The effect of initial option listing on stock returns: Evidence from India

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Abstract

Using a control sample methodology and for a sample of 108 stocks we find significant abnormal returns around option listing suggesting strong evidence in support of market completion hypothesis. For a control sample, used to verify that the results are not due to market wide factors, we find no abnormal returns around option listing suggesting that the abnormal returns found around option listing are specific to original sample and not due to the market wide factors.

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The effect option introduction have on the underlying securities has been widely studied in financial markets. The problem with the option listing literature emanate from the theory which posit all possible out comes due to option listing. That is, according to Black and Scholes (1973) options listing should have no effect on stock returns, positive price effect according to Hakensson (1982), Detemple and Seldon (1991) and Detemple (1990) and negative price effects according to Miller (1977) and Danielson and Sorescu (2001). As theory provides no indication of direction or magnitude of option listing effects empirical research has gained prominence in this area. The theoretical ambiguity of option listing effects also demanded extensive empirical research in this area. Empirical Studies in US are mixed, positive price effects until 1981 and negative afterwards. Studies from Europe and other developed countries are more tilted towards positive price effects except in case of Netherlands where Kabir (2000) reports negative price effects on stock returns. The above literature is limited to US , UK and other developed markets, thus motivating us to study option listing effects on stock returns in a growing and emerging market like India where derivatives is of recent phenomenon but has grown phenomenally in the last couple of years. Also it would be interesting to find out what effect options listing have on stock returns in India, an open electronic limit order book market.

Using a control sample methodology we find evidence for market completion hypothesis in Indian markets. Rest of the paper is organized as follows. Section I looks at previous literature of option listings. Section II briefly introduces the institutional background of

India. Section III discusses the data. Section IV, the methodology and hypothesis. Empirical results are discussed in Section V and finally Section VI concludes.

I. Review of Literature

Options are modeled as redundant securities by Black and Scholes (1973). An option is called a redundant security because it can be synthetically replicated by a combination of assets already available in the market. With the assumption of perfect capital markets, options can be replicated by combining the underlying stock and risk less borrowing and lending opportunities. However in the absence of perfect markets, like presence of transaction costs or margin requirements, inability to borrow and lend at same rate and the inability to sell short, price effects could appear for several reasons. Diamond and Verrecchia (1987), using a rational expectations framework theorize that there is no impact on stock prices due to option introduction. However, some scholars argued that the reverse impact of options on underlying securities might also be true. Studies by Ross (1976), Hakansson (1982), Detemple and Seldon (1991) and Detemple (1990) suggested that options could have positive price effect on the underlying stock returns as it improves the efficiency of the incomplete markets by expanding the opportunity set available to investors. Thus option introduction could complete the previously incomplete markets forming basis for market completion hypothesis. Miller (1977) and Danielson and Sorescu (2001) shows that relieving short sales constraints would act to lower stock prices as the views of pessimists are better reflected in the stock price.

The theory proposed by the above studies suggests that options could raise, lower or not affect the underlying stock prices depending on market completeness or diminishing short sales constraints. As theorists have left the field wide open, empirical researchers have taken the task upon themselves to provide relevant answers to this issue.

In the United States studies by Branch and Finnerty (1981), Conrad (1989), Detemple and Jorion (1990) and later by Sorescu (2000) provide evidence that the price effect on the underlying stock with the introduction of options have been positive until 1980 and negative after 1981.

Conrad (1989) finds price effect on listing day and not on announcement day for the options listed period of 1974 to 1980. The price affects starts three days before the listing day and she explains the price affect due to inventory build up by traders for hedging positions in anticipation of option trading volume. Detemple and Jorion (1990) find significant price increases due to options listed between the period 1973 and 1982 and none after that. The authors justify the non-affect of options listing on underlying stocks to market completeness as a result of introduction of S&P futures index in April 1982 and support the market completion hypothesis. Sorescu (2000) while confirming earlier positive price effect until 1980 rejects the market completion hypothesis by providing evidence for negative price effect after 1980. He suggests that the negative price effect could be a phenomenon consistent with relaxation of short-sale constraints on the underlying security.

