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ABNORMAL RETURNS AND IMPACT OF INFORMATION OF NATURAL DISASTER ON THE INDIAN STOCK MARKET

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Abstract *The capital market responds to precedent and unprecedented events. These events play an important role in market efficiency. The purpose of this paper is to elaborate the state of the stock market due to the recurring landslides in the Uttarakhand region in India. This study will help to determine the loss faced by the companies in the Indian stock market. Hence, analysing the "shock due to the natural disaster" in the stock market is an important issue. The study is based on secondary sources of information about various landslides in India. To calculate the "shock due to the natural disaster" in the stock market, we have employed event study methodology to measure this impact. The paper finds that a negative shock is brought by this catastrophic disaster on the Indian stock market. The impact of this shock is on each and every industry in the market; however, the most significant impact is felt by the top companies in the various industries. The market has shown a negative trend in its abnormal returns on and after the event day. Conversely, as the news of relief programmes were released by the government after three or four days, the market again started becoming normal.*

Keywords: *Natural Disaster, Indian Stock Market, Event Study, Cumulative Abnormal Return*

INTRODUCTION

Natural disasters are considered an unanticipated event with unknown results. The entire economy feels the effects of any such shock together. It is really difficult to envisage the actual losses occurring due to the disaster. In all countries, there are government as well as non-government organisations that react to such events. These organisations try to provide relief to the economy as soon as possible. The impact of a natural disaster is felt not only by the public, but is also swiftly injected into the economy, including the stock market. With these sorts of events, the stock market has a scope to shift upwards or downwards quickly and concurrently. The worst ten events of the past decade are as follows:

- Gujarat Earthquake (2001)
- Indian Ocean Earthquake (2004)
- Hurricane Katrina (2005)
- Pakistan Earthquake (2005)
- Cyclone Nargis (2008)
- Afghanistan Blizzard (2008)
- Haiti Earthquake (2010)
- Tōhoku Earthquake and Tsunami (2011)
- New Zealand Earthquake (2011)
- Uttarakhand Floods (2013)

A natural disaster in any country shakes the capital market of that specific economy. It is right to say that individual stocks react rapidly in such cases. This type of behaviour was initially explained by Fama in the 1960s. "The Behavior of Stock Market Prices", a research paper by Fama (1965), introduced the term 'Efficient Market Hypothesis' (hereafter called EMH). The theory elucidates that competition in the stock market drives information quickly and swiftly into stock prices. Therefore, it is impossible to retrieve abnormal returns of stocks in any circumstances.

EMH is a theory that laid the foundation for market efficiency. The Indian stock market has embarked as one of the prominent bourses in the entire global market. A growing body of researches have been conducted on the theme of reactions of the capital market towards various anticipated and unanticipated events in developed market economies. However, there is still scarcity of literature in the context of developing countries, where monitoring the impact of a natural disaster on the stock market is limited. This aspect, therefore, becomes particularly important for economies like India.

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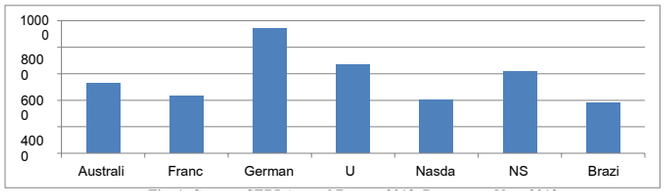
In the study, we are emphasising on the latest unprecedented event of the Uttarakhand floods. Uttarakhand, a state in India, has a total area of 53,484 square kilometres. Among the total area, 93% is mountainous; the remaining is forests. In June 2013, a multi-day cloudburst caused devastating floods and landslides. It is considered the country's nastiest natural disaster since the 2004 Tsunami. According to reports provided by the Uttarakhand Government of India, 5,700 plus people were "presumed dead" on 16 July 2013.

In the developmental race, Uttarakhand has made a fast track record in tourism industries, several hydroelectric projects, population growth, and so on. Initially, Uttarakhand was a part of Uttar Pradesh, a northern state of India. Later, there occurred a partition in the state of Uttar Pradesh and the constitution of Uttarakhand as an independent state began. This led to a rapid growth in the population of the place and it registered a growth of approximately 141% in the state. The Kedarnath temple is situated at the Rudraprayag district. This district has already faced natural disasters and other uncontrollable events during the last 34 years. Around 764.48 million people have endured the floods and natural disasters that have occurred between 1953 and 1980.

As per the data procured from the Annual Report of the SEBI for the year 2012-2013, the Indian Stock Market has one of the largest shares in terms of market capitalisation. The result reveals that after Germany and the United Kingdom, India has a prominent position in the share of the world market. The National Stock Exchange (NSE) is gaining world recognition for its share in the global market.



Source: SEBI Annual Report 2013, Data as on Nov. 2013

Fig. 1

The objective of the study is to determine whether the Indian stock market reacts to unanticipated events such as natural disasters, and to know the effects of these reactions on the top 50 companies listed at the National Stock Exchange (NSE). The study is divided into five parts. The first part introduces the background and rationale of the study; the second explores the theoretical issues, along with the review of the existing literature. Data collection and methodology of the study is covered under the third section of the study. The fourth section provides the analysis of the results. Finally, in section five, policy implication and conclusion is discussed.

CONCEPTUAL FRAMEWORK

Fama et al. (1969) has introduced the event study methodology. In their study, they used the data of 940 companies making stock splits during the period 1927 to 1959. The findings suggest that stock prices are adjusted very rapidly to the stock split information and the market is efficient in its nature. Since then this methodology is widely used by various academicians and researchers to investigate the relationship between stock prices and the impact of other information, such as dividend announcement, mergers and acquisitions, natural disasters, and so on.

