and their essay showed the same tendency.

Dr. Babu Thomas
Editor

An Analytical Study on Measurement of Risk and Volatility in Equity Market

B. Mohanty

Amity Global Business School (A Constituent of Amity University, Uttar Pradesh),
HIG-15, Jaydev Vihar, Bhubaneswar 751015, Orissa, INDIA
E-mail: birajitmohanty@yahoo.com

Abstract

This paper examines the relationship between the risk and volatility in the stock market. The main innovation is to construct a statistical technique to measure the risk associated with a particular stock and how volatile is the stock on that particular day. This measure is forward looking and does not rely critically on either realized equity returns or instrumental variables. The issues of volatility and risk have become increasingly important in recent times to financial practitioners, market participants, regulators, investors and researchers. Some of the main concerns, currently expressed are whether the financial system has become more volatile in recent times have financial regulation and innovation led to an increase in financial volatility or has it successfully permitted its redistribution away from risk averse operators to more risk neutral market participants; does the current wave of financial innovation lead to a complete set of financial markets, which will efficiently distribute risk; can financial managers most efficiently manage risk under current circumstances; what role the regulator goes out to play in this process? (Raju and Ghosh, 2004). This paper would be useful in debating all/some of these issues.

Key words: Close to Close Volatility, Inter-day Volatility, Intra-day Volatility, Open to Open Volatility, Risk and Volatility Analysis

1. Introduction

The equity market is a public market for the trading of company stock and derivatives at an agreed price; these are securities listed in a stock exchange as well as those which are only traded privately. The stocks are listed and traded in stock exchanges which are entities of a corporation or mutual organization specialized in the business of bringing buyers and sellers of the organization to a listing of stocks and securities.

The equity market volatility indicates the degree of changes in share prices during a particular period. A certain degree of fluctuation in the stock price indicates changing values across economic activities and it facilitates better resource allocation. Stock prices change everyday in the stock market. Buyers and sellers cause prices to change as they decide how valuable each stock is. Basically, share prices change because of the market forces of demand and supply. If more people want to buy a stock than sell it- the price moves up. Conversely, if more people want to sell a stock, there would be

more supply (sellers) than demand (buyers) - the price would start to fall. Volatility is a symptom of a highly liquid stock market. Pricing of securities depends on volatility of each asset. An increase in stock market volatility brings a large stock price change (advances or declines). Investors interpret a raise in stock market volatility as an increase in the risk of equity investment and consequently they shift their funds to less risky assets. It has an impact on business investment spending and economic growth through a number of channels. Changes in local or global economy and political environment influence the share price movements and show the state of stock market to the general public. The issues of return and volatility have become increasingly important in recent times to the Indian investors, regulators, brokers, policy makers, dealers and researchers with the increase in the FIIs investment. Hence, in this paper an attempt has been made to analyse the following objectives.

2. Objectives

The objectives of the present study were – (i) to study the risk and return of individual sample stocks; (ii) To study the inter-day volatility of sample stocks; (iii) to study the correlation between risk and volatility of sample stocks; and (iv) To study the volatility models and their measurement of sample stocks.

3. Review of Literature

Williams S. (1989) revealed that there exists a relationship of stock volatility with real and nominal microeconomic volatility, economic activities, financial leverages and stock trading activities using monthly data from 1857 to 1987. An important fact, previously noted by the investors, is that stock return variability was unusually high between 1929-1939 during the great depression, while aggregate leverage was significantly co-related with volatility. It explains a relatively small part of the fluctuation in stock aggregate and that stock volatility is difficult to explain using simple model of stock valuation.

Eagle and Ng (1993) indicated that information (in the form of news) plays an important role in market volatility. Market information can and does lead to fluctuations in the indices of the stock market. He also examined the method of measurement of the stock market volatility and also that of each company's stock.

Antoniou and Holmes (1995) studied about the future trading, information and spot price volatility. They took the evidence for the FTSE-100 stock index future contracts using GARCH model.