The evidence from markets outside the United States mostly indicated a positive price effect. Positive abnormal returns around option listing have been reported for the U.K by

Watt, Yadav, and Draper (1992) and Faff and Hillier (2005), by Stucki and Wasserfallen (1994) for Switzerland , by Gjerde and Saettem (1995) for Norway, by Draper, Mak and Tang (2001) for Hong Kong, and by Alkeback and Hagelin, (1998) for Sweden. Negative abnormal returns around option listing have been reported by Kabir (2000) for a sample of Dutch option listing. However, studies from Norway, Sweden and Switzerland suffer from either infrequent trading or very small sample size.

II. Institutional background

India has a long history of trading in both derivatives and cash market. The Bombay Cotton Association started futures trading in 1875 and by early 1900's it was one of the world's largest futures trading industry in commodities. In 1952 after independence, the government enacted Forward Contracts Regulation Act which prohibited derivative trading in most commodities. Until early 1990's the Indian securities markets were regulated by three regulatory bodies. First was the Capital Issues (Control) Act of 1947 which authorized the government to control new share issues, types of shares issued and their issue price. Second was the Securities Contracts Regulation Act (SCRA) of 1956 which provided for statutory control over stock exchanges. This Act governed all the exchanges and they had to meet the minimum standards laid down in the legislation in terms of exchange rules and listing regulations. Under this Act, all securities trading must take place on a recognized stock exchange. Third was the Companies' Act of 1956 which set out a code of conduct for corporate sector in relation to the issue, allotment, transfer of securities, and disclosure standards for public issues.

The Capital Issues (Control) Act of 1947 was highly restrictive and failed to improve the efficiency of the exchanges and proper development of the financial markets. Plagued with frauds, inefficient settlement systems (Exchanges) and lack of investor confidence, the government repealed the Capital Issues (Control) Act of 1947 in early 1990's and replaced it with Securities and Exchange Board of India (SEBI) Act. SEBI is the principal authority governing stock exchanges and a range of corporate financial activities. Subsequently, SEBI introduced several new regulatory measures including capital adequacy rules for brokers, a share depository system involving progressive dematerialization of securities, and investor guarantee fund. Impetus for derivative trading came with successful launch of National Stock Exchange (NSE) an electronic market place, reforms in clearing by establishing National Securities Clearing Corporation Limited (NSCCL), National Depository Limited (NDL) and introduction of BSE Online Trading (BOLT).

The promulgation of the Securities Laws (Amendment) Ordinance in 1995, withdrew the prohibition on trading in derivatives in exchanges imposed in 1952. Immediately the exchanges applied to SEBI for trading in derivatives. The market for derivatives could not take off immediately as there was no regulatory framework to trade in derivatives. In 1996, SEBI set up a committee under the Chairmanship of Dr.L.C.Gupta to develop appropriate regulatory framework for derivatives trading in India. An important recommendation made by the committee was that derivatives should be declared as 'securities' so that regulatory framework applicable to trading of 'securities' could also be applicable for trading of derivatives. SEBI also set up a group in June 1998 under the chairmanship of Prof.J.R.Varma, to recommend measures for containment of risk in

