

Introduction of Reliance Jio and Telecom Stock Returns : A Test of Competition Hypothesis in the Bombay Stock Exchange

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Abstract

The telecommunication sector is one of the fast-developing sectors in India. Hence, many investors like to invest in telecommunication companies. This sector has been experiencing big events during the current decade such as 2G spectrum auction and scams, 3G and 4G spectrum allocations, etc. On September 1, 2016, a big business concern, Reliance Industries Ltd. introduced their new-product Reliance Jio network services through their subsidiary company with attractive offers both for voice call and 4G Internet mobile services. It threatened other mobile service providers who want to retain their market share. The study analyzed the impact of the event on the telecommunication sector in India using standard event study methodology. The study found that the telecommunication sector in India was affected by the introduction of Jio services as shown by returns on BSE Telecom index (-5.67%). There was a significant impact on sample companies (listed mobile network service providers). On the date of the event, the average abnormal returns was -6.695%. It was also seen that there was a significant sustaining impact on sample companies in the market as shown by the results of CAR. Among the sample companies, Idea Cellular Ltd. was affected severely by the event followed by Reliance Communications Ltd., but there was severe sustaining effect of the event on the abnormal returns of Idea Cellular Ltd. followed by that of Bharti Airtel Ltd.

Keywords : event, return, abnormal return, expected return and telecommunication.

JEL Classification : G140, G170, G110

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Communication is playing a pivotal role in modern life of people. Communication technologies have been upgraded frequently in recent decades. Telephone is the initial invention of modern communication system. Mobile phone technology has become very popular among people, especially usage of internet through smart phone has increased drastically. Telecommunication sector in India is one of the largest and fastest growing sectors of the Indian economy as mobile phone services have become a necessity for people. Initially, mobile phones were used for voice communication and sending text messages (SMS). Major incomes of telecommunication companies were derived from sale of SIM cards, recharge for voice call, text messages by pre-paid customers and usage charges paid by post paid customers.

Invention of smart phones and technological upgradation of internet services such as 2G, 3G, and 4G gives value added services to customers, the customers are attracted more by these facilities, hence income from sale of internet services has occupied one of the major parts of incomes of telecommunication companies. In order to attract new customers and to retain existing customers the telecommunication companies offer attractive internet

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and voice call plans and they are eager to introduce new technology for providing internet services like 2G to 3G and 3G to 4G. This has created more competition among telecommunication companies in the recent decade. Some companies could not compete with big companies and they either went out of business or merged with big companies such as Virgin mobiles, Uninor, Videocon, Spice etc. Leading telecommunication service providing companies in India are Airtel, Idea Cellular, Tata, Reliance Communications, BSNL, MTNL, MTS, Vodafone, and Aircel. Apart from these companies, telecommunication infrastructure providing companies in India are also operating in India, for example, GTL Ltd., GTL Infrastructure Ltd., ITI Ltd., Aksh Optifibre Ltd. etc. Scripts of 13 big telecommunication companies are actively traded on stock market in India. Bombay Stock Exchange is one of the oldest and biggest stock exchanges in India. SENSEX is the popular index of the exchange. Apart from this index the exchange maintains broad based indices such as BSE 100, BSE 200 BSE 500 and sector-wise indices also. The exchange maintains separate index for telecommunication companies called 'BSE Telecom'. A total of 13 telecommunication companies are constituents of the index, of which four companies are providing mobile network services and others are infrastructure providers, fixed line providers and telecommunication instrument manufacturers. Bharti Airtel, Idea Cellular, Tata Teleservices and Reliance communication are actively traded scripts on the index. Reliance Industries Ltd. is one of the giant companies in India. The company has formed a subsidiary company called Reliance Jio Infocom Ltd. in order to provide mobile phone services throughout the country.

