

Monetary Policy Announcements and Stock Price Behavior: Empirical Evidence from CNX Nifty

Gaurav Agrawal*

Introduction

The Monetary Policy is one of the most important economic events in India. The ultimate objectives of Monetary Policy are expressed in terms of macroeconomic variables such as output, employment and inflation. However, Monetary Policy impacts these variables only in the long run. The most direct and immediate impact of Monetary Policy announcements such as changes in the interest rates are on the financial markets, mainly by affecting asset prices and returns of the companies. A number of economic studies reveal that stock market activities tend to be greatly influenced by Monetary Policy announcements. According to James Tobin (1978) links between Monetary Policy and stock prices can be explained through transmission mechanism. Changes in the Monetary Policy are transmitted through the stock market via changes in the cost of capital (private portfolio) to the companies. Financial economists are frequently asked to measure the effects of an economic event on the value of the

This paper investigates, whether monetary policy announcements contain any informational value to the stock market and examines the efficiency of the Indian stock market in the semi-strong form. An event study was conducted on fifty companies comprising the CNX Nifty index. The sample was divided into two different groups on the basis of good and bad announcements. The Abnormal Returns (ARs), Average Abnormal Returns (AARs) and Cumulative Average Abnormal Returns (CAARs) were computed based on the single index model using daily closing price data of companies and nifty. The behavior of these variables was examined for 15 days before and 15 days after the event day. The study found that the impact of the announcement on the event day may or may not be significant because sometimes event announcement has already been discounted by the market in advance, however during the event window of 31 days (i.e. -15 to +15) AARs and CAARs were positive for good news and negative for bad news on most of the days that clearly indicated that announcements possess important information which leads changes in the stock prices. The trend of CAARs indicated that it rose (good news) and declined (bad news) continuously even several days after the event day that reflected slow assimilation of information to the stock prices. Therefore the study concluded that monetary policy announcements hold important information to the stock market but the Indian stock market was not efficient in the semi strong form of Efficient Market Hypothesis (EMH) during the study period.

* Assistant Professor, Finance Area, FORE School of Management, New Delhi, India. Email: gaurav@fsm.ac.in ; drgauravagrawal@gmail.com

firm. On the surface it seems like a difficult task but a measure can be constructed easily using an event study. The most widespread use of the event study is in testing the Efficient Market Hypothesis (EMH). Efficiency is demonstrated by showing that the market response to an event takes place either before the event or very shortly after the event. Information is either anticipated or very quickly assimilated.

An efficient market is one that rapidly absorbs new information and adjusts the prices swiftly. Financial economists who have worked on the efficiency of stock market have realized that no stock market is absolutely efficient. Financial analyst and researchers have classified the stock market efficiency into three separate forms: weak, semi strong and strong form. The three forms of market efficiency have been the subject of intense research in the financial economics. Therefore, the objectives of this paper is to find out whether monetary policy announcements hold any informational value to the stock market that may lead to changes to the stock prices and to test the semi strong form of Efficient Market Hypothesis in the Indian stock market.

Literature Review

The issue of the impact of the monetary policy has long been debated by financial economists. Rozeff (1974) presents evidence that increase in the growth rate of money raises stock returns. One explanation for the unexpected inflation/ stock return correlation has been presented by Tobin (1978). Tobin argues that financial markets believe that news of inflation will generate a monetary tightening, that will reduce the present value of the future earnings and thus current stock returns. Boudoukh, Richardson and Whitelaw (1994) state that it's still an open question whether monetary policy affects the real economy and stock returns. Willem Thorbecke (1997) measured the impact of monetary policy by narrative indicators and event study and found that expansionary policy increases ex-post stock returns. A recent example using the event study framework to assess the effect of monetary policy on the stock market is Bernanke and Kuttner (2005). They find that an unexpected 25-basis-point cut in the target federal funds rate is associated with a 1% increase in equity prices. Related literature measuring the response of equity returns to monetary policy using the event study framework also includes Patelis (1997), Bomfin (2003), Craine and Martin (2003) and Bentzen (2004).

Extensive research has been conducted to check the semi strong form of Efficient Market Hypothesis (EMH) through event study. Perhaps the first published study is James Dolly (1933). In this work, he examines the changes in the stock prices at the time of stock split. Over the decades from the early 1930s until the late 1960s the level of sophistication of event studies increased. John H. Myres and Archie Bakav