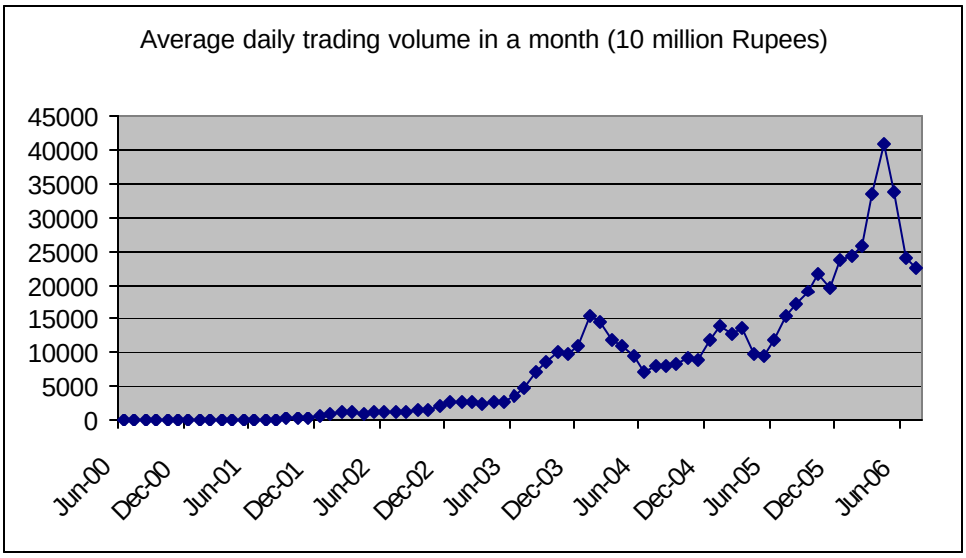
derivatives market in India. The report, which was submitted in October 1998, spelt the operational details of margining system, methodology for charging initial margins, broker's net worth requirement, margin requirement and real–time monitoring requirements. The Securities Contract Regulation Act (SCRA) was amended in December 1999. The Act included derivatives within the ambit of 'securities' facilitating the regulatory framework for governing derivatives trading. Derivatives trading commenced in India in June 2000 after SEBI granted the final approval to this effect in May 2000. To begin with, SEBI approved trading in index futures contracts based on S&P CNX Nifty[2] and BSE SENSEX[3]. This was followed by approval for trading in options based on these two indices and options on individual securities.

Bombay Stock Exchange commenced trading in SENSEX options on June 4, 2001 and the trading in options on individual securities commenced in July 2001. Futures contracts on individual stocks were launched in November 2001. The derivatives trading on NSE commenced with S&P CNX Nifty Index futures on June 12, 2000. The trading in index options commenced on June 4, 2001 and trading in options on individual securities commenced on July 2, 2001. Single stock futures were launched on November 9, 2001. As of October 2006 options on single stocks available for trading at NSE numbered a total of 122 securities.

[2]The S&P CNX Nifty, or simply Nifty, is the leading index for large companies on the National Stock Exchange of India. It consists of 50 companies representing 24 sectors of the economy. For the month of March 2006 it represented approximately 56% of the total market capitalization of all stocks on the National Stock Exchange of India. The S&P CNX Nifty is owned and operated by India Index Services and Products Ltd.

[3]The BSE SENSEX or Bombay Stock Exchange Sensitive Index is a value-weighted index composed of the 30 largest and most actively traded stocks, representative of various sectors, on the Bombay Stock Exchange.

Figure 1.1: Average Daily Trading volume in a month



Source: NSE Factbook 2006

The turnover in the derivatives segment has witnessed considerable growth in NSE since inception (refer figure 1.1). NSE also established itself as the sole market leader in futures and options trading in the country cornering 99% of market share.[4]

III. Data

Data for the study was collected from two main resources namely PROWESS and NSE website. Daily stock and market returns were procured from Centre for Monitoring Indian Economy (CMIE) PROWESS database. CNX S&P 500 was used as a proxy for the market returns. Option listing dates and announcement dates were procured from the various circulars released by NSE from time to time and the archives were available on the NSE website (www.nseindia.com). NSE introduces securities in the futures and

[4]As claimed in the NSE Factbook 2005

options segment based on a set criteria which take into consideration average daily market capitalization, average daily traded value, the market wide position limit in the security, the quarter sigma values and as approved by SEBI. The event date was the date on which an option listing has been announced for a particular stock in the exchange. There were 119 securities (listed in Annexure I) for which options on individual securities were being traded for derivatives in NSE as on September 14 2006.[5] Out of the total sample of 119, three were listed in the year 2006, 62 were listed in the year 2005, one stock was listed in the year 2004, 24 stock options were listed in the year 2003, none got listed in the year 2002 and the remaining 31stocks were listed in the year 2001. In total, there were 9 different event dates (see Table 3.1). 11 stocks had to be dropped for non availability of data. The final sample contained 108 stocks for analysis.