Peter Johnson (2008) examined the behaviour of stock market based on technical analysis to draw attention of retail investors. He also explained how an investor can become gainer by investing in a portfolio and the underlying risk attached to these portfolios.

Punithavathy and Queensly (2009) examined stock market volatility in the Indian stock market and were of the opinion that the bull phases volatilities were lower than bear phases.

Bali and Hovakimian (2009) investigated whether realized and implied volatilities of individual stock can predict the cross-sectional

variation in expected returns. Although the levels of volatilities from the physical and risk-neutral distributions cannot predict future returns, there is a significant relationship between volatility spreads and expected stock returns.

4. Methodology

The topic "*Measurement of Risk and Volatility in Equity Market*" was selected considering the growing requirements and necessities of the investors as well as for the company. Volatility associated with stock market is the major concern for the investor. Although the companies have calculated the volatility associated with their scrip's the retail investors do not know how to measure the volatility of any stock in the equity market. The volatility speaks of the range of fluctuation of price of stock of any company in an intra-day, monthly-basis, quarterly-basis, and also on annual-basis. It provides a guideline to the investors as to where to invest and how to invest. It also gives an idea to the investors which stock is profitable in intra-day trading. Keeping this in view, the topic has been selected to make the investor aware about the risk and volatility associated with a particular stock in the equity market.

Data were collected from BSE Sensex and NSE Nifty for calculating return and volatility. Sensex is a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. Due to its wide acceptance amongst the Indian investors, sensex is regarded as the pulse of the Indian stock market. Nifty is a well diversified 50 stock index accounting for 24 sectors of the economy. Hence these two indices were taken for the study. Thus, the number of sample units for this study is two.

There are 500 Fortune companies and many more incorporated companies operating in India. The study is conducted on the basis of data collected from five premier companies which are from five different sectors. These companies have been selected on the basis of their market capitalization and their influence over the equity market. Further, the trading of these stocks significantly influences the indices of both the stock exchanges. The companies selected under the study are; *Tata Steel*,

4.1. Sources of Data Collection

The study is conducted on the basis of secondary data, which is available on ICICI DIRECT.COM, BSEINDIA.COM, NSEINDIA.COM, MONEYCONTROL.COM, MONEYBHAI.COM, P.R. GROUP.

4.2. Study Design

The existing study is based on quantitative analysis of the secondary data with respect to risk and volatility. The 1st phase has been prepared after due consideration of the companies stock price and their responsiveness towards the stock. This study has been conducted on the basis of the closing price of the stock. But the 2nd phase is the quantitative part which employs different statistical tools to measure the volatility associated with the stock of different companies.

4.3. Statistical Methods

The statistical methods used in the study are Mean, Standard Deviation, Variance analysis, Correlation and Regression analysis.

4.3.1. Beta

Beta is calculated to know the volatility of the stock's return. Beta is the slope of the characteristics regression line. Beta describes the relationship between the stocks return and the index return. In this project, the study is conducted on the comparison of some stocks return with the NSE index return. The formula to calculate beta is:-

$$\beta = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2}$$

4.3.2. Alpha

ALPHA is the y-intercept of the characteristic regression line; the distance between the intersection and the horizontal axis. It indicates that the stocks return is independent of the market returns. A positive value of alpha is a healthy sign. Positive alpha values would yield profitable return. The formula to find out alpha (α):- $\alpha = \bar{Y} - \beta \bar{X}$, Where, \bar{Y} = Mean of the stocks \bar{X} = Mean of the index return, β = Beta.

4.4. Inter-day volatility

The variation in share price return between the two trading days is called inter-day volatility. Inter-day volatility is computed by close to close and open to open value of any index level on a daily basis. Standard deviation is used to calculate inter-day volatility.

4.4.1. Close to Close Volatility

For computing close to close volatility, the closing values of the Nifty and Sensex are taken. Close to close volatility (standard estimation volatility) is measured with the following formula.

$$\delta = \sqrt{\frac{1}{n-1} \sum (r_t - \bar{r})^2}$$

Where, n = the number of trading days, r_t = close to close return (in natural log), δ = average of the close to close return.

