Impact Of Information Technology Failure on Stock Exchange

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Introduction

Event study Methodology is one of the important tool used to access the impact of Information Technology failure on listed companies. It has been used to access the events such as corporate events – (Dividend, Bonus, Merger and acquisition etc), Failure Events and surprising news on the companies. For example, announcement of sudden system crash during trading hours creates "Lost Out" situation amongst the investor. Where the money has gone, where the order lost etc questions arises to investor mind and makes investor panic. Event study helps to understand the exact impact of failure on the companies listed on the stock exchange. In turn, investor also gets idea on how this failure impacted on their investment to that company.

As per definition of Event study methodology, researcher needs to calculate the abnormal return with respect to expected return. The basic thought is to discover the abnormal return attributable to the event has been studied by adjusting for the return that arise from the price/Volume variation of the market as a whole.

Event Study Methodology

Event study methodology has following standard steps to arrive at the result-

1. Identify the event

Researcher needs to identify the date of failure of Information Technology event from public announcement.

2. Identify the impacted entities

Researcher needs to indentify how many entities are impacted because of failure event and which entities to be considered for analysis.

3. Collect data

Collect Price and Volume data for the finalized entities which will be going to analyze.

4. Identify the estimation window

Estimation window is the period prior to event window period. Generally this period has been considered for more than 100 days to get the correct normal return.

5. Identify the event window

Event window is the period within which impact of event has been calculated. The event window generally few days prior and few days after the event has been considered.

6. Computation of Return

Price/ Volume return needs to calculate.

7. Computation of normal return

For the estimation window period researcher needs to calculate the normal return.

8. Computation of abnormal Return

For the event window period researcher needs to calculate the abnormal return.

9. Average abnormal return

Calculate the average of abnormal return.

10. Cumulative abnormal return

Calculate the cumulative abnormal return.

11. Hypothesis testing

Test the average abnormal return and cumulative abnormal return to test the significance of hypothesis.

Research Objective

1. To find out the negative impact on stock exchange Index price because of failure of Information technology.
2. To find out the negative impact on investors sentiments because of failure of Information technology.
3. To study Market integrated risk for stock exchanges.

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Literature Review

In past, some researchers had done research on relation between Information Technology and Stock Market/Exchange. The research published by Bart Hobijn & Boyan Jovanovic(2000) in National Bureau Of Economic Research states that Information technology revolution destroy old firms and entry of new firms took longer time hence stock exchanges had been declined. Hossein, Fatemeh and Seyed(2013) said Information technology development had direct impact on the SMD. Lun(2005) concluded that development in information technology may leads to increase in business productivity and long run business process improvements. Nagassam & Gani(2003) model confirms that personal computers and internet, there two components of Information technology, had strong positive effect on the stock market development and its market capitalization. Bahrami(2008) also expressed her findings as stock market development had positive impact because of Information technology. She also says that Information technology is strong/positive indicator for economic growth. Ashraf and Joarder (2009) states that internet, the variable of information technology, has positive impact on volume and volatility of Dhaka stock market. Bharadwaj (2007), his study analyzed how information technology firms get penalized in the stock market when they observe the unforeseen information technological failure. From the above researches it proves that there is positive impact of information technology on stock market. However no one has researched on impact of information technology failure on stock market. My research on "An analytical study and financial implication of stock market due to information technology failure" will try to full fill that gap.

Research Methodology

In this paper, researcher has studied the Bombay Stock Exchange failure event happed on 3-Jul-2014. 10 companies listed under Bombay stock exchange Index has been considered for analysis. The period considered for study from Jan-2014 to Oct-2014. The event window considered for study is 11 days i.e. -5 days to +5 days relative to failure event happened date, which are listed on Bombay stock exchange. Price and Volume data considered is daily basis throughout the event window and estimation window period. Index companies may get change based on stock exchange polices. For this study, the companies listed under SENSEX index on event date i.e. 3-Jul-2014 have been considered.