Now users of smart phones spend not only for voice call but also for internet packages in order to get value added services. Mobile internet has been passing through various technologies from 2G to 4G. Recharge for internet packages is contributing to major portion of income of telecommunication companies rather than recharge for voice calls. In the midst of stiff competition in the market of telecommunication products, Reliance Jio SIM card was introduced in August 2016. It threatened other telecommunication companies and they were worried about the future plan of reliance Jio. In this situation Reliance Industries Ltd. called its annual general meeting on 1st September, 2016 to unveil its plans for Jio network. Chairman of the company Mr. Mukesh Ambani, who is one of the most famous businessmen in the country offered cost free Jio SIM card with lifetime free calls on its network. Another highlight of the announcement was offering of 1 GB 4G data pack for less than ₹ 60. Even though there are opinions for and against the market strategy of Jio, it had a great impact on the telecommunication sector, especially, on mobile phone service providers. It increased competition in the telecommunication sector. This impact was also found in the market and also on telecommunication companies. Hence, we made an attempt to study the effect of information with respect to competition content in telecommunication sector by introduction of Reliance Jio using event study methodology. For this purpose, the study framed a competition hypothesis that competition in telecommunication sector has no significant impact on market returns.

Literature Review

Mackinlay (1997) in his empirical research concluded that event studies had shown results that would be expected in a rational market place. Price does respond to new information. He also stated that event study will continue to be a valuable and widely used tool in economics and finance. Wilcox, Chang, and Grover (2001) in their study analyzed valuation of M&As in telecommunication industry in U.S. The study found that the event of M&A had positive impact on the telecommunication sector.

Park, Yang, Nam, and Ha (2002) investigated the effects of merger and acquisition on market return of telecommunication companies in the USA. The study found negative market reaction on cross-border M&As rather than domestic M&A deals on telecommunication companies as shown by the results of event study analysis. Eisenach, Lowengrub, and Miller (2008) analyzed economic implication of the FCC's UNE decision on telecommunication industry using event study methodology. The study evidenced that the above said event

had substantial negative effect on RBOC's market value. Konchitchki and O'Leary (2011) in their paper summarized event study methodologies used in prior researches. The researchers pointed out issues in various event study methodologies dealt in their study and recommendations offered on the issues.

Jayaraman, Ramarathinam, and Ganapathy (2011) undertook a study to analyze possibilities for earning Superior Risk Adjusted Returns of selected stocks by trading on earning announcement. The researchers found that there was no impact of announcement of dividend on the rate of return of State Bank of India and HDFC bank stocks from the date of declaration of dividend. Rajagopalan and Shankar (2012) found statistically significant abnormal return of 1.32% on the day of announcement of buyback of shares and a cumulative abnormal return of 5.13% in -10 to +10 event frame. The open market repurchases (OMRs) recorded mixed abnormal returns in a positive and negative spread around the shorter version of the event window (-10 to +10), thereby curtailing opportunities of earning abnormal returns in a sustainable way to support semi-strong efficiency of the market. Tripathi and Singh (2012) in their study analyzed the impact of the event declaration of separation on stock prices of Hero MotorCorp Ltd. The researchers found that there was abnormal return on the date of the event i.e. separation announcement between Hero & Honda.

McWilliams and Siegel (2012) examined the use of event studies in management studies. The researchers found that there was inadequate attention paid to theoretical and research design issues. They also outlined procedures for appropriate use of event study method. Lee, Seol, and Kweon (2012) analyzed the effects of first telecommunication spectrum action on the telecommunication sector in Korea. They used event study analysis. The study evidenced significant positive return both by the winners and the losers on the completion day of the auction.

Statement of the Problem

Reliance Jio mobile network services in India were launched on 1st September, 2016. The launch had a great impact on the telecommunication sector in terms of market return on account of heavy competition. As per the existing studies, market reacts on information about an event relevant to a company or industry. Sometimes event related to a particular company has greater impact on the whole industry depending on the nature of the event and level of competition created. On September 1, 2016 introduction of Reliance Jio services offered free SIM with free on net calls and low cost of 4G internet packages. The price offered was not offered by any mobile network service provider earlier and no one would have thought of offering services at such prices. This mega event increased competition in the telecommunication industry and threatened other mobile network service providers as it became difficult for them to retain their existing customers. This great impact may influence the share market also in terms of return on shares of competitive companies. Hence, the paper analyzed the impact of the event on return on sectoral index of BSE Telecom and impact on listed mobile network service providing companies. It reveals how the investors perceived the market after the event.

Objectives of the Study

The study had the following objectives:

- (i) To study the impact of introduction of Jio service on return on the index of BSE Telecom and,
- (ii) To test competition hypothesis in terms of the impact of introduction of Jio service on market return on listed mobile network service providers.