(1948), C. Austin Barker (1956) and John Ashley (1962) are examples of studies during the time period. The improvements included removing general stock market price movements and separating out confounding events. In the late 1960s seminal studies by Ray Ball and Philip Brown (1968), and Eugene Fama et al. (1969) introduced the methodology that is essentially the same as that which is in use these days. Ball and Brown considered the information content of earnings and Fama studied the effects of stock splits after removing the effects of simultaneous dividend increases. Their results showed that the reaction of earning announcements and stock splits occurred quickly and, therefore, the EMH in the semi strong form holds good. Brown and Kennely (1972) studied the behavior of security prices by taking the quarterly earnings as the event and found that the results were consistent with the semi strong form of EMH. Basu (1977) tested the predictive content of Price Earnings multiples and concluded that the results was a contradiction of semi strong form of EMH. According to Brown (1979), stock markets failed to adjust instantaneously to the new earnings per share information. Obaidullah (1992) examined the bonus issue and showed that the market was capable of reacting to bonus issue. Narayan Rao (1994), who examined the share price responses to some of the corporate financial policy announcements, reported that the stock market is efficient in the semi strong form. Bajaj and Vizh (1995) found that all dividend announcements without any ex-post selection criteria are accompanied by positive average excess returns. Mohanty (2002) found that companies, which announced buy back, yielded excess returns even after three months after the announcement date thus, casting doubts about the Indian stock market being semi strong form.

It is clear from the literature review, that considerable research has been undertaken to check the semi strong form of the financial markets, but mostly through company based micro indicators like earnings, price earning ratio, dividend, bonus shares etc. Very few studies have been conducted to measure the impact of macro indicators on the stock market using event study especially in India. Therefore this paper focuses that how financial markets react to the monetary policy announcements. The outline of the rest of paper is as follows. Section III discusses the research methodology; Section IV analyzes the empirical results and Section V concludes.

Research Methodology

(a) Data and their Sources

The data used in the study consist of 50 companies included in the CNX Nifty Index during 1st January 2006 to 31st August 2007. The study considers Nifty as a surrogate for the market portfolio. Nifty consists of large, liquid and well diversified 50 stocks which represent 25 sectors of the Indian economy. NSE website provides complete

details of daily closing prices of all the stocks that are the part of Nifty during the said period (www.nse-india.com).

(b) Methodology

In this study, Event Study methodology has been used to calculate Abnormal Returns (ARs), Average Abnormal Returns (AARs) and Cumulative Average Abnormal (CAARs) returns around the monetary policy announcements. We use an event window of 31 days i.e., 15 days before and 15 days after the event day. The event day is the date on which the RBI has announced the monetary policy. It is defined as $t = 0$. Fifteen days before the event day are designated as -15 to -1 and 15 days after the event day are designated as $+1$ to $+15$. Many researchers have used monthly, fortnightly or weekly data to analyze the impact of an event. In this study daily closing stock prices and Nifty index price are being used to check the impact of an event because weekly, fortnightly and monthly prices have a long time gap to measure the impact. The daily returns for each of the sample company for the event window period are computed as:

$$R_{it} = (P_{it} - P_{it-1}) / P_{it-1}$$

where P_{it} and P_{it-1} are respectively daily closing prices for company i at time t and $t - 1$ analogously, the actual returns for the market are also computed as:

$$R_{mt} = (I_t - I_{t-1}) / I_{t-1}$$

where, I_t and I_{t-1} are respectively daily closing index values at time t and $t - 1$.

The expected returns on a stock have been estimated using the market model of Sharpe (1964)

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

where R_{it} is the return on security i at time t , R_{mt} is the return on the market index at time t , α_i is the estimate of the intercept for share of company i , β_i is the estimate for beta for share of company i and ϵ_{it} is the independently and identically distributed residual error term. In the next step we compute the 'abnormal' returns for each of the sample company for the window period.

The Abnormal return is defined as the actual return minus the expected return. The abnormal return for company i on day t is calculated as:

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt}$$

In order to eliminate the effect of any one or group of securities on the abnormal returns, the ARs are averaged over the number of companies. The ARs of individual companies are averaged for each day surrounding the event day (i.e., -15 to $+15$

days)

$$(AAR_t) = \sum_{i=1}^N AR_{it} / N$$

With a view to know the cumulative effect of AARs on days surrounding the event, we calculate the Cumulative Average Abnormal Return (CAAR) for event days t_1 through t_2 by summing the average abnormal returns for these days: i.e.

$$(CAAR_d) = \sum_{t=t_1}^{t_2} AAR_t$$

(c) Events

In the fast growing Indian economy, during the last couple of years RBI (Central Bank of India) is using its monetary quantitative tools mainly CRR (Cash Reserve Ratio) to control inflation. This study considers RBI liberal/ neutral policy (i.e. cuts the CRR and release money to the market/keeps CRR unchanged) as ‘good’ news; because during fast economic growth inflation is likely to increase and most of the time market expects that RBI may increase the CRR to maintain inflation. Therefore even after the inflationary conditions in the economy if RBI cuts the CRR/keeps CRR unchanged this announcement is accepted positively by the market. While it considers ‘bad’ news to the market when policy is stringent (i.e. increases the CRR and reduce money from the market).

Six events have been identified and classified into two groups for this study, first group comprises of three good events respectively on 18th April 2006; 25th July 2006 and 24th April 2007 when contrary to popular belief to control inflation, RBI left CRR unchanged. Second group comprises of three bad events respectively on 11th December 2006; 30th March 2007 and 31st July 2007 when to curb the inflation RBI announced to hike CRR Source: (economicstimes.indiatimes.com/archive/year-2006/07).