Data Collection and Analysis

Event study parameter for the study are listed below-

Event Details	**Data Considered**
Event	Bombay stock exchange halts for 3 hrs because of software glitch
Event Date	3-Jul-2014
Event Window	26-Jun-2014 to 10-Jul-2014
Estimation Window	27-Jan-2014 to 24-Jun-2014
Abnormal Return	Bombay stock exchange index details
Expected return	Nation stock exchange index details

Analysis Of Abnormal Return

Using trade data on stock market, event study methodology determine the impact of exact event in the market. Price and volume of the stock has direct impact on the failure event. Thus the time period considered for impact measure is shorter period. For this study researcher considered 11 days event window.

[1]Calculation of Abnormal retrun

The individual abnormal returns are calculated using formula –

$ARit = Rit - E(Rit)$

Where,

ARit – Abnormal return of company for the period of t

Rit – Actual return of company for the period of t

E(Rit) – Expected return of company for the period of t

Abnormal returns are compared with respect to expected return of the company. Expected return are using formula –

E(Rit) = ALPHAi +BETAi*Rmt

Where,

E(Rit) – The Expected return of company for the period of t

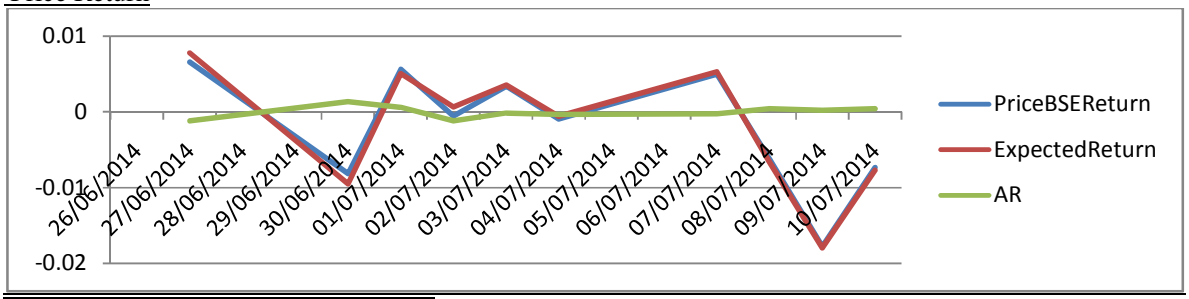
ALPHA – Intercept term

BETA – Regression constant

Rmt – Market return for the period of time t

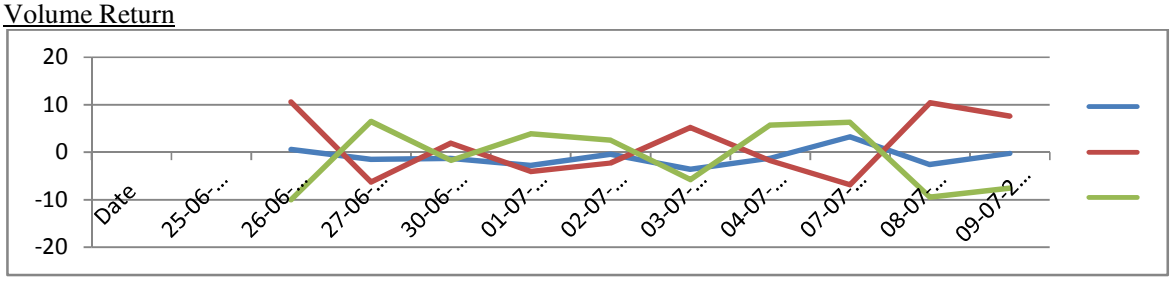
Axis Bank

Price Return



Average AR	-0.0002
Average CAR	0.020672

Volume Return



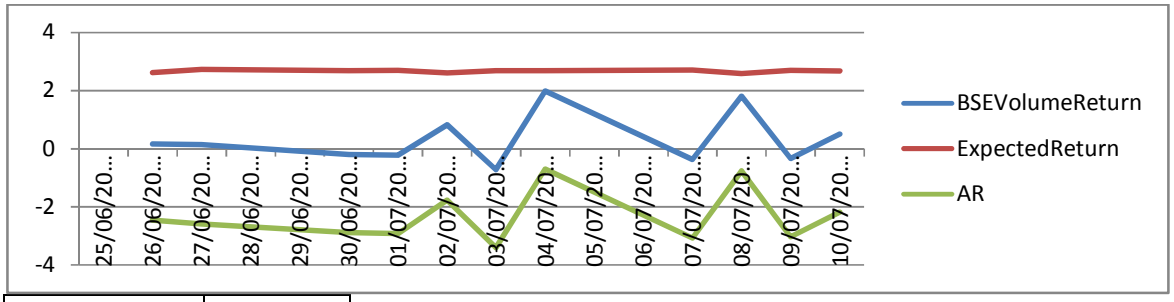
Average AR	-0.9200
Average CAR	2.39582

Bharat Heavy Electricals

Price Return

AverageAR	-0.00022
AverageCAR	-0.00025

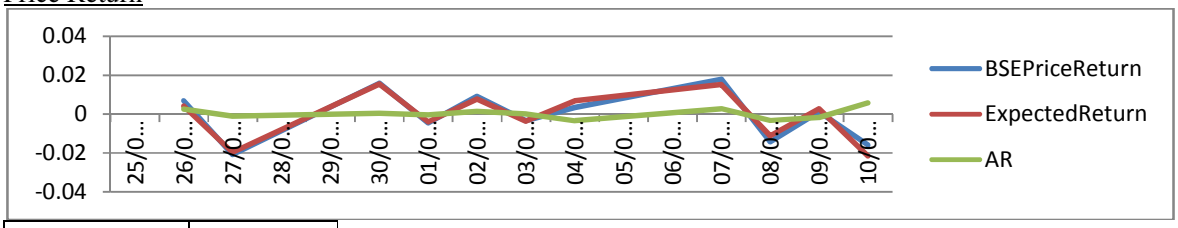
Volume Return



AverageAR	-2.34436
AverageCAR	-14.6722

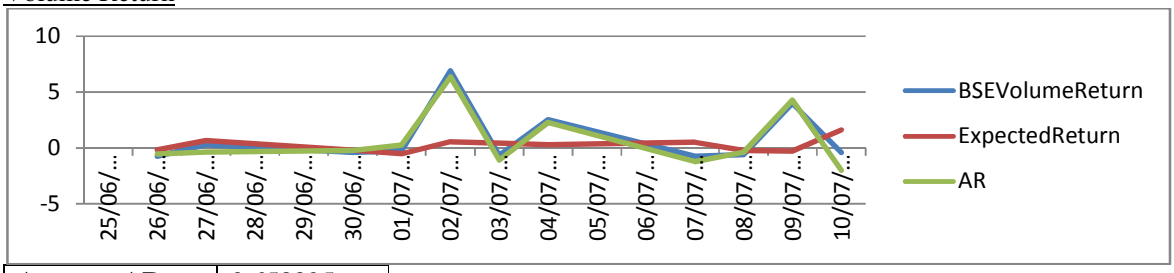