4.4.2. Open to Open Volatility

Open to open volatility is considered necessary for many market participants because opening prices of shares and the index value reflect any positive or negative information that arrives after the close of the market and before the start of the next day's trading. The following formula is used to calculate open to open volatility:

$$\delta = \sqrt{\frac{1}{n-1} \sum (r_t - \bar{r})^2}$$

Where, n = the number of trading days, r_t = open to open return (in natural log), δ = average of the close to close return. Inter-day volatility takes into account only close to close and open to open index value and it is measured by standard deviation of returns.

4.5. Intra-day volatility

The variation in share prices return within the trading day is called intra-day volatility. It indicates how the indices and shares behave in a particular day. Intra-day volatility is calculated with the help of Parkinson Model and Garman and Klass model.

4.6. Parkinson Model

High-low volatility is calculated with the following formula:

$$\delta = k \sqrt{\frac{1}{n} \sum \log \left(\frac{H_t}{L_t} \right)^2}$$

Where, δ = high-low volatility, $k = 0.601$, H_t
 = high price on the day, L_t
 = low price on the day, n = number of trading days

4.7. Garman and Klass Model

The Garman and Klass model is used to calculate the open-close volatility. The formula for Garman and Klass Model takes the following form.

$$\delta = \sqrt{\frac{1}{n} \sum [\log \left(\frac{H_t}{L_t} \right)]^2 - [2 \log(2) - 1] [\log \left(\frac{C_t}{O_t} \right)]^2}$$

Where, δ = Intra-day volatility for the period, H_t
 = High price on the day, L_t
 = Low price on the day, C_t

Table 1: Risk and Return of Individual Stock

Company (Stock)	Avg. Return	Std. Dev. (Risk)
Tata Steel	0.93	5.37
SBI	1.15	6.74
Unitech	0.42	2.80
M & M	0.75	3.90
Maruti	0.81	4.39

Table 1 reveals that the average return of the sample stocks of different companies ranged from 0.42 to 1.15. The Unitech Company gives the highest return among the five companies, followed by Tata Steel (0.93), M & M (0.75), SBI Bank (1.15) and the lowest return is given by Maruti. The riskiest company is SBI among the five Companies which bears a risk of 6.74% while other companys' risk varies from 5.37% (Tata Steel) to 2.80 (Unitech) which gives the lowest risk in comparison to the other stocks.

A probe into the data reveals that the daily average return of *M&M* stock was 1.497 and 2.9317 in Nifty and Sensex, respectively (Table 2). The stock showed a better performance in Sensex than Nifty in the month of April. In the month of May, there was the same level of performance in both the indices. The maximum stock price was 678.15 and 678.65 in Nifty and Sensex respectively. But in the month of June, the stock performance was neither good nor bad; the return was 0.204 and 0.168 percent respectively in the indices.

= Closing price on the day, O_t

= Opening price on the day, n = Number of trading days.

5. Data analysis

Data Analysis has been carried out on the basis of data collected from BSE Sensex and NSE Nifty, for calculating the return and volatility. Sensex is a basket of 30 constituent stocks representing a sample of large, liquid and representative companies. Due to its wide acceptance amongst the Indian investors, Sensex is regarded as the pulse of the Indian stock market. Nifty is a well diversified 50 stock index accounting for 24 sectors of the economy. Hence these two indices were taken for the study. Data were taken from 1st April to 30th June of 2009.

The average return of *Unitech* was positive throughout the first quarter. The company's return was high in May at 3.279 per cent. But the company's daily average return increased from 1.667 to 3.27 in Nifty index from April to May whereas there was no substantial increase in return in Sensex index at 3.1667 to 3.277. In April, there was a difference of 17.2 between the maximum and minimum stock price of the Company. But there was a huge difference of 31.65 in the stock in the month of May and average return of 3.27745.