Cutler et al. (1989) used the stock returns month-wise from 1926-1985. Their study calculated the impact of non-economic news on the stock returns. Their result reveals that non-economic events had a "surprisingly small effect" on the stock prices.

Schweitzer (1989) explored event studies, and other statistical techniques, to analyse the stock returns and its impact on a specific event, such as firm announcements, regulatory changes in banks, and various other kinds of events. The study concluded that stock markets responded to the new information of the market.

Aiuppa et al. (1993) studied the reaction of stock prices of the insurance industry with reference to the Loma Prieta Earthquake that occurred in 1989. The data was analysed using the two-index market model; the conclusion shows that earthquake insurers can make abnormal returns as a reward of their insurance investment.

Worthington and Valadkhani (2004) examined the impact of 42 natural disasters that occurred during 1982 to 2002 in Australia. The analysis showed that in the Australian stock market, among different kinds of natural disasters, an earthquake had registered a mixed impact on the market returns.

Barton (2005) observed Hurricane Katrina and its impact on the US stock market performance. He observed that stock markets had shifted upwards after the storm. In the same line, hurricanes Andrew, Camille, and Hugo had also showed the same results.

Liargovas and Repousis (2010) investigated the impact of terrorism on the stocks of Greek banks, by using the event study method. Three attacks, including the Madrid train bombing of 2004, the train bombing in London in the year 2007, and the 9/11 attack in New York were used in the study. The results show that all three attacks grounded the negative returns of the stock of Greek banks.

Lin (2011) analysed the impact of Japanese natural disasters on the Japanese Nikkei 225 and US S & P 500 index. He

used 84 natural disasters from 1982 to 2011. The conclusion was that an inefficient market response can be caused by information delayed due to loss and death. He further added that natural disasters might cause an indirect impact on changing the volatility in stock returns.

Maierhofer (2011) observed the reaction of the five worst natural disasters on the stock market. The study showed that there was a small decline in a very short period of time, and then, as a result of readjustment, the entire market would go up. He suggested that this may be because of panic selling made by the investors at the time of the natural disaster.

Luo (2012) investigated the impact of the 2011 Japanese earthquake on six stock markets all over the world. An event study method was employed to analyse the data. The conclusion shows that the direction of impact of the earthquake depends on the industries of that specific company.

Mohammad et al. (2014) explored the reasons for proactive or reactive approaches in disaster risk reduction (DRR) for stakeholders. The findings reveal that if the stakeholder considers the paradigm of value maximisation in decision making, then power and legitimacy results in proactive approaches. Thus, the powerful and legitimate stakeholder may take the reactive approach due to reactive reasoning capacity.

METHODOLOGY

The National Stock Exchange (NSE) is a benchmark index for the Indian stock market. It covers approximately 50 plus shares of the Indian stock market. The market returns of the nifty, along with the top 50 shares as per market capitalization, has been taken into account. The list of names and codes used in the study of these companies are shown in Appendix A. The data for these companies and index have been taken from the official website of the National Stock Exchange of India (http://www.nseindia.com/).

In an event study, selection of the event day is the key point of the study. During that period, market reactions may come due to many different reasons, such as stock splits, earning announcement, changes in fiscal or monetary policies, inflation rate, unemployment rate, and any other important public information released during that period. Therefore, to analyse the impact of one event, a specific period will be chosen, to exclude the influence of the other important event. An unanticipated event suddenly strikes and it results in a 'shock' for the entire market movement. A natural disaster consists of distinct features and unpredictability properties. Hence, analysing the "shock due to a natural disaster" in the stock market is an important issue, which is covered in this study.

The Kedarnath massive flood and landslide has resulted in one of the deepest losses for Uttarakhand, and more particularly, the Indian economy. Statistics showed that 822 were dead due to the flood (official estimates), 1,800 persons were missing, and 154 bridges and 1,520 roads were damaged. The Uttarakhand Government had also announced that the total number of damaged houses in the flood were two lakhs. This unforgettable story is covered in this research paper. The event day was Monday, 17 June 2013. The first trading day after the event occurred was 18 June 2013. The event day is T = 0 and post-event day is considered as T = 1. The event window considered is ten days before and after the event date. Thus, the event window of 21 days is used in the study (i.e. T = −10 to T = +10). The estimation or clean period is a measure to estimate the expected return of the stocks taken for the study. Here, we have chosen 50 days as the estimation period or clean period (T = −50) prior to the event window. Estimation period starts from 18 March 2013 to 31 May 2013, and the event window is from 3 June 2013 to 1 July 2013, with the event day being 17 June 2013.

Models of Event Study

To analyse the data for the estimation period, various statistical models and economic models are used. The most commonly used economic models are the Arbitrage Pricing Theory (APT) and the Capital Asset Pricing Model (CAPM).

The Arbitrage Pricing Theory (APT) model explains the general theory of the expected return of an asset. It is a linear function, which details the various macro-economic factors. The APT model can be described as:

$$R_t = \alpha_t + \beta_{it} F_i + e_t \quad (1)$$

R_t is the return of asset at time t. α_t is a constant for the asset. F_i is a systematic factor. β_{it} is the sensitivity of the i_{th} asset at time t. e_t is the error term with zero mean.