Bharti Airtel

Price Return



Average AR	0.000327
Average CAR	0.001566

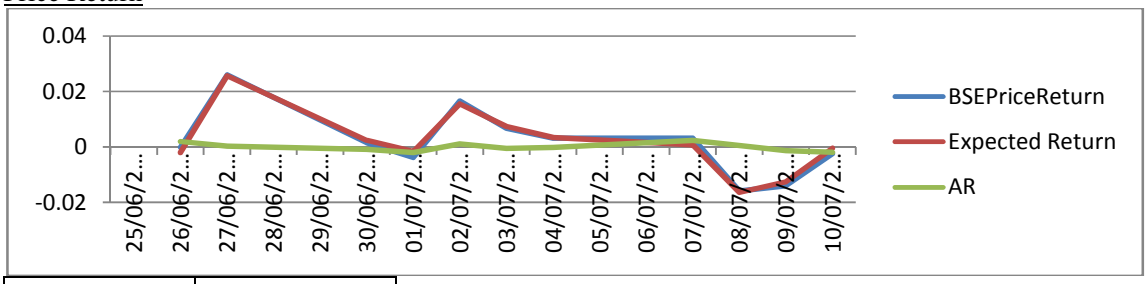
Volume Return



Average AR	0.658825
Average CAR	3.615049

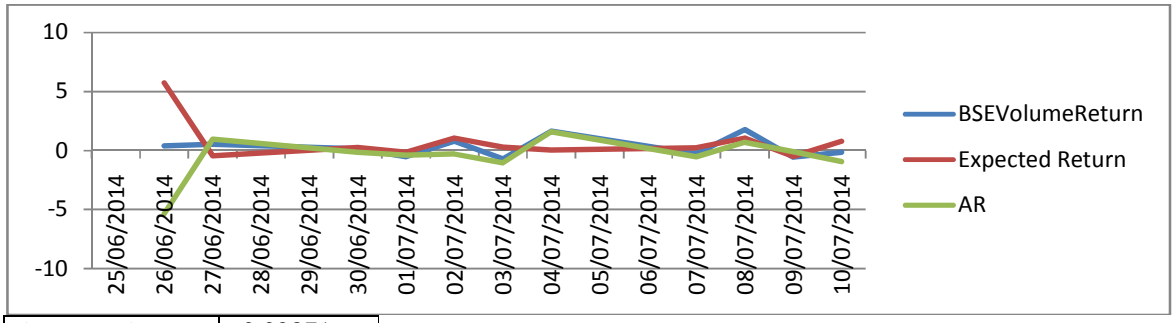
Cipla

Price Return



Average AR	-8.0924E-05
Average CAR	0.000793116

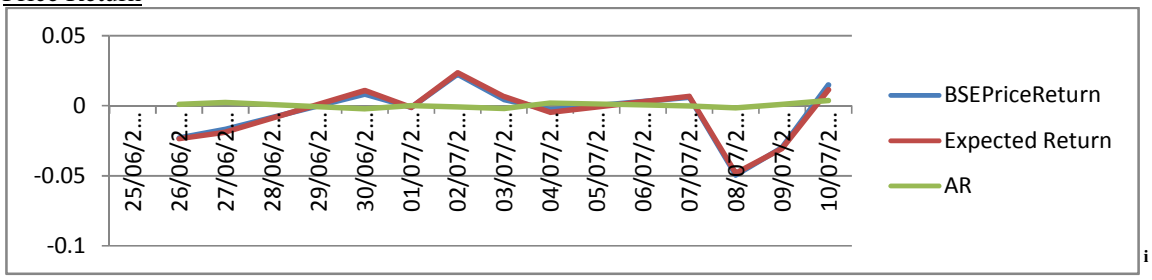
Volume Return



Average AR	-0.09871
Average CAR	-4.99223

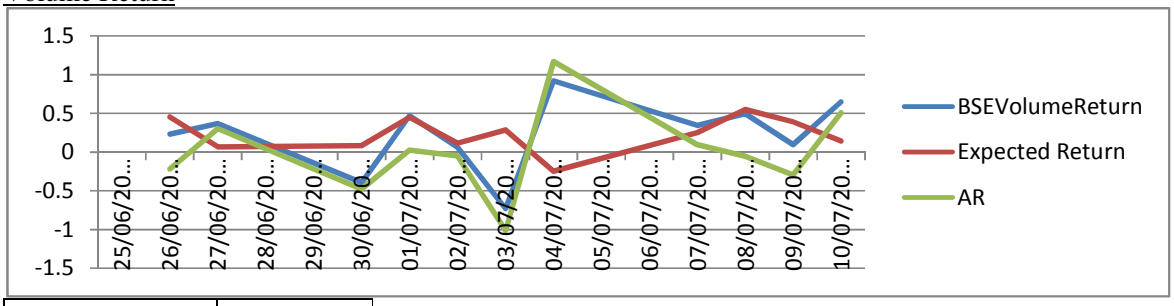
Coal India

Price Return



AverageAR	0.000186
AverageCAR	-0.00011

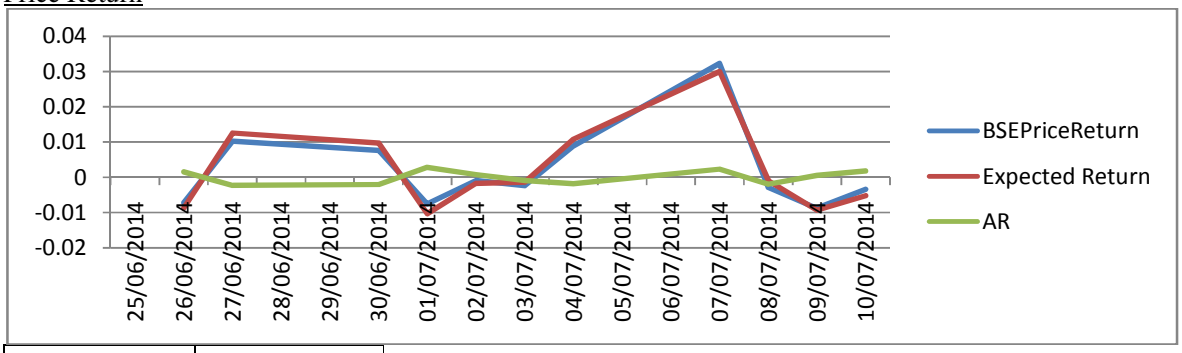
Volume Return



AverageAR	-0.00175
AverageCAR	-0.36373

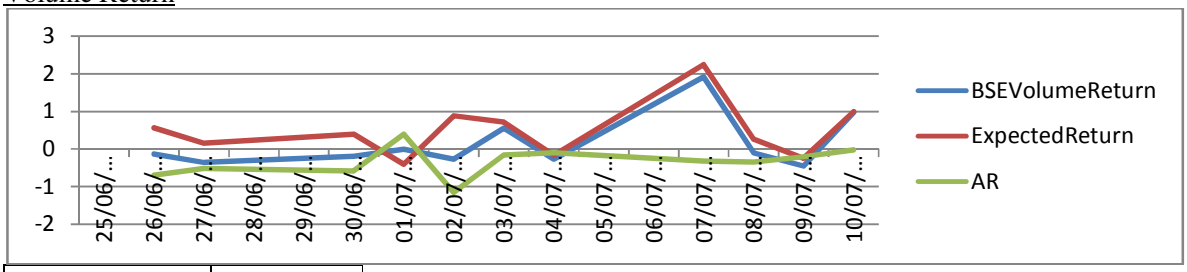
Infosys

Price Return



AverageAr	2.07764E-05
AverageCAr	-0.00075342

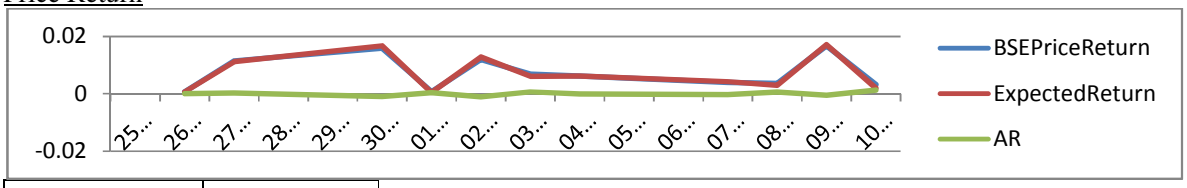
Volume Return



AverageAR	-0.04065
AverageCAR	-2.49586

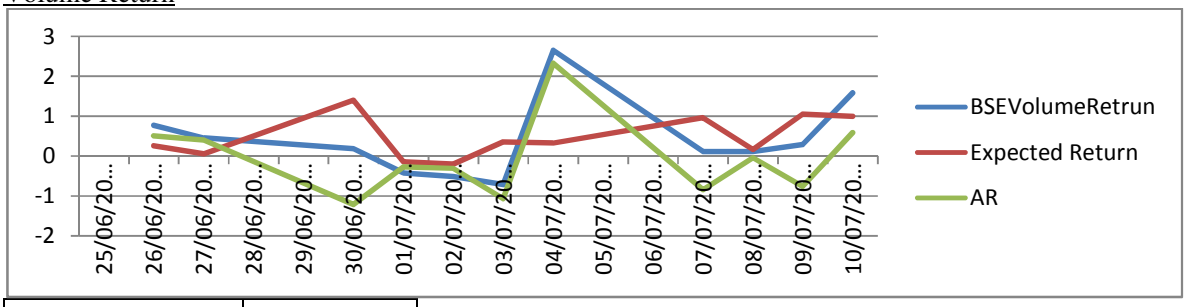
ITC

Price Return



AverageAR	2.1857E-05
AverageCAR	-0.0006051