(d) Test Statistics

The test statistics is calculated using the cross sectional standard deviation. The advantage of using the cross sectional estimator is its robustness to an increase in the variance of stock abnormal returns around the event day i.e. the cross sectional test is well specified for event day variance increases (Asquith, 1983). The cross sectional t-test employing the cross sectional variance estimator is computed as

$$\frac{AAR_t}{S^2 / \sqrt{N}} \text{ where } S^2 = \frac{1}{N} \sum_{i=1}^N \frac{(AR_{it} - AAR_t)^2}{N-1}$$

The conclusions are based on the results of t-values for CAAR after the event day. These values were tested for hypothesized CAARs to be equal to zero. The level of significance used at 5% with 14 degree of freedom. The rejection regions fall on both sides of t distribution. The critical value of t is 2.145.

Results and Discussions

Table 1 presents the Average Abnormal Returns (AARs), Cumulative Average Abnormal Returns (CAARs) and their respective t values for ‘good news’ on 18th April 2006, 25th July 2006 and 24th April 2007 respectively. It reveals that on 18th April 2006 AAR is negative (-0.00682) with t value (-1.90274) which is insignificant at 5%, while the CAAR on the announcement day is positive (0.039717) with t value (11.07392) which is significant at 5%. Again on 25th July 2006 AAR is (0.00238) with t value (2.33216) which is significant at 5% and CAAR on the announcement day is (0.01688) with t value (16.54457) which is also significant at 5%. Similarly on 24th April 2007 AAR is (0.00603) with t value (4.28234) which is significant at 5% and CAAR on the announcement day is (0.01926) with t value (13.67430) which is also significant at 5%. It indicates that the impact of the event may or may not realize on the event day because sometimes event announcement has already been discounted by the market in advance but the real impact of the announcements realized by the investors through accumulated returns before and after the event. As the news is good news for all the three specified days, CAAR on all the three event days are significant with positive value.

Table 1: AARs, CAARs and ‘t’ of the good news events

AARs, CAARs and ‘t’	18 th April 2006	25 th July 2006	24 th April 2007
AARs on the event day	-0.00682	0.00238	0.00603
t value	-1.90274	2.33216*	4.28234*
CAARs on the event day	0.03971	0.01688	0.01926
t value	11.07392*	16.54457*	13.6743*
AARs positive / negative during the event window	(p) 20 days (n) 11 days	(p) 22 days (n) 09 days	(p) 20 days (n) 11 days

AARs positive (p) / negative (n) before the event day	(p) 12 days (n) 03 days	(p) 11 days (n) 04 days	(p) 08 days (n) 07 days
AARs positive / negative (n) after the event day	(p) 08 days (n) 07 days	(p) 10 days (n) 05 days	(p) 11 days (n) 04 days
CAARs positive / negative during the event window	(p) 30days (n) 01 days	(p) 25 days (n) 06 days	(p) 22 days (n) 09 days
CAARs positive / negative before the event day	(p) 15days (n) 00 days	(p) 09 days (n) 06 days	(p) 06 days (n) 09 days
CAARs positive / negative after the event day	(p) 14days (n) 01 days	(p) 15 days (n) 00 days	(p) 15 days (n) 00 days
CAARs significant values during the event window	(p) 26 (n) 0	(p) 22 (n) 05	(p) 20 (n) 08
CAARs significant values before the event	(p) 13 (n) 0	(p) 08 (n) 05	(p) 06 (n) 08
CAARs significant values after the event	(p) 12 (n) 0	(p) 15 (n) 0	(p) 15 (n) 0

* indicate significant at 5% level & (p) Positive (n) Negative

A look at Table 1 reveals that out of the total 31 days (event window for 18th April 2006), ARR values on 20 days (64.51%) are positive and on 11 days (35.49%) are negative. Again it is clear from the table that AARs values are positive on 12 days (80%) and negative on 03 days (20%) before the event day, but positive on 08 days (53.34%) and negative on 07 days (46.66%) after the event day. Again out of the total 31 days (event window for 25th July), ARR values on 22 days (70.96%) are positive and on 09 days (29.03%) are negative. It is also clear from the table that AARs values are positive on 11 days (73.33%) and negative on 04 days (26.66%) before the event day, but positive on 10 days (66.66%) and negative on 05 days (33.33%) after the event day. Similarly out of the total 31 days (event window for 24th April 2007), ARR values on 20 days (64.51%) are positive and on 11 days

(35.49%) are negative. Again it is clear from the table that AARs values are positive on 08 days (53.33%) and negative on 07 days (46.66%) before the event day, but positive on 11 days (73.33%) and negative on 04 days (26.66%) after the event day. Even from the appendix (table A,B,C) it is clear that most of the ARR for all the three event days are not significantly different from zero and do not support that returns are abnormal. But as we are aware of that cumulative earnings CAARs are better indicator to the presence of abnormal returns because the standard deviations for the combination of positive AARs tend to be higher than the mean values.