Table 3.1, Panel A presents the characteristics of the 108 underlying stocks in the sample. The average market capitalization of the stocks underlying these options was Rs. 49.85 billion on the date of listing, ranging from a minimum of 0.397 billion rupees (Mphasis BFL Ltd.) to a maximum of 534.84 billion rupees (ONGC). Similar statistics for a control sample of stocks were also presented to verify that the results were not driven by market-wide factors. For each of the 108 stocks in the sample, a matching stock was selected based on the smallest difference in market capitalization at the announcement of the date of option listing. The universe of possible matches comprised of stocks that did not have any options listed, therefore eliminating any possibility of potential initial listing confounding the results. The criterion for selecting control sample was the market

[5] The number of stocks available for option listing changes from time to time due to delisting or addition based on the set criteria of NSE.

capitalization, as it leads to reasonable control[6]. Options that were initially listed by options exchanges were the most liquid and hence tended to be on large cap stocks. The size of the firms in our sample thus makes market capitalization the constraining criterion in the matching algorithm. As seen from Table 3.1, panels A and B show that control stocks were smaller in market value, but larger than original sample stocks in the price of the underlying. The average stock price for the 108 sample stocks was Rs. 202 while that for control stocks was Rs. 360. On an average, sample stocks had a higher market capitalization than control stocks.

[6] Bessembinder (2003) and Bessembinder (1999) use and discuss matching based on market capitalization. LaPlante and Muscarella (1997) compare size matching to other alternatives and found that results were similar

Table 3.1: Descriptive statistics of Indian option listings

Table3.1 Panel A Initial Listing of Indian options	
Announcement Date	**Number of stocks**
29-Jun-01	31
31-Jan-03	10
22-May-03	1
25-Aug-03	8
23-Sep-03	4
23-Aug-04	1
15-Apr-05	60
10-Aug-05	1
08-Sep-06	3
Total	**119**

Table 3.1 PANEL B: Descriptive Statistics of Original Sample and Control(Matched) Sample					
		Mean	**Median**	**Minimum**	**Maximum**
Market Cap (10 Million Rupees)	Sample	4985.01	2423.10	39.70	53486.78
	Control	1414.02	1035.10	39.67	10761.10
Price (Rupees)	Sample	202.84	157.33	11.75	1297.40
	Control	360.68	176.85	9.45	7946.50

Panel A of the table 3.1 shows the number of underlying stocks falling on each announcement date during the period June 29th 2001 to September 08 2006. Announcement date is the date on which an announcement has been made that an option class for the first time is getting listed in the National Stock Exchange (NSE). Panel B of the table 3.1 shows descriptive statistics of the original and control (Matched) sample for market capitalization and price as on option listing date. The original sample includes option classes that were listed for first time in NSE during the period of study. Control samples were selected from a universe of stocks that do not have any options listed in the exchange during the period of study. Out of 119 stocks 108 stocks remained in the original sample after removing stocks for which data was not available. For each of the 108 stocks in our sample, we select a matching stock based on the smallest difference in market capitalization.

IV. Event Study Methodology

We employ the Brown and Warner (1985) market model which is well specified under wide variety of limitations.

According to the market model, the return of a stock is linearly related to the return of the market and is given by.

$$R_{it} = a_i + b_i R_{mt} + e_{it} \quad \ldots \quad (4.1)$$

$$E(e_{it}) = 0 \; ; \; Var(e_{it}) = s_{ei}^2$$

where R_{it} and R_{mt} are period 't' returns of the security 'i' and the market portfolio respectively in the estimation window. e_{it} is a zero mean disturbance term with constant variance over 't'.

In order to investigate if option listing induces any abnormal returns for each stock on each day in the event period, the actual returns in the event window are compared with the Market Model predicted returns in the event window. The difference between these two returns is interpreted as the abnormal return of a stock and is given by

$$AR_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{mt}) \quad \ldots \quad (4.2)$$

where $\hat{a}_i$ and $\hat{b}_i$ are ordinary least squares estimates from the estimation period using the market model. R_{it} and R_{mt} are the returns (ex post returns) of the security 'i' and the market portfolio respectively for period 't' in the event window.