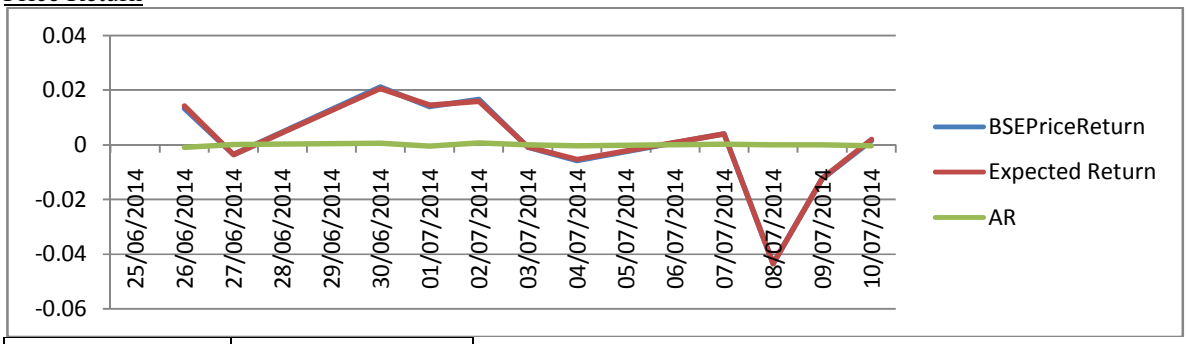
Volume Return



AverageAR	-0.06442
AverageCAR	-0.45328

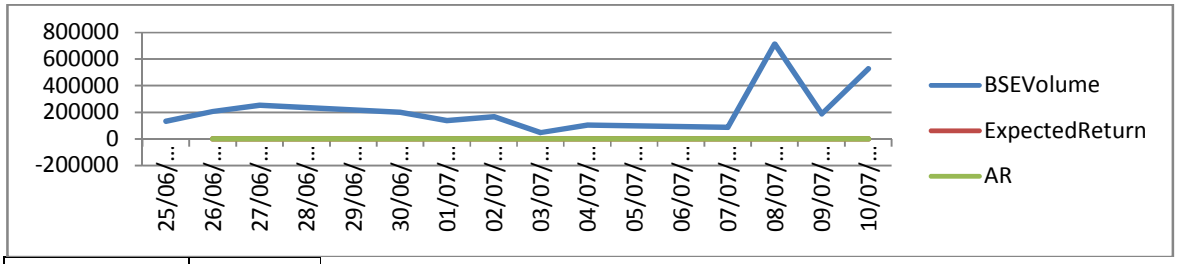
L&T

Price Return



AvergarAR	-3.27489E-05
AvergarCAR	-0.000275059

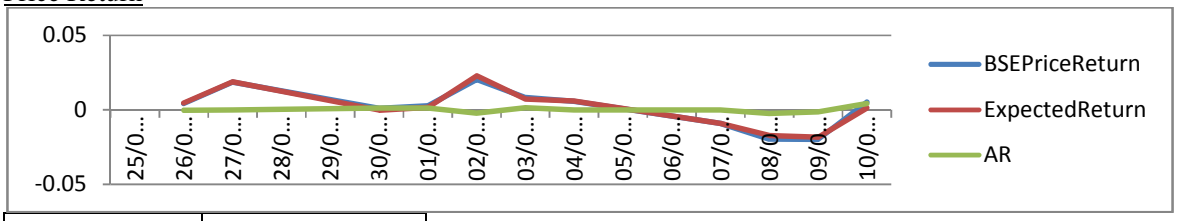
Volume Return



AverageAR	0.567429
AverageCAR	1.181226

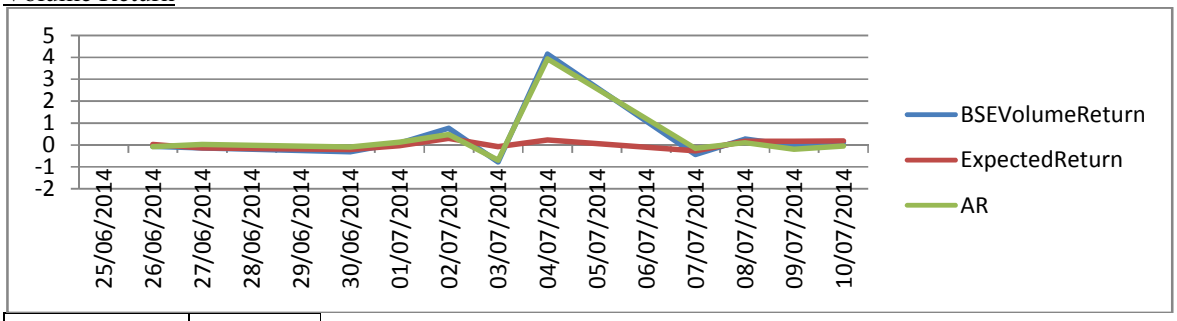
Lupin

Price Return



averageAR	6.79947E-05
averageAR	-9.89273E-05

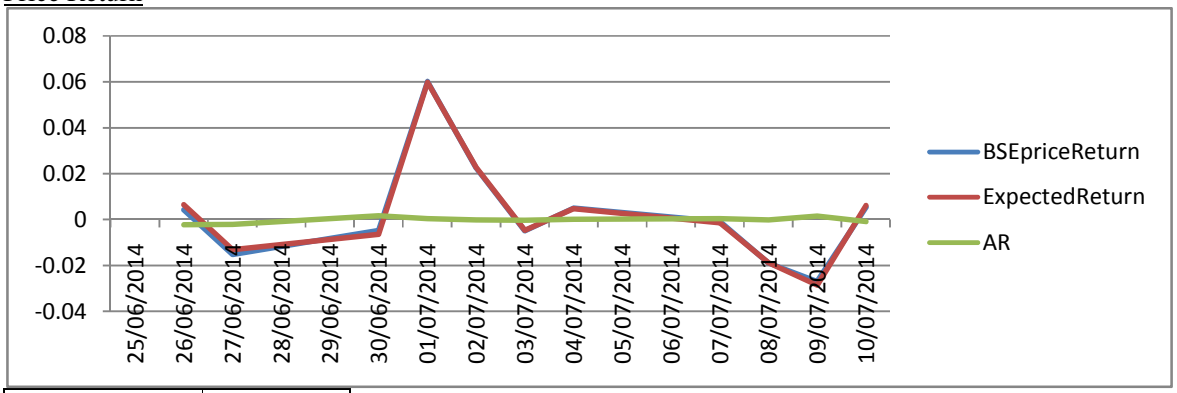
Volume Return



AverageAR	0.303094
AverageCAR	1.574426

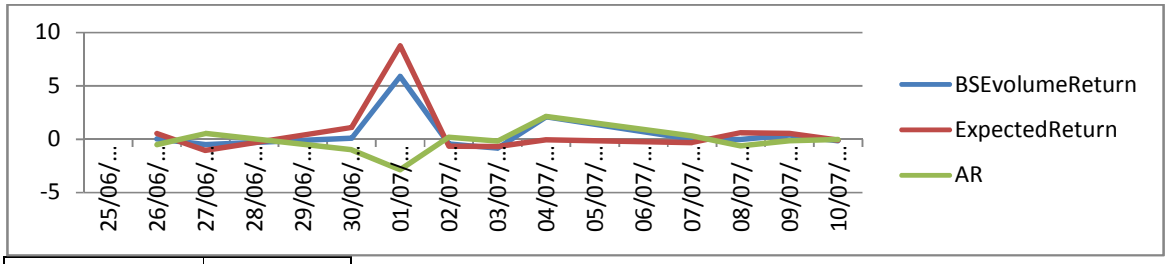
Maruti Suzuki

Price Return



AverageAR	-0.0002
AverageCAR	-0.00267

Volume Return



averageAR	-0.19828
averageCAR	-2.01015

Hypothesis Testing & Interpretation

Average abnormal return and average cumulative abnormal return has been consolidate to calculate the average abnormal return-

Average abnormal return = Average of abnormal return for sample of 10 companies for the period of t