It is also clear from Table 1 that out of total 31 days (event window for 18th April 2006), CAARs on 30 days (96.77%) are positive and only 01 day (3.33%) is negative. Again all the CAAR values (100%) are positive before the event day while positive on 14 days (93.33%) and negative only 01 day (6.67%) after the event. Further it is interesting to note that out of total 31 days CAAR values on 26 days (83.87%) fall to the right of the rejection region and only on 05 days (16.13%) values are insignificant. It is also clear that 13 positive significant values are before the event and 12 positive significant values from the event day onwards. Again out of total 31 days (event window for 25th July 2006), CAARs on 25 days (80.64%) are positive and 06 days (19.35%) is negative. Again CAAR on 09 days (60%) are positive and on 06 days (40%) negative before the event day while positive on all the 15 days (100%) after the event. Further it is interesting to note that out of total 31 days CAAR values on 29 days (93.54%) fall to the right of the rejection region and only on 02 days (6.45%) values are insignificant. It is also clear that 08 positive significant values and 05 negative significant values are before the event and 15 positive significant values from the event day onwards. Similarly out of total 31 days (event window for 24th April 2007), CAARs on 22 days (70.96%) are positive and 09 days (29.03%) is negative. Again CAAR on 06 days (40%) are positive and on 09 days (60%) negative before the event day while positive on all the 15 days (100%) after the event. Further it is interesting to note that out of total 31 days CAAR values on 30 days (96.77%) fall to the right of the rejection region and only 01 day (3.22%) value is insignificant. It is also clear that 06 positive significant values and 08 negative significant values are before the event and 15 positive significant values from the event day onwards. From the aforesaid information (esp. CAARs significant values) about all the three event days clearly indicates that investors were expecting good news before the announcement. It suggests that monetary policy announcements content important information to the investors. Again CAARs in all the three cases show that abnormal positive returns are present even after several days, it means volatility is not going down to normal gradually. Therefore, findings suggest that Indian market is not efficient in the semi strong form.

Table 2: AARs, CAARs and 't' of the bad news events

AARs, CAARs & 't'	11 th Dec. 2006	30 th March 2007	31 st July 2007
AARs on the event day	-0.01629	0.00323	-0.01176
t value	-13.5273*	1.47891	-7.64565*
CAARs on the event day	-0.01161	-0.00783	-0.01121
t value	-9.64043*	-3.22622*	-7.28873*
AARs positive / negative during the event window	(p) 18 days (n) 13 days	(p) 13 days (n) 18 days	(p) 16 days (n) 15 days
AARs positive / negative (n) before the event day	(p) 08 days (n) 07 days	(p) 06 days (n) 09 days	(p) 10 days (n) 05 days
AARs positive / negative (n) after the event day	(p) 10 days (n) 05 days	(p) 06 days (n) 09 days	(p) 06 days (n) 09 days
CAARs positive / negative during the event window	(p) 15 days (n) 16 days	(p) 08 days (n) 23 days	(p) 13 days (n) 18 days
CAARs positive / negative before the event day	(p) 15 days (n) 00 days	(p) 04 days (n) 11 days	(p) 13 days (n) 02 days
CAARs positive / negative after the event day	(p) 00 days (n) 15 days	(p) 04 days (n) 11 days	(p) 00 days (n) 15 days
CAARs significant values during the event window	(p) 14 (n) 14	(p) 00 (n) 15	(p) 13 (n) 17
CAARs significant values before the event	(p) 14 (n) 00	(p) 08 (n) 00	(p) 13 (n) 01
CAARs significant values after the event	(p) 00 (n) 13	(p) 00 (n) 06	(p) 00 (n) 15

* indicate significant at 5% level & (p) Positive (n) Negative

Table 2 presents the Average Abnormal Returns (AARs), Cumulative Average Abnormal Returns (CAARs) and their respective t values for 'bad news' on 11th December 2006, 30th March 2007 and 31st July 2007 respectively. It reveals that on 11th December 2006 AAR is negative (-0.01629) with t value (-13.5273) which is significant at 5% and the CAAR on the announcement day is (-0.01161) with t value (-9.64043) which is significant at 5%. Again on 30th March 2007 AAR is (0.00323) with t value (1.47891) which is insignificant at 5% and CAAR on the announcement day is (-0.00783) with t value (-3.22622) which is significant at 5%. Similarly on 31st July 2007 AAR is (-0.01176) with t value (-7.64565) which is significant at 5% and CAAR on the announcement day is (-0.01121) with t value (-7.28873) which is also significant at 5%.

It indicates that the impact of the event may or may not realize on the event day because sometimes event announcement has already been discounted by the market in advance but the real impact of the announcements is realized by the investors through accumulated returns before and after the event. As the news is bad news for all the three specified days, CAAR on all the three event days are significant with negative value.