Capital Asset Pricing Model (CAPM) explains the risk and return relation towards the stock. It is an equilibrium model and used to determine the required rate of return of an asset. The CAPM can be described as:

$$R_{it} = R_{ft} + \beta_i (R_{mt} - R_{ft}) \quad (2)$$

R_{it} is the stock return at time t. The risk-free rate (T-bill rate) is represented by R_{ft} at time t. R_{mt} is the market return of portfolio at time t. β_i is the risk parameter. It is measured by regression analysis of the historical data.

The APT model is an extension to the CAPM. It just includes many factors, which makes it relatively complicated. These models require economic theory to support, which is not suited for the study.

Statistical models are derived from statistical assumptions. They are more commonly used in event studies, because in these models, expected returns are calculated by the statistical assumptions of knowing the behaviour of returns. We employed the market model due to its simplicity, and we can also easily analyse the data through it for the estimation period.

Market Model

$$R_{it} = \alpha_t + \beta_{it} R_{mt} + e_t \quad (3)$$

Where:

R_{it}: The return of the stock at period t.

α_t: The intercept of this regression line for the stock i.

β_{it}: The slope of this regression line for the stock i.

R_{mt}: The return of the market index at period t.

e_t: The error term.

$$Rit = \frac{Pit - Pit\,(t-1)}{Pit\,(t-1)} \quad (4)$$

Where:

Kindly check alignment of Rit. I think it should be placed before = Moreover, i think 'it' in all should be subscript

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R_{it}: The return of the stock at period t.

P_{it}: The price of stock i at time t.

P_{it} (t − 1): The price of stock i at time t−1.

The systematic component of returns in the market model is represented by ($\alpha_t + \beta_{it} R_{mt}$). The error term ($e_t$) is the unsystematic component. Through analysis of the data for estimation period by means of this model, we can easily calculate the values of α_t and β_{it}.

Abnormal Return (AR)

The difference between the actual return of stocks and the expected return of stocks in the event period can be calculated using the following formula.

$$AR_{it} = R_{it} - (\alpha_t + \beta_{it} R_{mt}) \quad (5)$$

Or

$$AR_{it} = [\text{Actual Return} - \text{Expected Return}]$$

Where:

AR_{it}: The abnormal return of stock i at time t.

R_{it}: The actual return of stock i at time t.

$\alpha_t + \beta_{it} R_{mt}$: The expected return of stock i at time t.

Average Abnormal Return (AAR)

Average Abnormal Return (AAR) is the average of abnormal returns (ARs). The equation for Average Abnormal Return (AAR) is mentioned below.

$$AARt = \Sigma ARit/N \quad (6)$$

Where:

AAR_t: The average abnormal return at time t.

N: Total number of stocks.

AR_{it}: The abnormal return of stock i at time t.

T-test is generally used for a small sample. The following equation shows how to calculate the t-test.

$$t - stat = \frac{AARt}{\sigma t/\sqrt{n}} \quad (7)$$

Where:

AAR_t: The average abnormal return at time t.

σ_t: The standard deviation of abnormal return at time t.

n: Total number of stocks.

Cumulative Abnormal Return (CAR)

It is simply the accumulation of each company's abnormal returns. The formula can be described as follows:

$$CAR_i = \sum AR_{it} \quad (8)$$

Where:

CAR_i: The cumulative return of stock i over the event period.

t-Statistic

To calculate the t-statistic, we need to use the following equation.

$$t - stat = \frac{CARi}{\left[\sigma t/\sqrt{n}\right]} \quad (9)$$

Where:

n: The number of trading days in the event period.

σ_t: The standard deviation of abnormal returns of stock i.

In this t-test, the significance level is 5%, and degrees of freedom, 20. From the t-table, the corresponding value of t 0.05, 20 is ±2.086. This means, if $|t| \geq t\ 0.05, 20$, we reject the

null hypothesis. Then the mean of cumulative abnormal return of stock i in the sample is significantly different from zero.

Average Cumulative Abnormal Return (ACAR)

To calculate average cumulative abnormal return (ACAR), the following equation is used.

$$CAR = \Sigma CARi/N \quad (10)$$

Where:

N: The number of stocks.

t-Statistic

To calculate the t-statistic for ACAR, we need to use equation 11.

$$t - stat = \frac{ACAR * \sqrt{n}}{\sigma t} \quad (11)$$

Where:

n: The number of stocks.

σ_t: The standard deviation of cumulative abnormal return.

The hypothesis of the paper is to test whether the AAR at time t, CAR of stock i, and ACAR of the event period is significantly different from zero.

Table 1: Author's Compilation

Hypothesis of the Study	Null Hypothesis	Alternate Hypothesis
AAR	H_0: $AAR_t = 0$	H_1: $AAR_t \neq 0$
CAR	H_0: $CAR_i = 0$	H_1: $CAR_i \neq 0$
ACAR	H_0: ACAR = 0	H_1: ACAR ≠ 0

Normally, a significance level of ten, five, and 1% will be chosen, and the degrees of freedom is N−1. If the corresponding calculated value of t-stats is more than the tabulated value, it means that we reject the null hypothesis. The same will be followed for all the equations of t-stats. However, the degrees of freedom will keep changing as per the n value in the corresponding equation.

Analysis of Results

The first step is to calculate the daily return of each company by using equation 4. Subsequently, the expected return of the stock for the estimation period will be measured. The next step is to use the estimated α and β to calculate the abnormal return of stock in the event study. Through the SUM function and formula in MS Excel, we can calculate the average abnormal return, cumulative abnormal return, and average cumulative abnormal return.

Next, t-test and standard deviation will be calculated. Finally, the value of t-stats will be compared with tabulated values and analysis of the final conclusion will be made.