The daily average return of the *Maruti* stock was positive in these three months. The company showed a good performance in the month of May. The company's maximum and minimum stock price in April was 855.15, 754.15 and 851.55, 754.25 in Nifty and Sensex respectively. The daily average return of the company of Nifty and Sensex in April was 0.86 and 1.2017 respectively. That increased to 1.236 and 1.204 in the month of May. But in the month of June the stock faced a downward trend in

Table 2: Month-wise Daily-Basis Av. Return of Company Stocks in Nifty and Sensex (1st April to 30th June)

Company (Stock)	Month (2009)	Name of the indices	Minimum Index level	Maximum Index level	Daily basis average return
M & M	April	Nifty	487.95	394.95	1.497
		Sensex	486.25	394.64	2.9317
	May	Nifty	678.15	493.4	1.781
		Sensex	678.65	494.25	1.7837
	June	Nifty	811.4	689.1	0.204
		Sensex	815.3	689.75	0.1684
Unitech	April	Nifty	53.95	36.75	1.667
		Sensex	53.75	36.8	3.1667
	May	Nifty	79.6	48.05	3.279
		Sensex	79.75	48.1	3.2774
	June	Nifty	97.8	76.1	0.176
		Sensex	97.8	76.4	2.9794
Maruti	April	Nifty	855.15	754.15	0.86
		Sensex	851.55	754.25	1.2017
	May	Nifty	1041.85	808.55	1.236
		Sensex	1043.4	809.2	1.2049
	June	Nifty	1109.35	1025.8	0.201
		Sensex	1109.45	1026.9	0.2080
SBI	April	Nifty	1311.15	1077.45	1.126
		Sensex	1307.8	1073.95	1.082
	May	Nifty	1868.85	1258.2	2.0648
		Sensex	1869.1	1260.7	1.722
	June	Nifty	1906.9	1637.6	-0.276
		Sensex	1909.5	1637	-0.311
Tata Steel	April	Nifty	293	209.8	1.005
		Sensex	293.35	209.85	0.89
	May	Nifty	405.35	260.2	2.864
		Sensex	406.3	263	2.35
	June	Nifty	488.1	388.3	-0.05
		Sensex	487.9	387.9	-0.41

comparison to the month of May. There was 84.9% decrease in the daily average return of the company between May and June.

The daily average return of *SBI* in Nifty and Sensex in April was 1.126 and 1.082 respectively. There was 83.37% increase in daily average return in Nifty in comparison to Sensex's increment of 59.25% in the month of May. But in the month of June, there was a negative return in both the indices. As regards daily average return, it was -0.276% in Nifty and -0.311% in Sensex.

Finally, the daily average return of *Tata Steel* also showed a positive return in the first two months of first quarter of the financial year. The company's daily average return was 1.005 and 0.89 percent in Nifty and Sensex respectively. The daily return increased from 1.005 to 2.864 as 184% increment in the return of the company in May. But in the month of June the Nifty and Sensex return was -0.05 and -0.41 respectively. The stock price decreased 102% in June.

5.1. Inter-day volatility

Inter-day volatility is measured by the calculation of return deviated from open to open and close to close return and volatility. TATA Steel, in the month of April, revealed a high volatility. In this month, the close to close

volatility was 5.5876 and 5.7656 in Nifty and Sensex respectively. The inter-day volatility increased by 20% in both the indices to 6.1156 and 6.0550 respectively. But there was a sharp decline in close to close volatility in June (Table 3).

Table 3: Inter-day volatility of companies

Month (2009)	Company	Close – Close		Open-Open	
		Nifty	Sensex	Nifty	Sensex
APRIL	Tata Steel	5.5876	5.7656	5.9201	5.8970
	SBI	3.5101	3.5554	5.0835	3.6310
	Unitech	8.0621	8.0373	7.0150	8.3465
	M & M	3.9736	4.5093	3.9559	3.5327
	Maruti	2.6775	2.7225	3.6341	3.3036
MAY	Tata Steel	6.1156	6.0550	6.6169	5.6262
	SBI	5.8084	5.8034	5.0835	5.4589
	Unitech	7.9374	7.8336	7.8652	8.0236
	M & M	6.6598	5.7099	5.4464	4.1741
	Maruti	3.7938	4.9350	3.4779	4.1782
JUNE	Tata Steel	4.9429	4.8458	6.6651	6.1029
	SBI	2.6816	2.6659	4.3156	2.9343
	Unitech	6.0094	6.5188	9.0475	6.6882
	M & M	3.3733	3.3196	3.9735	4.7146
	Maruti	2.0170	6.0387	2.5423	6.9068