A look at Table 2 reveals that out of the total 31 days (event window for 11th December 2006), ARR values on 18 days (58.06%) are positive and on 13 days (41.93%) are negative. Again it is clear from the table that AARs values are positive on 08 days (53.33%) and negative on 07 days (46.66%) before the event day and positive on 10 days (66.66%) and negative on 05 days (33.33%) after the event day. Again out of the total 31 days (event window for 30th April 2007), ARR values on 13 days (41.93%) are positive and on 18 days (58.06%) are negative. It is also clear from the table that AARs values are positive on 06 days (40%) and negative on 09 days (60%) before the event day as well as after the event. Similarly out of the total 31 days (event window for 31st July 2007) ARR values on 16 days (51.61%) are positive and on 15 days (48.38%) are negative. Again it is clear from the table that AARs values are positive on 10 days (66.66%) and negative on 05 days (33.33%) before the event day, but positive on 06 days (40%) and negative on 09 days (60%) after the event day. Even from the appendix (table d,e,f) it is clear that most of the ARR for all the three events day are not significantly different from zero and do not support that returns are abnormal. But as we are aware of that cumulative earnings CAARs are better indicator to the presence of abnormal returns because the standard deviations for the combination of negative AARs tend to be lower than the mean values.

It is also clear from Table 2 that out of total 31 days (event window for 11th December 2006), CAARs on 15 days (48.38%) are positive and 16 days (51.61%) are negative.

Again all the CAAR values (100%) are positive before the event day while negative on all 15 days (100%) after the event. Further it is interesting to note that out of total 31 days CAAR values on 28 days (90.32%) are significant and only on 03 days (9.6774%) values are insignificant. It is also clear that 14 positive significant values are before the event and 13 negative significant values from the event day onwards. Again out of total 31 days (event window for 30th March 2007), CAARs on 08 days (25.80%) are positive and 23 days (74.19%) is negative. Again CAAR on 04 days (26.66%) are positive and on 11 days (73.33%) negative before the event day as well as after the event. Further it is interesting to note that out of total 31 days CAAR values on 15 days (48.38%) are significant and on 16 days (51.61%) values are insignificant. It is also clear that 08 positive significant values are before the event and 06 negative significant values from the event day onwards. Similarly out of total 31 days (event window for 31st July 2007), CAARs on 13 days (41.93%) are positive and 18 days (58.06%) is negative. Again CAAR on 13 days (86.66%) are positive and on 02 days (13.33%) negative before the event day while negative on all the 15 days (100%) after the event. Further it is interesting to note that out of total 31 days CAAR values on 30 days (96.77%) are significant and only 01 day (3.22%) value is insignificant. It is also clear that 13 positive significant values and 02 negative significant values are before the event and 15 negative significant values from the event day onwards. From the aforesaid information (esp. CAARs significant values) about all the three event days clearly indicates that abnormal negative returns are present even after several days, it means volatility is not going down to normal gradually. Therefore, findings suggest that Indian market is not efficient in the semi strong form. AARs and CAARs are also presented graphically in figure (7 to 12).

Conclusions

This study is an effort to understand whether monetary policy announcements hold any informational content to the stock market that may lead to changes to the stock prices and to test whether the semi strong form of efficient market hypothesis holds in the Indian stock market. An event study is used to examine the effect of monetary policy announcement on the stock prices. In order to examine the impact study has been divided into two different groups on the basis of 'good' news (18th April 2006, 25th July 2006 and 24th April 2007 when RBI kept CRR unchanged) and 'bad' news (11th December 2006, 30th March 2007 and 31st July 2007 when RBI hiked CRR). In an efficient market, the AAR should tend to be zero and CAAR should rise before the event and taper off after the event. It indicates that abnormal returns / losses are not possible after the policy announcements. The study found that on 18th April 2006, 25th July 2006 and 24th April 2007 in case of good news, out of total 15 days after the event CAARs are positive on 14, 15 and 15 days respectively while on 11th December

2006, 30th March 2007 and 31st July 2007 in case of bad news event CAARs are negative 15, 11 and 15 days respectively. It indicates that monetary policy holds informational value to the stock market. Again in case of good news CAARs after the event are significantly (t test) greater than zero on 12, 15 and 15 days and no negative value significantly less than zero while in case of bad news are significantly less than zero on 13, 06 and 15 days and no positive value significantly greater than zero. It indicates CAARs is not going down gradually to the normal levels, means market is slow in incorporating the information content of monetary policy announcements. Therefore, we can conclude that monetary policy announcements contain important information which leads changes in the stock prices but Indian stock market is not efficient in the semi strong form of efficient market hypothesis. The evidence presented here suggests several directions of future research for financial economist. First, from the study it is clear that monetary policy leaves an impact on the stock prices, however very few studies try to reveal why it affects stock returns. For example, Campbell and Mei (1993) have shown that an asset's beta with a common factor can be decomposed into portions representing the covariance of news about (a) expected future cash flows, (b) expected future interest rates and (c) expected returns with the risk factor. Thus Campbell and Mei's method can shed light on the channels through which monetary policy affects stock returns. A second direction for future research builds on the work of Fama and French (1995). They argue that firm size proxies for sensitivity to an unknown risk factor. They also find that small stocks have lower earnings on book equity than big stocks. Therefore, in the Indian context we can extend the research work that how monetary policy leaves an impact on the future cash flows and why this impact is different for different size of companies.