The daily average abnormal return of 50 companies listed on the NSE Index is shown in Fig. 2. The event day is day 11. We can see that the daily movement of AAR is slickly fluctuating around zero and one. From days 1 to 8, the abnormal returns are showing a negative trend. In contrast, on days 9 and 10, the market reported positive returns. On day 11 and the day after the trading day, AAR has a sharp rise; however, on the subsequent day, AAR shifted downwards at approximately twice the rate. The AAR is around −0.004 on day 13. On the next subsequent day, the market tried to cope. However, the release of the news of more destruction through the Uttarakhand landslide carried the market down by approximately three times. Thereafter, on the next day, and for the rest of the event window, the market reacts efficiently and it reached its position again. Thus, we can summarise that release of information has impacted the stock market significantly. Hence, the Indian stock market is efficient because of its property of random behaviour towards the new information released in the market.

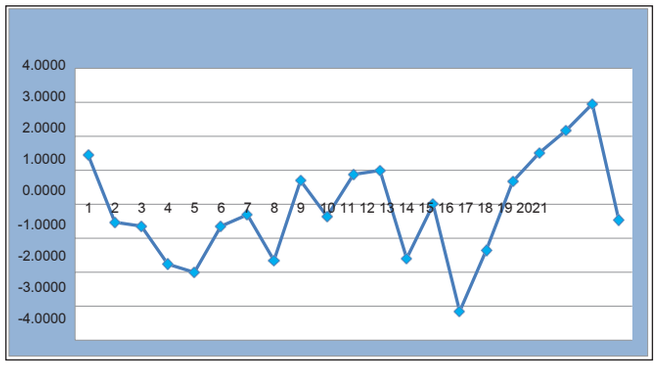

Fig. 2: AAR of the Indian Stock Market

From Appendix B, we notice the t-value of daily AAR. The t-value is significant for six days of the event window. Post-event days are +4, +8, and +9 days with significant t-values. Thus, the null hypothesis is rejected. It means that the Uttarakhand disaster had a significant impact on the Indian stock market for the considered period of the study.

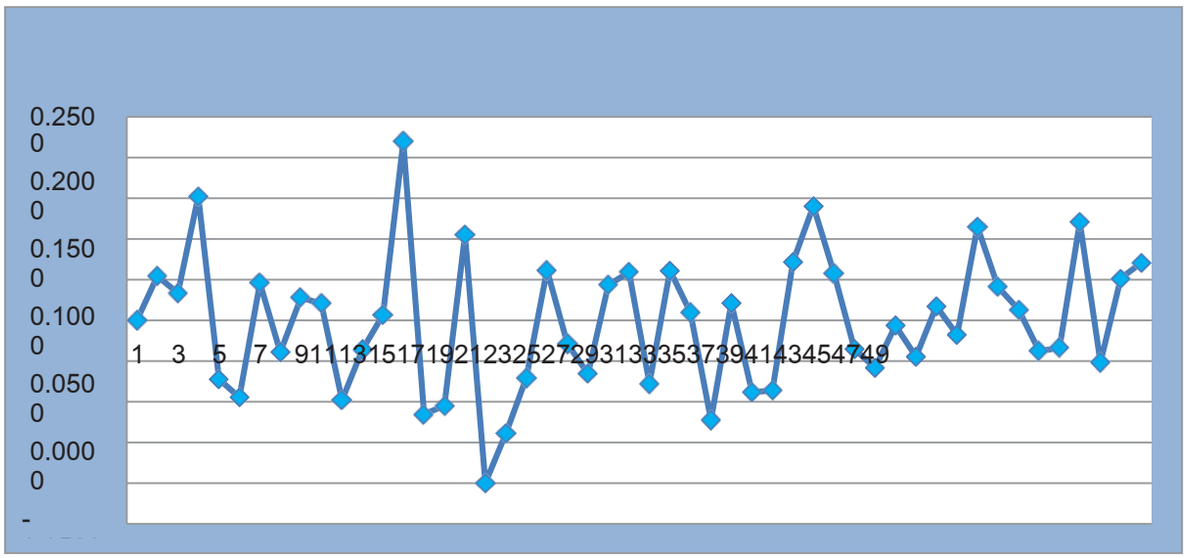

Fig. 3: CAR of the Indian Stock Market

Fig. 3 shows the CAR (Cumulative Abnormal Return) of each company during the event window. We can see that the CAR of most of the companies is fluctuating near zero. It is observable (from Appendix A), that out of 50 companies, there are ten companies that have been impacted by this disaster. The names of the companies are Cipla Ltd, DLF Limited, Wipro Ltd., Hindustan Unilever Ltd., Larsen & Toubro Ltd., Tata Motors Limited, Indian Oil Corp. Ltd., ICICI Bank Ltd., Reliance Industries Ltd., and ITC Ltd. The t-stats for these companies are statistically significant at one, five, or 10% level of significance. As per the statistical view, these companies were impacted by this disaster. Surprisingly, these firms are the leading companies of their respective industries. Therefore, the impact of a natural disaster is clear in the t-stat of these firms. The t-value of ACAR is not statistically significant. So, we can say that the Uttarakhand tragedy has a significant impact on several individual stocks, but overall, it has had a negative insignificant impact on the entire Indian stock market. Thus, the stock prices of the leading companies are highly affected by this catastrophic disaster.

LIMITATION

There are several other companies, which are listed on the stock market. Some of them are directly or indirectly related to this event. For example, after the destruction, medical-related, energy-related, and material-and-construction-related corporations are in demand for the development of the Indian economy. For these kinds of stocks, a positive and significant impact may appear. However, it cannot correspond to the overall stock market situation. There are still other economies in the world, which were impacted from this event. Thus, these criteria are the limitations of the study.