5.1.1. SBI Bank

SBI- India's No.1 Bank in the public sector showed a moderate volatility throughout the first quarter of this year. The close to close volatility in April was 3.5101 and 3.5554 in Nifty and Sensex respectively. In the month of May, it increased by 65% and 63% in Nifty and Sensex respectively. But in the month of June, the SBI faced sharp decline in close to close volatility.

Open to open volatility for SBI in April in Nifty and Sensex was 5.0835 and 3.6310 respectively. Further, it was observed that there was an increase of volatility from 3.6310 to 5.4589 in Sensex whereas there was no increment of volatility in the Nifty. But in June, there was a sharp fall in volatility. In June, open-to open volatility was 4.3156 and 2.9343 in Nifty and Sensex respectively.

5.1.2. Unitech

Unitech, the major infrastructure company in India showed a high volatility and high risk throughout the first quarter. The close to close volatility in Nifty and Sensex in April was 8.0621 and 8.0373 respectively. Due to the high volatility, there was an involvement of high risk and high return. In the month of May, the close to close volatility decreased to 7.9374 and 7.8336 in both the indices. Again, the volatility reduced to 6.0094 and 6.5188 in Nifty and Sensex, respectively.

The open to open volatility fluctuated sharply throughout these three months. The open-open volatility in Nifty and Sensex in April was 7.0150 and 8.3465, respectively. In this case, the Sensex showed more volatility than the Nifty. The volatility increased to 7.8652 in Nifty but slightly reduced from 8.3465 to 8.0236 in Sensex. Again in June, this

volatility increased from 7.8652 to 9.0475 in Nifty but in Sensex this volatility reduced sharply from 8.0236 to 6.6882.

5.1.3. M&M

The close to close volatility of M&M Company in Nifty and Sensex in April was 3.9736 and 4.5093 respectively. This is the moderate volatility. It would give moderate return as there was moderate risk. In the month of May, the volatility peaked by 67% and 26% both in Nifty and Sensex respectively. This volatility however decreased by 49% and 41% in Nifty and Sensex, respectively.

The open to open volatility in Sensex and Nifty ranged from 3.9559 to 5.4464 and 3.5327 to 4.7146 respectively. In April, it was 3.9559 and 3.5327 in Nifty and Sensex respectively. It was a moderate volatility in that month. The open –open volatility increased to 4.1741 in Sensex whereas it sharply increased to 5.4464 in Nifty. But in both the indices, there was the sharpest fall in June to 3.9735 and 4.7146 in respective indices.

5.1.4. Maruti

The close to close volatility of Maruti Company in April was 2.6775 and 2.7225 in Nifty and Sensex respectively. This volatility increased to

3.7938 in Nifty and 100% increase in Sensex to 4.9530 in May. Again in June, in Nifty the close to close volatility decreased by 46% whereas it increased by 22% in BSE Sensex.

The open to open volatility of Maruti Company in April was 3.6341 and 3.3036 in Nifty and Sensex. There was no increment in the month of May in this volatility. But in June, open to open volatility of Maruti Company in the Nifty index decreased sharply by 26% to 2.5423. In Sensex, there was only 3.3036 open to open volatility in the month of April. Then it increased by 26% to 4.1782 in May. In June, the stock showed the volatility in the upward direction. The volatility in the month of June was 6.9068 that was the highest volatility of Maruti Company in the first quarter.

5.2. Correlation between risk and return

The correlation between the market index and share return of each company are positively correlated that varied slightly from 0.663 to 0.785 (Table 4). The beta value indicates the volatility of the stock. The volatility ranges from 0.66 to 1.59. The most volatile company is Unitech and the least volume is Maruti Company. The second most volatile company is M & M i.e. 1.22% and the third one is 1.03%.