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Appendix

Table a : AARs, CAARs and 't' surrounding the event day (good news, 18th April 2006)

Days	AAR (%)	't' value	CAAR (%)	't' value
-15	0.004669	1.655711	0.004669	1.65566
-14	0.002926	0.91821	0.00759488	2.383451*
-13	-0.00076	-0.27107	0.006835285	2.439203*
-12	0.000863	0.32118	0.007698311	2.864968*
-11	0.004725	1.320056	0.01242288	3.470982*
-10	-0.0024	-0.6389	0.0100256	2.671936*
-9	0.005493	1.465246	0.015518802	4.139456*
-8	0.00415	1.701967	0.019669193	8.065823*
-7	0.009962	2.271458*	0.029631098	6.756318*
-6	0.007482	2.487458*	0.037113393	12.33819*
-5	0.000152	0.04213	0.037265183	10.34325*

-4	0.003587	1.107891	0.040851713	12.61922*
-3	0.00547	1.62644	0.04632135	13.77402*
-2	-0.00559	-1.77972	0.040727576	12.95794*
-1	0.005814	1.50228	0.04654112	12.02671*
0	-0.00682	-1.90274	0.039716891	11.07392*
1	-0.00338	-0.99601	0.036336739	10.70715*
2	-0.00055	-0.1772	0.03578615	11.51755*
3	0.00423	1.386063	0.040016613	13.11099*
4	-0.01974	-1.04933	0.020280272	1.078248
5	0.001746	0.607554	0.022026457	7.663713*
6	0.000327	0.092951	0.022352998	6.362878*
7	0.003008	0.852899	0.025361257	7.190403*
8	0.004229	1.028548	0.029590267	7.196723*
9	0.004453	1.399666	0.034043293	10.70042*
10	0.001211	0.267774	0.035254348	7.795028*
11	0.002185	0.743328	0.037439063	12.73828*
12	-0.00056	-0.17312	0.036875511	11.32769*
13	-0.03052	-0.91477	0.006359663	0.190643
14	-0.003	-1.43086	0.003359178	1.601909
15	-0.00336	-1.26193	-4.04348E-07	-0.00015

* indicates significant at 5% level

Table b: AARs, CAARs and 't' surrounding the event day (good news, 25th July 2006)

Days	AAR (%)	't' Value	CAAR (%)	't' Value
-15	-0.002968874	-2.324099763*	-0.00297	-2.32498122*
-14	0.006430704	5.196842711*	0.003460704	2.796697587*
-13	-0.008252866	-10.37144682*	-0.004792162	-6.022350701*

-12	-0.013684488	-11.39785292*	-0.01847665	-15.38925966*
-11	0.010565552	10.11546072*	-0.007911098	-7.574086152*
-10	-0.007237174	-5.713991071*	-0.015148272	-11.96006769*
-9	0.014487152	7.72042266*	-0.00066112	-0.352320858
-8	0.002134	2.114921286	0.00147288	1.459711932
-7	0.003654	3.335679829*	0.00512688	4.680249098*
-6	0.004351	2.726520897*	0.00947788	5.939241067*
-5	0.000153	0.127174877	0.00963088	8.005267861*
-4	0.000162	0.102627044	0.00979288	6.203792125*
-3	0.00186	1.522270931	0.01165288	9.537011012*
-2	0.000541	0.410921784	0.01219388	9.261979519*
-1	0.00231	2.040637731	0.01450388	12.81262544*
0	0.00238	2.332169396*	0.01688388	16.54456648*
1	0.000243	0.216349159	0.01712688	15.24850238*
2	0.000412	0.329016813	0.01753888	14.00627768*
3	0.000871	0.716668048	0.01840988	15.14784474*
4	0.001535088	1.316602999	0.019944968	17.10625364*
5	0.0000421	0.044159467	0.019987068	20.96480461*
6	0.000318	0.346138895	0.020305068	22.10180438*
7	-0.003167	-3.951595129*	0.017138068	21.38386676*
8	-0.004461356	-4.393788034*	0.012676712	12.48472112*
9	-0.005651632	-6.884086799*	0.00702508	8.557043433*
10	0.009622264	9.968056594*	0.016647344	17.24559492*
11	-0.00941	-10.15791767*	0.007237344	7.81257646*
12	-0.000711706	-0.792314617	0.006525638	7.264739051*
13	0.001175542	0.998172611	0.00770118	6.5392023*
14	0.004965364	5.282832016*	0.012666544	13.47639854*
15	0.0046356	3.751409111*	0.017302144	14.00194595*