CONCLUSION

This paper employed an event study methodology to investigate the impact of the Uttarakhand disaster, which happened on June 17, 2013. The paper chose the top 50 companies as per the market capitalisation of only the Indian Stock Market. Ten days before and after the calendar date of the event was selected to create an event window. The estimation or clean period is 40 days before the event window. We have considered the market model to estimate the proper parameters for the study. The sample size is 50 companies; so, we have selected t-test for the analysis of the results.

The findings show that the Indian stock market has felt a statistically significant impact due to this disastrous event. Among the top 50 companies, ten companies have shown either a negative or positive significant impact due to this catastrophe. The market has shown a negative trend in its abnormal return on and after the event day. Conversely, as the news of relief programmes were released by the government, after three or four days, the market started responding positively again. We may summarise that better relief for landslides will save the market from the long negative trends. Therefore, the efficient market hypothesis theory given by Fama (1965) has been supported in this regard. The Indian market has responded very quickly and efficiently to information of the Uttarakhand disaster. Thus

we conclude that natural disasters have a significant impact on the Indian stock market.

RECOMMENDATION

The empirical results suggest that time of release of the unprecedented event has a statistically significant impact on the prices of the stocks. On the basis of the results, we may conclude that around the announcement date the stock market is more volatile and it has both a negative and positive impact on the specific industry. We have gained simonised results in the summary. These findings suggest that among the 10 most affected companies, 5 have had a negative impact on them and the remaining 5 a positive impact. The positive impact is felt by companies such as Reliance, Wipro, L&T, DLF, and Cipla. There may be ample reasons for these companies to experience a positive impact from the occurrence of a natural disaster. This can be the scope of further research. ITC, ICICI, Hindustan Unilever Ltd., Tata Motors, and Indian Oil are organisations which were negatively impacted by the disaster. The investors can take advantage of these results by cautiously selecting stocks. They can choose companies with positive returns to invest in their portfolio. The neglecting of the negative returns stocks can hedge them from further losses. The remaining 40 companies have shown neither positive nor negative results. Investment in such stock can also save people from risk. It is advisable to choose the strategy of risk diversification in the event of a natural disaster.

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APPENDIX A

1	TATA CONSULTANCY SERVICES LTD	26	ULTRATECH CEMENT LIMITED
2	OIL AND NATURAL GAS CORP.	27	POWER GRID CORP. LTD.
3	RELIANCE INDUSTRIES LTD	28	KOTAK MAHINDRA BANK LTD
4	ITC LTD	29	ASIAN PAINTS LIMITED
5	COAL INDIA LTD	30	NESTLE INDIA LIMITED
6	INFOSYS LIMITED	31	BHEL
7	HDFC BANK LTD	32	GAIL (INDIA) LTD
8	STATE BANK OF INDIA	33	DLF LIMITED
9	HDFC LTD	34	IDEA CELLULAR LIMITED
10	ICICI BANK LTD.	35	MARUTI SUZUKI INDIA LTD.
11	NTPC LTD	36	BHARTI INFRATEL LTD.
12	BHARTI AIRTEL LIMITED	37	JINDAL STEEL & POWER LTD
13	WIPRO LTD	38	STERLITE INDS (IND) LTD
14	HINDUSTAN UNILEVER LTD.	39	HERO MOTOCORP LIMITED
15	SUN PHARMACEUTICALS IND.	40	OIL INDIA LTD
16	LARSEN & TOUBRO LTD.	41	CIPLA LTD
17	TATA MOTORS LIMITED	42	TATA STEEL LIMITED
18	INDIAN OIL CORP LTD	43	DR. REDDY'S LABORATORIES
19	AXIS BANK LIMITED	44	BOSCH LIMITED
20	HCL TECHNOLOGIES LTD	45	LUPIN LIMITED
21	NMDC LTD.	46	ADANI PORT & SEZ LTD
22	MAHINDRA & MAHINDRA LTD	47	BANK OF BARODA
23	BAJAJ AUTO LIMITED	48	BHARAT PETROLEUM CORPORATION LTD
24	CAIRN INDIA LIMITED	49	AMBUJA CEMENTS LTD
25	HINDUSTAN ZINC LIMITED	50	GODREJ CONSUMER PRODUCTS

APPENDIX B

				1	2	3	4	5	6
t-stat	**AAR**	**St. Dev.**	**Time**	**AR**					
1.448387	0.0027	0.0132	−10	0.0001	0.0064	−0.0050	0.0045	−0.0039	−0.0018
−0.52466	−0.0009	0.0124	−9	0.0024	0.0189	0.0280	−0.0126	−0.0061	−0.0114
−0.64328	−0.0015	0.0166	−8	0.0123	−0.0023	−0.0110	0.0009	−0.0020	−0.0095
−1.759*	−0.0031	0.0125	−7	0.0376	−0.0083	−0.0018	0.0007	−0.0104	0.0150
−2.0021**	−0.0042	0.0148	−6	0.0054	0.0054	0.0089	0.0077	−0.0004	0.0197
−0.64408	−0.0014	0.0156	−5	−0.0061	−0.0263	0.0136	0.0033	−0.0218	0.0093
−0.30857	−0.0009	0.0206	−4	−0.0185	0.0073	0.0133	−0.0079	−0.0282	−0.0153
−1.649*	−0.0038	0.0162	−3	−0.0085	0.0091	0.0119	−0.0049	−0.0118	−0.0065
0.697232	0.0017	0.0172	−2	−0.0057	−0.0115	0.0104	−0.0046	−0.0005	−0.0043
−0.35837	−0.0006	0.0124	−1	−0.0015	−0.0021	0.0061	−0.0082	−0.0005	0.0095
0.878482	0.0020	0.0158	0	−0.0015	−0.0110	0.0055	−0.0018	0.0044	0.0174
0.998529	0.0022	0.0157	1	−0.0108	0.0017	0.0093	−0.0043	−0.0134	−0.0014
−1.5904	−0.0040	0.0180	2	0.0002	−0.0042	−0.0067	0.0012	−0.0046	−0.0050
−0.00011	0.0000	0.0156	3	0.0126	0.0252	−0.0079	−0.0051	0.0071	0.0225