Table 4: Correlation of risk and return of sample stocks

Company (Stock)	R	β	α
Tata Steel	0.678298	1.03	0.43
SBI	0.663304	1.59	0.84
Unitech	0.655474	0.66	0.15
M & M	0.785821	1.09	0.7
Maruti	0.764486	1.22	0.25

5.3. Volatility models and their measurement

Intra-day volatility was developed by two economists Parkinson and Garman & Klass. Parkinson developed the high-low volatility where as Garman & Klass developed the open-close volatility in the equity market.

The above table (Table 5) depicts the high – low volatility and open-close volatility of the major 5 companies i.e. Tata Steel, Wipro, M&M, Unitech ad Maruti Company.

5.3.1. Tata Steel

The high-low volatility of Tata Steel in Nifty and Sensex was 0.0436 and 0.2681. It was higher in Sensex than in Nifty. It was observed that the Sensex intra-day volatility was more than that of other indices of our country, which always happens. In May, this volatility decreased in Nifty from 0.0436 to 0.0306 whereas in Sensex it increased to 0.3060. But, in the month of June, Nifty increased to 0.0364 whereas in Sensex, it fell to 0.2425.

Table 5: Models of Volatility Measurement of Sample Stocks (Index-wise)

Month	Company	Parkinson High - Low		Garman & Klass Open-Close	
		Nifty	Sensex	Nifty	Sensex
April	Tata Steel	0.0436	0.2681	0.1866	0.7568
	SBI	0.0296	0.2283	0.1639	0.7510
	Unitech	0.0670	0.3268	0.1866	0.8019
	M & M	0.0365	0.2487	0.1541	0.7596
	Maruti	0.0285	0.0.2143	0.1568	0.7456
May	Tata Steel	0.0306	0.3060	0.1915	0.7997
	SBI	0.0312	0.2232	0.1706	0.7497
	Unitech	0.0494	0.2816	0.2104	0.7757
	M & M	0.0441	0.2421	0.1829	0.7574
	Maruti	0.0265	0.2241	0.1564	0.7410
June	Tata Steel	0.0364	0.2425	0.1680	0.7684
	SBI	0.0239	0.1932	0.1290	0.7382
	Unitech	0.0468	0.2774	0.2408	0.7734
	M & M	0.0321	0.2233	0.1847	0.7489
	Maruti	0.022	0.1894	0.1469	0.7371

The open to open volatility of Tata Steel in April was 0.1866 and 0.7568 in Nifty and Sensex respectively. The Garman and Klass volatility in May increased in both the indices. In May, the volatility was 0.1915 which increased by 2.62% in Nifty and in Sensex, it increased by 5.6%. But in June, the Tata Steel open to open volatility was 0.168 and 0.7684 in Nifty and Sensex respectively.

SBI's high-low volatility in Nifty and Sensex was 0.0296 and 0.2283 in April respectively. It was also observed that there was an increment on close to close volatility in Nifty and decrement in Sensex as well. In June, the high-low volatility was 0.0239 and 0.1932 in Nifty and Sensex respectively.

5.3.2. SBI Bank

The open-close volatility of SBI Bank in April was 0.1639 and 0.7510 in Nifty and Sensex respectively. In May, it increased by 4% in Nifty whereas in Sensex it decreased by 9%. Again in June, the open to close volatility decreased sharply in both the indices from 0.1706 to 0.1290 and 0.7497 to 0.7382 respectively.

5.3.3. Unitech

Parkinson's high – low volatility for Unitech Company in April was 0.0670 and 0.3268 in

Nifty and Sensex respectively. In May, it decreased in both the indices. But the high-low volatility in the month of June was 0.0468 in Nifty and 0.2774 in Sensex.

Garman and Klass open-close volatility for the month of April was 0.1866 and 0.8019 in Nifty and Sensex respectively. In May, the open to close volatility was 0.21004 and 0.7757 in both the indices. But in the month of June the volatility increased in Nifty by 14% and in Sensex by 0.29%.