Methodology

The study was done to analyze the effect of introduction of Reliance Jio service on return on the index of BSE Telecom and listed telecommunication companies providing mobile phone network services. Reliance Jio SIM card was introduced with attractive plans on September 1, 2016. Hence, the date was taken as an event date and standard 'Event Study' methodology was adopted for analysis. This method is globally accepted and it was propounded and improved by various studies by Henderson (1990), Mackinlay (1997), and Brav (2000). According to the method, an event window was framed as five days before and five days after the event day. In order to estimate the return of scripts, an estimated window was framed for 150 days before the event window. Regression analysis was used for the purpose of estimation. As a broad based index BSE 500 was taken as an independent factor in order to estimate return on share price of Reliance Communications Ltd., Bharti Airtel, Tata Teleservices Ltd., and Idea Cellular Ltd. since these four companies are constituents of 'BSE Telecom' index and provide mobile network services. Others were not considered because they are either telecommunication infrastructure providers or instrument manufacturers. Share prices of the selected companies and the index of 'BSE Telecom' were collected on a daily basis for the period of 162 days from 14.01.2016 to 09.09.2016 (Bombay Stock Exchange, 2016).

In order to understand abnormal returns on the selected scripts caused by the selected event, estimated return was calculated considering data for 150 days using regression analysis. Abnormal return (AR) was calculated by deducting estimated return from actual return. It is considered as abnormal return caused by the event. Average abnormal return (ARR) was calculated by averaging the abnormal return of the selected companies. It revealed combined effect of the industry. The study also calculated cumulative average abnormal return (CAAR) in order to know sustainability effect of the event. Return on specific company is calculated as :

$$R_c = \frac{SP_{ct} - SP_{ct-1}}{SP_{ct-1}} \times 100 \quad \dots\dots\dots (1)$$

where,

R_c = Return on company 'c',

SP_c = Share price of company 'c',

t = current day and,

$t-1$ = previous day.

Return on BSE 500 index is calculated as :

$$R_m = \frac{M_t - M_{t-1}}{M_{t-1}} \times 100 \quad \dots\dots\dots (2)$$

where,

R_m = Return on BSE 500,

M = Index of BSE 500,

t = current day and,

$t-1$ = previous day.

Expected returns was calculated as :

$$ER_{ct} = \alpha_c + \beta_c R_{mt} + E_{ct} \quad \dots\dots\dots (3)$$

where,

ER_{ct} = Expected return of security 'c' of day 't',

α_c = Intercept for security 'c',

β_c = Systematic risk component of security 'c',

R_{mt} = Return on market for day 't' (BSE 500),

E_{ct} = Error term for security 'c' for day 't'.

Abnormal return is calculated as :

$$AR_{ct} = R_{ct} - ER_{ct} \dots \dots \dots (4)$$

where,

AR_{ct} = Abnormal return of security 'c' for day 't',

R_{ct} = actual return of security for day 't',

Er_{ct} = Expected return of security 'c' for day 't'.

Average abnormal return was calculated as :

$$AAR_t = \frac{1}{N} \sum_{c=1}^N AR_{ct} = (AR_{c1} + AR_{c2} + AR_{c3} + \dots AR_{cN}) / N \dots \dots \dots (5)$$

where, N denotes number of securities considered for day 't'.

Cumulative average abnormal returns (CAARs) were also calculated for analyzing the persistent effect of the event on the price. Cumulative average abnormal returns (CAARs) are the sums of daily average abnormal returns (AARs) during the event window :

$$CAAR_t = \sum_{t-k}^{+k} AAR_t \dots \dots \dots (6)$$

✧ **'t' test for Abnormal Returns** : The average abnormal return (AAR) and cumulative average abnormal returns (CAAR) were calculated for the selected companies for the event window. In order to check the efficiency of market, student 't' test (two tailed) was applied to know the significance of the abnormal return.

An estimator of σ can be constructed from the cross sectional variance of abnormal returns in period 't' and is denoted by :

$$S_t = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (AR_{ct} - AAR_t)^2} \dots \dots \dots (7)$$

where,

N is the number of companies considered,

AR_{ct} = Abnormal return of company 'c' at time 't',

AAR_t = Average abnormal return of particular day 't'.