Hypothesis testing for price variable

Price	Average AR	Average CAR	Std Error
Axis Bank	-0.0002	0.020672101	0.001278744
Bharat Heavy Electricals	-0.0002246	-0.00024506	0.002896354
Bharti Airtel	0.00032702	0.00156563	0.001691879
Cipla	-8.09E-05	0.000793116	0.001483884
Coal India	0.0001857	-0.00011211	0.00152126
Infosys	2.08E-05	-0.00075342	0.001160739
ITC	2.19E-05	-0.00060508	0.001293385
Larsen	-3.28E-05	-0.00027506	0.001125673
Lupin	6.80E-05	-9.89E-05	0.001819941
Maruti Suzuki	-0.0001954	-0.00267009	0.001361113
Average	-1.10322E-05	0.00182711	0.001563297
T-Test	-0.007057007		

T-Test = Average of abnormal return / Average of standard deviation

= -1.10322/0.00156

= -0.00705

H0: There is no significant impact on stock market index price due to failure of information technology event.

H1: There is significant impact on stock market index price due to failure of information technology event.

H2: There is negative impact on stock market index price due to failure of information technology event.

Interpretation:

P-value = 0.00706

P-value is within the limit of significance level (i.e -0.05 to 0.05) hence rejected null hypothesis and accepted alternate hypothesis.

Hypothesis testing for Volume variable

Volume	Average AR	Average CAR	Std Error
Axis Bank	-0.92	2.39581956	15.96497939
Bharat Heavy Electricals	-2.344355	-14.6721634	25.37012655
Bharti Airtel	0.65882534	3.615049181	0.673382103

Cipla	-0.0987088	-4.99223137	1.5530194
Coal India	-0.0017534	-0.36372694	0.959393899
Infosys	-0.0406511	-2.49585672	1.545709533
ITC	-0.0644153	-0.45328059	1.226806868
Larsen	0.56742917	1.181226457	0.400058689
Lupin	0.30309376	1.574425891	0.507511373
Maruti Suzuki	-0.1982776	-2.0101498	1.179012222
Average	-0.2138813	-1.62208877	4.938000003
T-Test	-0.0433133		

T-Test = Average of abnormal return / Average of standard deviation
= -0.2138813 / 4.93800
= -0.0433133

Interpretation:

P-value = -0.04331

P-value is within the limit of significance level (i.e -0.05 to 0.05) hence rejected null hypothesis and accepted alternate hypothesis.

Conclusion

Above analysis clearly signifies, price and volume indicator of stock exchange index has significant impact because of Information Technology failure announcement. The significant impact is more toward on negative side compare to positive side. Researcher has used 11 days window to understand the negative impact of failure on stock exchange index. Post event date the price of stock exchange index has not significant variation however the volume of stock index has impacted most on event date and post event date also has significant variation.

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