5.3.4. M&M Company

The high-low volatility of M & M Company in April was 0.0365, which was the second lowest among five sample stocks of the companies under the study but in Sensex it was third lowest after SBI and Maruti at 0.2487. In May, this volatility increased to 0.0441 from 0.0365 and 0.2421 from 0.2487 in Nifty and Sensex respectively. Comparing May and June results for M & M Company the volatility was higher in May. In June, the close to open volatility was 0.0321 which decreased by 27% in Nifty; and in Sensex it decreased from 0.2421 to 0.223.

But in Garman & Klass model, the open to close model for M & M Company in April was 0.1541 and 0.7596 in Nifty and Sensex respectively. The open to close volatility in May

increased to 0.1829 and 0.7574. In June M & M Company's intra-day volatility increased slightly at 0.1847 and decreased to 0.7489.

5.3.5. Maruti

The high-low volatility for Maruti Company in April in Nifty and Sensex was 0.0285 and 0.2143 respectively. In the month of May, the high-low volatility decreased to 0.0265 in Nifty and in Sensex it increased to 0.2241. But in the same period the Parkinson's open-close volatility was 0.22 and 0.1894 in Nifty and Sensex respectively.

6. Conclusion and recommendation

The prospects for investment in capital markets in India seem to be good. The balance sheets of banks, corporates and financial institutions look strong. Despite world-wide recession, most of the companies in India are witnessing a positive trend. Although some of the companies did suffer in 2009, first quarter results indicate about the recovery from recession to some extent which was reflected in our stock market. India's stock market is a big market in the world in trading and also in capital adequacy. The above discussed five companies are from different sectors. These are from automobile, infrastructure, finance, steel and banking sectors. In the recent scenario, the infrastructure, bank, steel and automobile sectors suffered a lot. The stock market now is progressing with little fluctuation because of profit booking and short selling by small and retail investors.

From the above study, it is concluded that

the highest volatile company gives more returns to the investors in an intra-day trading and they are riskier than the other companies'. The investors who trade in intra-day basis will get more returns than those who are inter-day traders. The inter-day traders bear lesser risk than the intra-day traders. Therefore, the inter-day trader gets less return than the intra-day trader.

7. Implications for future research

The present study lays down the foundation for carrying out further research in the field of risk and volatility analysis in the stock market. Although the literature on stock market volatility is voluminous, some general conclusions on common stock risk have emerged from this research. The overall stock market volatility has fluctuated over the time with no discernible trend and some authors have argued that volatility is higher during the bear markets. In this study, inter-day and intra-day volatility are calculated which provides a basis for investors and researchers to carry forward their research work in a more meaningful manner. The approach and the analytical framework of the study can provide researchers an insight into the research design and data analysis. The findings and recommendations of this study can also be used by research scholars to redesign their framework for further analysis. One of the major drawbacks of this study is the small sample size. A larger sample size could have produced better results. The study does not attempt to generalize the factors under consideration and is kept for open discussion.

References

- Antoniou, A. and Holmes, P. (1995) Future trading, information and spot price volatility – Evidence for the FTSE-100 stock index futures contract using GARCH, *Journal of Banking and Finance*, 19:117-129.
- Bali, Turan G. and Hovakimian, Armen (2009) Volatility Spreads and Expected Stock Returns, *Management Science*, 55(11):1797-1812.
- Engle, R. and Ng, V. (1993) Measuring and testing the impact of news on volatility, *Journal of Finance*, 48:1749-1778.
- Peter Johnson (2008) Behaviour of stock market based on technical analysis, www.articlesbase.com.
- Punithavathy, P. and Queensly, J. (2009) Stock Market Volatility in Indian Stock Exchanges, *Socio-Economic Voices*, May-June, www.indiastat.com.
- Raju, M.T. and Ghosh, Anirban (2004) Stock Market Volatility - An International Comparison. SEBI, Working Paper Series No. 8.
- Williams S. (1989) Why does stock market change over time? *Journal of Finance*, 45(5).