* indicates significant at 5% level

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Table c: AARs, CAARs and 't' surrounding the event day (good news, 24th April 2007)

Days	ARR (%)	't' Value	CARR (%)	't' Value
-15	-0.031889272	-14.94193516*	-0.03189	-17.40350332*
-14	0.0083441	10.12212166*	-0.0235459	-28.56323204*
-13	0.00518801	4.823201577*	-0.01835789	-17.0670072*
-12	-0.000313838	-0.395473844	-0.018671728	-23.52863595*
-11	0.012273294	12.58654061*	-0.006398434	-6.561738795*
-10	-0.002165578	-2.52066456*	-0.008564012	-9.968240138*
-9	0.00086244	0.782685579	-0.007701572	-6.989366611*
-8	-0.006252822	-6.923224805*	-0.013954394	-15.45052885*
-7	0.012167652	10.47940691*	-0.001786742	-1.538833989
-6	0.012967242	12.13888353*	0.0111805	10.46628013*
-5	-0.00675077	-7.327294907*	0.00442973	4.808034946*
-4	0.002898306	2.897011104*	0.007328036	7.324762004*
-3	-0.003953564	-5.846434897*	0.003374472	4.990087642*
-2	0.012021918	11.24351857*	0.01539639	14.39949905*
-1	-0.002168246	-2.229783296*	0.013228144	13.60357382*
0	0.006031482	4.282342875*	0.019259626	13.67430462*
1	0.000968828	0.949094534	0.020228454	19.81643296*
2	0.0000189	0.023026145	0.020247354	24.66764596*
3	0.00000231	0.00180166	0.020249664	15.79350918*
4	0.000156	0.130288109	0.020405664	17.0424062*
5	0.007133214	6.856860345*	0.027538878	26.47197189*
6	0.00000127	0.001420341	0.027540148	30.80031547*
7	0.00000876	0.012171032	0.027548908	38.27609982*
8	-0.007027318	-10.59657452*	0.02052159	30.94474416*
9	-0.00236121	-2.920982933*	0.01816038	22.46566804*
10	-0.004082216	-4.532984563*	0.014078164	15.63271029*

11	0.00097842	1.054952902	0.015056584	16.23432369*
12	0.006991806	7.869048821*	0.02204839	24.81474133*
13	-0.004797824	-5.006082166*	0.017250566	17.99935779*
14	0.006474412	6.999921134*	0.023724978	25.65066525*
15	0.0000623	0.07742679	0.023787278	29.56296258*

* indicate significant at 5% level

Table d: AARs, CAARs and 't' surrounding the event day (bad news, 11th Dec. 2006)

Days	AAR (%)	't' Value	CAAR (%)	't' value
-15	0.002044476	1.830730632	0.002044	1.830304835
-14	0.008622861	11.82333391*	0.010666861	14.62598768*
-13	0.004409782	4.647269824*	0.015076643	15.88859341*
-12	-0.00341179	-3.456584303*	0.011664853	11.81800474*
-11	-0.000709373	-1.001593361	0.01095548	15.46848888*
-10	0.002328861	2.858982747*	0.013284341	16.30827153*
-9	-0.007637124	-9.362271888*	0.005647216	6.922864061*
-8	-0.000981463	-1.23726524	0.004665753	5.881803514*
-7	0.005690902	5.563758828*	0.010356655	10.12527203*
-6	0.004159131	4.679216513*	0.014515786	16.33093801*
-5	-0.002010208	-2.036345304	0.012505578	12.66817765*
-4	0.002640394	3.055456416*	0.015145971	17.52687581*
-3	0.000502065	0.736849085	0.015648037	22.96562103*
-2	-0.001521331	-1.971544003	0.014126706	18.30727819*
-1	-0.009445541	-12.03862107*	0.004681165	5.966283603*
0	-0.016291651	-13.52729288*	-0.011610486	-9.640425057*
1	-0.021299149	-18.06926792*	-0.032909635	-27.91909699*
2	0.006337671	5.289002758*	-0.026571963	-22.17520876*
3	0.01120909	11.89455599*	-0.015362873	-16.30235479*
4	0.00537249	5.927937742*	-0.009990384	-11.02326383*

5	0.006284639	5.406862832*	-0.003705745	-3.188163245*
6	-0.015942147	-19.00977924*	-0.019647892	-23.42859388*
7	-0.00294642	-3.42894092*	-0.022594312	-26.29446959*
8	0.001490173	2.203954834*	-0.021104139	-31.21285517*
9	0.00478662	6.937426879*	-0.016317518	-23.6495859*
10	0.009893798	13.77512198*	-0.00642372	-8.943737538*
11	0.004030149	5.850958426*	-0.002393571	-3.474979954*
12	-0.000840186	-1.210265584	-0.003233757	-4.658142729*
13	-0.002541769	-3.332252873*	-0.005775527	-7.571699844*
14	0.004194822	4.74710318*	-0.001580704	-1.788815966
15	0.001580243	1.973655178	-4.61224E-07	-0.000576049