The above yields the following test statistic for the AARs :

$$t = \sqrt{N} \frac{AAR_t}{S_t} \sim t_{N-1} \dots \dots \dots (8)$$

The test statistic follows student 't' distribution with $N - 1$ degrees of freedom and approximately follows a standard normal distribution. This is a result of the central limit theorem, which states that under these assumptions, \sqrt{N} times the average divided by the standard deviation converges to a standard normal random variable. Therefore,

$$t = \sqrt{N} \frac{AAR_t}{S_t} \approx N(0,1) \dots\dots\dots (9)$$

✧ **'t' test for Cumulative Abnormal Returns (CAR)** : In order to analyze the adjustments of prices, the significance of abnormal returns in an event window around $t = 0$ needs to be tested. Cumulative average abnormal returns (CAAR) over the event window are tested for significance.

The standard deviation is calculated as :

$$S_t = \sqrt{\frac{1}{N-1} \sum_{c=1}^N (CAR_{ct} - CAAR_t)^2} \dots\dots\dots (10)$$

where,

N is the number of companies considered for the study,

CAR_{ct} = Cumulative abnormal return of share 'c' at time 't',

$CAAR_t$ = Cumulative average abnormal return of a day 't'.

The test statistics is :

$$t = \sqrt{N} \frac{CAAR_t}{S_t} \approx N(0,1) \dots\dots\dots (11)$$

Results and Discussion

The study was done to analyze the impact of introduction of Jio service on telecom industry and on competitors in terms of market return. For this purpose the study framed a competition hypothesis in order to test whether an event of a company has any impact on return of competitors. The Table 1 gives the results of impact of the selected event on market return of BSE telecom index.

Table 1. Returns on BSE Telecom Index

Date	BSE Telecom	Return
-5	1241.77	-1.8201
-4	1245.87	0.3302
-3	1235.74	-0.8131
-2	1220.85	-1.2049
-1	1226.10	0.4300
0 (Event Day)	1156.58	-5.6700
1	1173.73	1.4828
2	1182.94	0.7847
3	1181.70	-0.1048
4	1195.11	1.1348
5	1188.03	-0.5924

Table 2. AAR of Sample Companies

Days	AAR	t- value
-5	-0.0474	-0.0404
-4	0.9273	0.6140
-3	-0.5948	-1.0801
-2	-2.4072	-5.1130*
-1	-0.3871	-2.6366*
0	-6.6959	-4.0665*
1	0.3348	0.4414
2	-1.3850	-1.4385
3	0.1258	0.2955
4	0.1162	0.2359
5	1.4567	1.5561

* Statistically significant

Table 3. CAAR of Selected Companies

Days	CAAR	t - value
-5	-0.0474	-0.0404
-4	0.8799	0.3988
-3	0.2850	0.1366
-2	-2.1222	-0.9461
-1	-2.5093	-1.0916
0	-9.2052	-3.1590*
1	-8.8704	-3.6462*
2	-10.2554	-5.5151*
3	-10.1296	-4.4518*
4	-10.0134	-4.3391*
5	-8.5566	-2.9128*

* Statistically significant

H0: There is no significant impact of the event of introduction of Jio services on return on telecommunication companies.

It can be seen from Table 1 that the event of introduction of Jio crashed the telecommunication sector to a large extent. On the date of the event, return on 'BSE Telecom' index was high negative (- 5.67%). It shows that investors in telecommunication companies perceived that the event will affect the growth of other competitive telecom companies in the future negatively. It was observed that out of 13 scripts in the sectoral index Airtel, Reliance Communications, Tata Teleservices, and Idea Cellular were the major constituents with high turnover and market capitalization. Hence, drastic downfall of their share values were reflected in the index and the same led the index with negative return on that day. In that index, rest of the constituents (nine companies) were not in the business of providing mobile network services. These nine companies included providers of fixed line, infrastructure providers, and producers of telecommunication goods, hence there was no impact on such companies.

It was also observed that GTL infrastructure Ltd. and GTL Ltd. had very high abnormal return on the date of event at 19.72% and 10.09% , respectively. This very high abnormal return happened because of positive perception of investors about the company, since it had an agreement with Reliance Jio Infocom Ltd. for sharing tower infrastructure throughout the country. Reliance Jio Infocom Ltd. shares 6000 towers of GTL in 22 telecom circles (Gupta, 2016).