−3.149***	−0.0080	0.0181	4	0.0003	−0.0168	0.0164	−0.0148	−0.0025	−0.0031
−1.35548	−0.0039	0.0201	5	−0.0137	0.0385	0.0111	0.0117	−0.0118	−0.0021
0.669887	0.0020	0.0208	6	0.0357	−0.0066	0.0049	0.0112	−0.0198	0.0164
1.514932	0.0041	0.0193	7	0.0298	0.0220	0.0146	−0.0209	−0.0106	0.0258
2.165**	0.0062	0.0203	8	0.0036	0.0070	0.0079	−0.0188	0.0429	−0.0106
2.951***	0.0079	0.0189	9	−0.0211	−0.0190	0.0166	−0.0058	0.0037	−0.0230
−0.46355	−0.0003	0.0040	10	0.0018	0.0003	0.0063	−0.0036	−0.0040	0.0044
ACAR	−0.0039		AAR	0.0544	0.0337	0.1524	−0.0723	−0.0944	0.0460
St. Dev.	0.0841		St. Dev.	0.0159	0.0156	0.0095	0.0088	0.0140	0.0135
t-value	−0.3270		t-stat	0.7477	0.4699	3.516***	−1.795*	−1.4671	0.7420

7	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
−0.0063	−0.0133	−0.0145	−0.0035	0.0143	0.0078	0.0257	−0.0064	−0.0026	0.0234
0.0051	0.0028	−0.0143	−0.0060	−0.0021	−0.0059	−0.0126	−0.0061	0.0135	0.0083
−0.0091	0.0111	0.0003	0.0167	−0.0212	−0.0230	0.0213	−0.0041	−0.0226	0.0111
−0.0024	−0.0003	0.0001	−0.0041	−0.0143	−0.0134	0.0241	−0.0023	−0.0073	−0.0007
−0.0003	−0.0034	0.0150	−0.0220	0.0149	−0.0143	0.0309	−0.0024	−0.0180	−0.0026
−0.0011	0.0164	−0.0083	−0.0192	0.0136	0.0027	0.0188	0.0016	−0.0145	0.0247
0.0029	0.0133	−0.0080	0.0091	0.0099	0.0038	0.0062	−0.0032	−0.0042	0.0052
0.0056	0.0234	0.0009	0.0004	−0.0010	0.0504	−0.0014	0.0004	−0.0320	0.0166
−0.0076	−0.0114	0.0036	0.0050	−0.0023	−0.0180	−0.0116	−0.0139	−0.0083	0.0061
−0.0058	0.0018	0.0012	−0.0115	−0.0160	0.0141	0.0034	−0.0039	0.0125	0.0011
−0.0090	0.0001	−0.0062	−0.0032	−0.0208	−0.0048	0.0182	−0.0034	−0.0028	−0.0001
0.0089	0.0011	0.0073	−0.0075	−0.0143	0.0249	0.0116	−0.0072	−0.0162	−0.0002
−0.0121	0.0186	0.0031	−0.0025	−0.0087	0.0020	0.0322	0.0026	0.0159	0.0173
−0.0057	−0.0050	−0.0001	−0.0056	0.0173	0.0090	0.0072	−0.0104	−0.0269	−0.0032
−0.0014	0.0008	0.0200	0.0199	0.0043	−0.0106	0.0075	−0.0117	−0.0003	−0.0041
0.0088	−0.0235	−0.0144	−0.0215	−0.0316	0.0382	−0.0042	0.0001	−0.0043	0.0063
−0.0147	0.0032	0.0007	−0.0035	0.0260	−0.0541	0.0202	−0.0029	−0.0131	−0.0030
0.0179	−0.0148	0.0208	−0.0188	−0.0226	−0.0100	0.0086	−0.0102	0.0228	−0.0254
0.0027	−0.0157	0.0148	0.0014	−0.0010	0.0035	−0.0035	−0.0217	0.0247	0.0011
−0.0132	0.0202	−0.0010	−0.0167	0.0213	0.0033	0.0071	−0.0048	−0.0152	0.0182
−0.0022	0.0024	0.0002	−0.0044	−0.0020	0.0010	0.0101	−0.0054	−0.0060	0.0050
−0.0389	0.0279	0.0211	−0.0977	−0.0361	0.0068	0.2197	−0.1153	−0.1049	0.1053
0.0082	0.0127	0.0103	0.0114	0.0162	0.0217	0.0129	0.0057	0.0156	0.0113
−1.0306	0.4797	0.4460	−1.866*	−0.4860	0.0683	3.72***	−4.44***	−1.4667	2.035**