* indicate significant at 5% level

Table e : AARs, CAARs and 't' surrounding the event day (bad news, 30th March 2007)

Days	AAR (%)	't' value	CAAR (%)	't' value
-15	0.003858	1.068211	0.003858	1.06817459
-14	-0.00333	-1.06798	0.00053	0.16995977
-13	-0.00087	-0.31651	-0.00034	-0.123206
-12	0.001434	0.596466	0.001096	0.45602142
-11	0.002255	1.089186	0.003352	1.61853523
-10	-0.01314	-0.94404	-0.00979	-0.7032812
-9	0.000548	0.240584	-0.00924	-4.0595156*
-8	-0.0015	-0.69452	-0.01075	-4.9672614*
-7	0.006789	2.64964*	-0.00396	-1.5441176
-6	-0.00349	-1.41264	-0.00744	-3.014682*
-5	-0.00099	-0.36852	-0.00844	-3.1293773*
-4	0.000941	0.333807	-0.0075	-2.6610522*
-3	-0.00101	-0.5462	-0.00851	-4.6116839*
-2	-0.00028	-0.11575	-0.00879	-3.590684*

-1	-0.00228	-0.79444	-0.01107	-3.8573719*
0	0.003238	1.334127	-0.00783	-3.2262285*
1	5.43E-05	0.030199	-0.00778	-4.3239218*
2	-0.00102	-0.53479	-0.0088	-4.5962062*
3	-0.00013	-0.03682	-0.00893	-2.4974489*
4	0.003026	1.478913	-0.00591	-2.8861091*
5	-0.00019	-0.10656	-0.0061	-3.3790117*
6	0.005329	2.241666*	-0.00077	-0.3233213
7	-0.00138	-0.41757	-0.00215	-0.6502655
8	-0.00097	-0.41658	-0.00312	-1.340573
9	-0.00015	-0.05659	-0.00327	-1.2111244
10	0.001779	0.634918	-0.00149	-0.532027
11	0.003046	1.142317	0.001556	0.58344858
12	0.002286	0.758694	0.003842	1.27504052
13	0.00097	0.471268	0.004813	2.33725136*
14	-0.00226	-0.95886	0.002548	1.07894103
15	-0.00255	-0.82907	-1.5E-07	-4.945E-05

* indicate significant at 5% level

Table f: AARs, CAARs and 't' surrounding the event day (bad news, 31st July 2007)

Days	ARR (%)	't' Value	CAAR (%)	't' Value
-15	-0.00114077	-1.105652116	-0.00114	-1.10490582
-14	-0.002267944	-2.138970786	-0.003407944	-3.214141379*
-13	0.0062663	4.789700189*	0.002858356	2.184808942*
-12	0.007969404	5.293397264*	0.01082776	7.191960046*
-11	0.001975784	1.537862327	0.012803544	9.965708787*
-10	4.3166E-05	0.030711505	0.01284671	9.140105524*
-9	0.001140776	1.033091758	0.013987486	12.66712878*
-8	0.009154316	7.094453423*	0.023141802	17.9345389*
-7	0.003319996	3.206549965*	0.026461798	25.55758424*

-6	0.007743918	5.195755982*	0.034205716	22.95021119*
-5	0.002009584	1.673872923	0.0362153	30.16535266*
-4	-0.001380462	-1.020955222	0.034834838	25.76297629*
-3	0.003060408	1.73879695	0.037895246	21.53050776*
-2	-0.018212312	-12.93118323*	0.019682934	13.97536052*
-1	-0.000586146	-0.406497716	0.019096788	13.24380052*
0	-0.01176	-7.645653852*	-0.011211	-7.288726644*
1	-0.019149542	-15.10977978*	-0.030360542	-23.95572195*
2	-0.001583	-1.442383689	-0.031943542	-29.10602903*
3	-0.001723	-1.919513967	-0.033666542	-37.50632478*
4	-0.006387354	-5.156727348*	-0.040053896	-32.33686764*
5	0.010078	10.25567579*	-0.029975896	-30.50437298*
6	0.013405678	12.33045598*	-0.016570218	-15.24117942*
7	-0.006098898	-6.016025073*	-0.022669116	-22.36108396*
8	-0.007673022	-6.033904173*	-0.030342138	-23.86042332*
9	0.00231	2.80589686*	-0.028032138	-34.04990823*
10	0.000864452	1.123548529	-0.027167686	-35.31047836*
11	-0.023402996	-14.66577667*	-0.050570682	-31.69074286*
12	-0.007144194	-4.705472556*	-0.057714876	-38.01349251*
13	0.01483472	9.938034549*	-0.042880156	-28.72615538*
14	-0.0000176	-0.01474551	-0.042897756	-35.94030091
15	0.012789572	9.043597058	-0.030108184	-21.28971042

* indicate significant at 5% level

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