To understand the impact of introduction of Jio services on listed mobile network service providers, four companies namely Reliance Communications, Bharti Airtel, Tata Teleservices, and Idea Cellular were taken. Hence average abnormal returns (AAR) of the sample companies were calculated and presented in Table 2. The Table 2 shows that introduction of Jio service had a major negative impact on selected companies on the day of launch. The AAR was highly negative at - 6.6959% on this day. The same was statistically significant at 5% level. Investors in telecom industry perceived the event negatively. It resulted in high negative abnormal return on that day. It was also noticed that there was significant negative return on days -2 and -1 at - 2.4072% and - 0.3871% , respectively. There was negative return on day - 3 at - 0.5948% but it was not significant. A moderately high

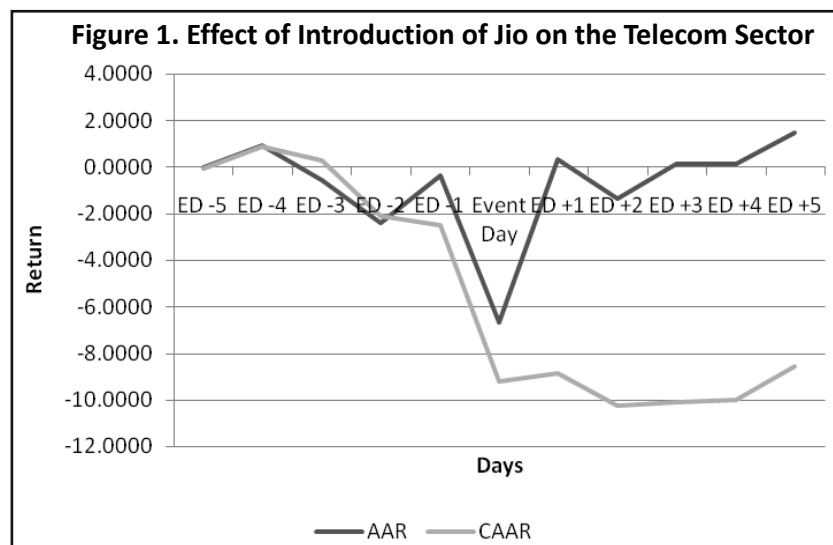


Table 4. AR of Sample Companies

Days	Reliance	Airtel	Tata	Idea
-5	0.3012	-1.5483	3.1247	-2.0673
-4	5.2894	-0.5485	0.4834	-1.5150
-3	0.0212	-0.9017	-1.9981	0.4991
-2	-2.1023	-3.6989	-2.3676	-1.4601
-1	-0.0338	-0.3495	-0.7500	-0.4153
0	-8.0074	-6.2637	-2.3676	-10.1447
1	-0.1164	2.3817	-1.2494	0.3233
2	-1.2522	-0.0808	-4.1495	-0.0574
3	1.1901	-0.3372	0.3937	-0.7435
4	0.7963	0.5513	-1.3468	0.4641
5	2.3412	0.0292	3.6711	-0.2145

negative return was found on day -2 (-2.4072%). It was caused by spread of assumptions about low cost plans of Jio to be announced on the day of the event. The AAR on the days of -4 and -5 were 0.9273 and -0.0474%, respectively, but they were not statistically significant. The AARs during post event window were not statistically significant. During the period the AAR was positive on day +1 (0.3348%), it was negative on day +2 at -1.3850%, but on the days of +3, +4, and +5 it was positive. It reflected slow recovery of the market from the impact of the event. The results showed that there was severe impact of introduction of Jio services on the telecom industry in terms of market return. In order to know the cumulative effect of the event, cumulative average abnormal return (CAAR) was calculated and is presented in Table 3.