17	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
−0.0195	0.0028	−0.022	−0.0055	−0.0047	−0.0097	−0.0103	0.0159	0.0046	0.0086	0.0180
0.0090	−0.0048	−0.011	−0.0108	−0.0009	−0.0244	−0.0247	−0.0008	−0.0065	−0.0079	−0.0077
−0.0052	−0.0169	0.026	0.0305	0.0038	0.0187	−0.0008	0.0002	0.0040	0.0229	−0.0038
−0.0180	−0.0157	−0.021	0.0004	0.0088	0.0028	−0.0096	0.0057	0.0047	−0.0121	−0.0082
−0.0231	−0.0109	−0.017	0.0143	0.0082	0.0035	0.0129	0.0064	−0.0174	0.0189	−0.0060
−0.0197	−0.0076	−0.006	0.0123	−0.0059	−0.0077	−0.0083	0.0081	−0.0057	−0.0060	−0.0095
−0.0101	0.0051	−0.031	0.0146	−0.0061	−0.0074	0.0027	0.0073	−0.0088	−0.0044	0.0044
−0.0266	−0.0253	0.009	−0.0010	−0.0371	0.0134	−0.0006	0.0076	−0.0079	−0.0011	−0.0139
0.0241	−0.0097	−0.004	0.0000	0.0147	−0.0122	−0.0159	−0.0099	0.0150	0.0134	0.0177

17	18	19	20	21	22	23	24	25	26	27
−0.0013	0.0005	0.004	0.0144	−0.0121	0.0023	0.0122	−0.0011	0.0004	0.0146	−0.0138
−0.0306	−0.0112	−0.016	0.0092	−0.0031	0.0087	0.0373	0.0038	0.0111	−0.0181	0.0057
−0.0090	−0.0301	−0.004	0.0008	−0.0032	−0.0234	0.0176	0.0118	−0.0012	−0.0156	−0.0099
−0.0144	0.0263	−0.001	−0.0094	−0.0057	−0.0292	0.0130	0.0049	−0.0140	0.0124	0.0042
−0.0198	−0.0236	0.012	−0.0009	0.0169	−0.0026	0.0022	0.0120	−0.0164	−0.0032	0.0107
−0.0202	−0.0538	0.003	0.0111	−0.0063	−0.0158	0.0027	−0.0249	−0.0284	−0.0057	−0.0030
−0.0329	0.0153	−0.015	−0.0129	−0.0250	0.0060	0.0112	−0.0312	−0.0225	0.0004	−0.0294
−0.0078	0.0016	0.017	0.0247	0.0041	0.0221	−0.0344	0.0003	−0.0203	−0.0024	0.0302
0.0069	−0.0048	−0.008	0.0300	−0.0044	0.0028	0.0488	0.0432	−0.0211	0.0444	−0.0072
0.0203	0.0287	0.003	−0.0371	0.0323	−0.0114	−0.0023	−0.0107	0.0362	−0.0226	0.0242
0.0069	0.0016	0.005	−0.0260	−0.0020	0.0006	−0.0121	0.0076	0.0202	0.0222	0.0070
−0.0091	−0.0061	−0.003	0.0029	−0.0010	−0.0027	0.0021	0.0029	−0.0038	0.0026	−0.0001
−0.1998	−0.1387	−0.070	0.0616	−0.0286	−0.0654	0.0436	0.0590	−0.0776	0.0613	0.0097
0.0158	0.0186	0.014	0.0169	0.0142	0.0136	0.0188	0.0148	0.0158	0.0161	0.0142
−2.78***	−1.631*	−1.112	0.7950	−0.4386	−1.0492	0.5059	0.8681	−1.0703	0.8304	0.1489

28	29	30	31	32	33	34	35	36	37	38
−0.0038	−0.0011	−0.0017	−0.0045	0.0028	0.0014	0.0415	−0.0147	0.0109	−0.0017	−0.0113
−0.0025	−0.0006	−0.0040	−0.0054	0.0124	0.0383	0.0013	0.0102	−0.0023	−0.0094	0.0022
0.0053	−0.0110	−0.0003	−0.0108	−0.0131	0.0246	−0.0294	0.0092	−0.0003	−0.0460	−0.0090
−0.0114	−0.0063	−0.0096	−0.0067	−0.0043	0.0000	−0.0277	−0.0186	−0.0162	−0.0182	−0.0126
−0.0148	−0.0078	−0.0189	−0.0269	−0.0094	−0.0044	0.0059	−0.0241	−0.0140	−0.0486	−0.0177
0.0068	−0.0046	−0.0143	0.0017	0.0211	−0.0105	0.0179	−0.0131	−0.0465	−0.0083	−0.0133
−0.0022	0.0038	0.0098	−0.0043	0.0018	0.0318	0.0294	−0.0069	−0.0072	0.0816	−0.0161
0.0038	−0.0072	−0.0088	−0.0111	−0.0176	0.0099	0.0105	−0.0113	0.0156	0.0061	−0.0169
−0.0051	0.0200	0.0006	−0.0168	0.0049	−0.0115	−0.0101	0.0229	0.0021	0.0661	0.0043
−0.0113	0.0017	−0.0178	0.0273	−0.0151	−0.0072	0.0167	0.0057	−0.0200	−0.0232	−0.0133
0.0120	0.0028	−0.0038	−0.0022	−0.0117	0.0137	0.0142	0.0034	0.0020	−0.0064	0.0169
−0.0004	0.0079	0.0024	−0.0043	0.0114	0.0075	0.0430	−0.0008	0.0214	0.0444	0.0260
−0.0097	0.0025	−0.0058	−0.0154	0.0038	−0.0124	−0.0176	0.0049	−0.0514	−0.0619	−0.0255
−0.0177	−0.0035	−0.0071	−0.0086	−0.0069	0.0015	−0.0252	0.0147	0.0159	0.0074	−0.0107
−0.0382	−0.0307	−0.0034	−0.0122	−0.0026	−0.0299	−0.0110	−0.0001	0.0158	−0.0582	−0.0300
0.0288	−0.0077	−0.0238	−0.0176	0.0009	0.0145	0.0343	−0.0050	−0.0409	−0.0133	−0.0069
−0.0413	0.0321	−0.0095	0.0043	0.0401	0.0266	−0.0377	−0.0009	0.0139	−0.0074	0.0049
−0.0004	0.0050	0.0006	−0.0214	−0.0048	0.0219	0.0025	−0.0302	0.0297	−0.0032	0.0146
−0.0036	0.0127	−0.0160	0.0359	0.0243	−0.0156	−0.0119	−0.0121	0.0173	0.0302	0.0392
−0.0108	0.0137	0.0472	0.0172	0.0295	0.0328	0.0087	0.0340	−0.0013	0.0650	0.0329
−0.0061	−0.0005	−0.0042	−0.0043	0.0044	0.0075	0.0024	−0.0025	−0.0030	−0.0012	−0.0022
−0.1226	0.0212	−0.0884	−0.0861	0.0720	0.1404	0.0576	−0.0353	−0.0583	−0.0062	−0.0445
0.0152	0.0126	0.0143	0.0152	0.0153	0.0182	0.0233	0.0153	0.0223	0.0395	0.0188
−1.7610	0.3668	−1.3529	−1.2355	1.0294	1.6821	0.5399*	−0.5046	−0.5710	−0.0342	−0.5182