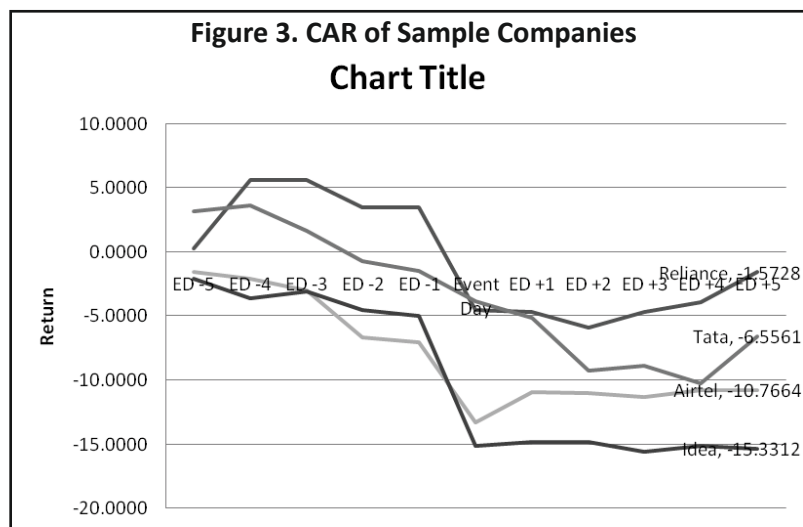
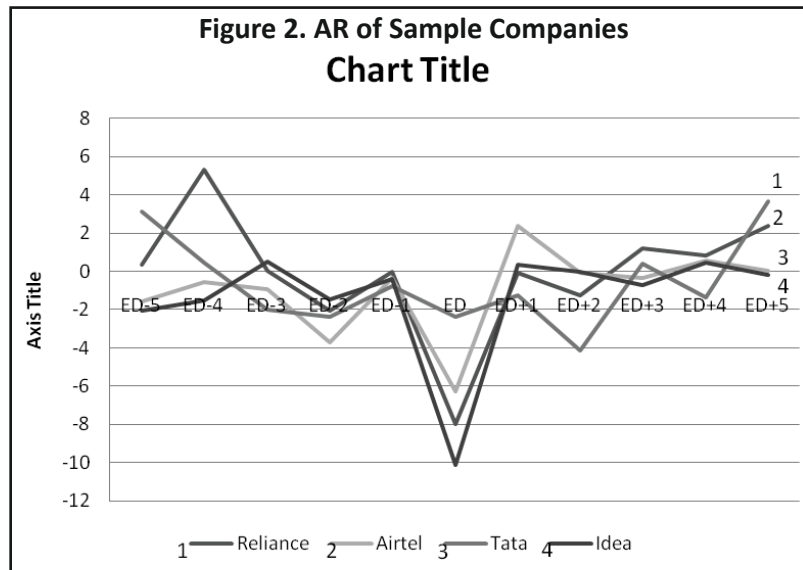
It can be seen from Table 3 that effect of introduction of Jio services on cumulative average abnormal return of the telecommunication sector was severe. It was -9.2052% on the day of the event and it was statistically significant. CAAR went down slightly on day +1 (-88704%), on account of positive AAR on that day. CAAR was more than -10% on days +2, +3, and +4 and it decreased to -8.5566% on day +5 on account of a moderate positive abnormal return. CAARs on the day of the event and all days of post event window were statically significant. Significant sustaining effect of the event of Jio invention on sample companies was seen. It was also observed that CAAR on day -1 was -2.5093%, it was moderately high, it showed that the investors started to perceive the introduction of event in advance to the event day. But CAAR, in pre-event window was not statistically significant.

The Figure 1 clearly shows the impact of the event of introduction of Jio on the date of event as per AAR and its sustaining effect even after the event day as per CAAR. As stated above, Reliance Communications, Bharti Airtel, Tata Teleservices, and Idea Cellular are the listed telecommunication companies providing mobile network services. The Table 4 gives abnormal return (AR) of each sample company during the event window in order to know the impact of introduction of Jio on the market return of sample companies.

The Table 4 shows that Idea Cellular Ltd. was affected severely due to introduction of Jio services. Its abnormal return was very high at -10.1447% on the date of the event followed by that of Reliance Communication Ltd. (-8.0074%). Bharti Airtel Ltd. was also affected severely in terms of negative abnormal return at -6.2637%. In case of Tata Teleservices Ltd. the effect was low (-2.3676%) compared to other sample companies. It was observed that there was considerable recovery in case of Reliance Communications during post event window, there was moderately high positive abnormal return on day +3 and day +5 at 1.1901 and 2.3412%, respectively. There was high positive abnormal return for Tata Teleservices on day +5 at 3.6711%. In case of other companies

Table 5. CAR of Sample Companies

Days	Reliance	Airtel	Tata	Idea
-5	0.3012	-1.5483	3.1247	-2.0673
-4	5.5905	-2.0968	3.6081	-3.5823
-3	5.6118	-2.9985	1.6100	-3.0831
-2	3.5095	-6.6973	-0.7576	-4.5433
-1	3.4757	-7.0468	-1.5076	-4.9586
0	-4.5317	-13.3105	-3.8752	-15.1033
1	-4.6481	-10.9289	-5.1246	-14.7800
2	-5.9003	-11.0097	-9.2741	-14.8374
3	-4.7102	-11.3469	-8.8804	-15.5809
4	-3.9139	-10.7957	-10.2271	-15.1168
5	-1.5728	-10.7664	-6.5561	-15.3312



there was no considerable positive return during post event window period. Even though there was high negative abnormal return on the date of event of sample companies, during pre-event window, the sample companies earned high negative abnormal returns. Idea Cellular Ltd. had negative AR on day -5 with 2%, on day -4 and day -2 with more than 1% of AR. Tata Teleservices Ltd. had negative return on day -3 and -2 with around 2%, Bharti Airtel had very high negative abnormal return on day -2 (3.6989%) and on day -5 it had more than 1% of negative abnormal return. Strangely, Reliance Communications Ltd. had very high positive abnormal return on day -4 (5.2894%), but on day -1 there was no specific event related to the company. On day -2 it had more than 2% of negative return. Reliance Jio was marketed to customers before the official announcement on September 1, 2016 with attractive offers. This was perceived by investors of competitive companies negatively, and therefore, caused negative abnormal return during pre-event window.

In the view of understanding sustainability of the event on return on sample companies cumulative abnormal return (CAR) was calculated and presented in Table 5. Very strong cumulative effect was found from Table 5 in case of Idea Cellular after the event of introduction of Jio as shown by CAR. It was -15.3312% on day +5. It was also observed that during all days of the event window it had negative CAR and was constantly increasing. Bharti

Airtel was another company which was severely affected by the event, its CAR was high on day + 3 at - 11.3469% , but there was small recovery on day +4 and +5. CAR of Tata Teleservices was also high during post-event window. It was very high on day + 4 at -10.2271%, but there was considerable recovery on day +5. The event of Jio did not have major sustainable impact on Reliance Communications Ltd. since there was fast recovery and high positive return on day - 4. It is also a reason for not having high CAR during post-event window. The Figure 2 gives the results of AR and the Figure 3 gives the results of CAR of selected companies during the event window.

Research Implications

It is implied from the study that the event of introduction of Jio in the market had greater impact on share price movements of competitor companies on the date of the event and the impact followed for few days as shown by the results of average abnormal returns and cumulative average abnormal returns.

Conclusion

Telecommunication sector is one of the fast developing sectors in India. Hence many investors like to invest in telecommunication companies. This sector has been experiencing big events during the current decade such as 2G spectrum auction and associated scams, 3G and 4G spectrum allocations etc. Good events give positive return and bad events give negative return on the sector. Companies are expected to be linked with the event. Recently, on September 1, 2016, a big business concern Reliance Industries Ltd. introduced their new product called Reliance Jio network services through their subsidiary company with attractive offers both for voice call and 4G internet mobile services. It threatened the market share of other mobile service providers. The study found robust effect on telecommunication sector in India because of the introduction of Jio services as shown by return on BSE Telecom index (- 5.67%). There was significant impact on sample companies (listed mobile network service providers). On the date of event the average abnormal return was - 6.6959%. It was also evidenced that there was significant sustaining impact on sample companies in the market as shown by the results of CAR. Among the sample companies Idea Cellular Ltd. was most severely affected by the event followed by Reliance Communication Ltd., but there was severe sustaining effect of the event on the abnormal return of Idea Cellular Ltd. followed by that of Bharti Airtel Ltd.

Limitations of the Study and Scope for Further Research

The study has been undertaken to analyze whether there is any impact of the event of introduction of Jio on share price movements of its competitors. The event date was September 1, 2016, but there was information leakage about the event. The study could not include all competitors into the study, since many leading mobile service providers are not listed in either BSE or NSE like Vodafone and Aircel. Further research may be undertaken to analyze the impact of the event on the profitability of competitor companies after ending of the financial year and this impact may be compared with the impact of earlier events in the same industry.

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