39	40	41	42	43	44	45	46	47	48	49	50
0.0025	0.0225	0.0242	0.0150	0.0192	−0.0004	0.0201	0.0007	0.0032	0.0135	−0.0198	0.0130
−0.0039	−0.0089	0.0018	0.0045	−0.0016	−0.0001	−0.0083	0.0340	0.0012	0.0067	−0.0172	−0.0056
−0.0114	−0.0142	0.0016	−0.0082	−0.0135	0.0017	−0.0199	0.0128	0.0265	−0.0002	0.0205	−0.0378
0.0057	0.0031	−0.0005	0.0000	0.0232	−0.0071	0.0126	−0.0116	−0.0143	0.0156	−0.0120	0.0110
−0.0025	−0.0129	0.0041	−0.0004	−0.0069	0.0116	−0.0041	−0.0136	−0.0055	−0.0247	0.0063	−0.0139
0.0186	−0.0116	0.0258	−0.0129	0.0018	0.0198	0.0005	−0.0170	0.0204	−0.0055	0.0262	−0.0249
−0.0220	0.0010	0.0153	−0.0174	−0.0043	−0.0291	0.0191	−0.0606	0.0106	0.0156	−0.0049	−0.0415
0.0107	−0.0407	−0.0067	−0.0129	−0.0094	−0.0068	−0.0092	−0.0100	−0.0246	−0.0046	0.0114	−0.0290
−0.0211	0.0605	−0.0119	0.0146	0.0001	−0.0011	0.0128	−0.0179	−0.0079	0.0171	0.0047	−0.0013
0.0072	−0.0057	0.0032	0.0073	−0.0183	0.0010	−0.0013	−0.0171	−0.0044	−0.0105	0.0013	0.0421
0.0112	0.0090	0.0035	0.0395	−0.0087	−0.0009	0.0025	0.0608	−0.0184	0.0010	0.0042	−0.0250
−0.0118	−0.0018	0.0000	0.0236	−0.0180	−0.0048	0.0017	0.0310	−0.0031	−0.0004	0.0249	−0.0125
0.0120	0.0086	0.0176	−0.0306	−0.0066	−0.0008	−0.0032	0.0020	−0.0218	−0.0109	0.0204	−0.0380
0.0127	−0.0106	0.0059	0.0001	0.0175	−0.0088	0.0045	−0.0020	−0.0477	−0.0092	0.0116	0.0472
−0.0180	−0.0215	0.0065	−0.0019	−0.0084	−0.0132	0.0175	0.0211	0.0217	−0.0140	−0.0272	−0.0267
−0.0028	−0.0191	−0.0026	−0.0001	−0.0055	−0.0267	−0.0345	0.0330	0.0273	0.0159	0.0174	−0.0109
0.0396	0.0292	0.0041	0.0008	−0.0040	−0.0012	−0.0190	−0.0081	0.0060	0.0147	−0.0275	0.0024
−0.0074	0.0075	0.0125	−0.0147	0.0232	0.0093	0.0008	0.0101	−0.0183	−0.0216	0.0134	0.0108
−0.0145	−0.0138	−0.0048	0.0118	0.0178	0.0392	−0.0102	0.0316	−0.0203	0.0385	0.0090	0.0281
0.0132	0.0041	0.0103	0.0196	0.0149	−0.0166	−0.0156	0.0362	0.0191	0.0130	0.0056	0.0201
−0.0007	−0.0026	0.0051	0.0031	0.0010	−0.0023	−0.0005	0.0054	−0.0010	0.0016	0.0024	−0.0040
0.0174	−0.0179	0.1151	0.0409	0.0135	−0.0374	−0.0336	0.1207	−0.0514	0.0517	0.0709	−0.0962
0.0150	0.0208	0.0095	0.0157	0.0133	0.0147	0.0139	0.0268	0.0194	0.0152	0.0161	0.0256
0.2520	−0.1875	2.644***	0.5683	0.2226	−0.5555	−0.5286	0.9836	−0.5789	0.7401	0.9585	−0.8212