In order to make statistical inferences average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) are calculated as follows.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \qquad \ldots \qquad (4.3)$$

where 'N' is the number of stocks whose abnormal returns are available on day 't' in the event window('t'=0 is the event date that is the date on which an announcement has been made that option is being listed in more than one exchange). If the event window is (-5 to +5) then 't' will take values from -5 to +5

$$CAAR_k = \sum_{t=1}^{k} AAR_t \qquad \ldots \qquad (4.4)$$

where 'k' is the number of days we want to cumulate over the event window.

To compute the t-statistic, first all abnormal returns are standardized as follows.

$$SAR_{it} = \frac{AR_{it}}{S_i(AR)} \qquad \ldots \qquad (4.5)$$

where, $S_i(AR)$ is the standard deviation of the abnormal returns of stock 'i' in the estimation period.

The cumulative abnormal returns are also standardized as follows.

$$SCAR_{ik} = \left(\sum_{t=1}^{k} SAR_{it}.\right)\frac{1}{\sqrt{k}} \qquad \ldots \qquad (4.6)$$

where ‘k’ is the number of days we want to cumulate in the event window.

The t-statistic for the sample of N stock for each day ‘t’ in the event window is calculated as follows.

$$t(SAR) = \left(\sum_{i=1}^{N} SAR_{it} \right) \cdot \frac{1}{\sqrt{N}} \quad \ldots \quad (4.7)$$

$$t(SCAR) = \left(\sum_{i=1}^{N} SCAR_{ik} \right) \cdot \frac{1}{\sqrt{N}} \quad \ldots \quad (4.8)$$

Hypotheses

The primary focus of this analysis is the measurement of abnormal returns in the stocks around the listing of the options. We measured abnormal returns using the market model and the S&P CNX 500 index as the proxy for the market portfolio. The market model parameters were based on -20 days to -220 days preceding the start of the event window. The estimation was made using the Ordinary Least Squares regression method. Both average and cumulative abnormal returns were computed during the event window. The t-statistic assuming that abnormal returns were cross-sectionally independent[7] tested the null hypothesis of abnormal returns equal to zero against the alternative hypothesis of presence of abnormal returns. Brown and Warner (1985) showed that even if the cross-sectional independence assumption was approximately true, the t-test would be efficient.

[7]Brown and Warner (1985) show that even if the cross-sectional independence assumption is approximately true, the t-test will be efficient. With the clustering of event dates, the t-test will be more powerful under the assumption of cross-sectional independent abnormal returns.

With the clustering of event dates, the t-test would be more powerful under the assumption of cross-sectional independent abnormal returns. We also tested the null hypothesis of cumulative average abnormal returns (CAAR) were equal to zero in the event window.

In this study four main hypotheses for initial option listings are tested. Similar hypotheses for a control sample of stocks were also tested to verify that the results are not driven by market-wide factors. Thus we construct a control sample for initial option listing.[8] The resulting four hypotheses are as follows.

Hypotheses for Initial Listing of options

Original Sample

Hypothesis 1: Average abnormal stock return for original sample in the event window around options initial listing is equal to zero.

Hypothesis 2: Cumulative average abnormal stock return for original sample in the event window around options initial listing is equal to zero.

Control Sample

Hypothesis 3: Average abnormal stock return for control sample in the event window around options initial listing is equal to zero.

[8] The original sample includes option classes that were listed for the first time in NSE during the period of study. Control sample was selected from a universe of stocks that do not have any options listed in the exchange during the period of study. For each of the 108 stocks in our sample, we select a matching stock based on the smallest difference in market capitalization.

Hypothesis 4: Cumulative average abnormal stock return for control sample in the event window around options initial listing is equal to zero.

In perfect capital markets, options are not supposed to effect stock returns. However, we know that many imperfections exist in the market. Hence, option introduction like any other financial instrument could add to the completeness of the market as investors have more opportunity sets available because of increasing trading alternatives, make markets more efficient as additional information may quickly get impounded into the security prices and bring the markets closer to perfect markets as it could reduce transaction costs in the financial markets as a whole. If this is what Indian capital markets achieve by introduction of stock options we may expect a significant positive abnormal return after initial listing of options. However if options introduction lead to relaxation of short sale constraints then we may expect negative abnormal returns around option listing.

V. Empirical Results

Abnormal returns were measured using the market model and the S&P CNX 500 value weighted index was used as the proxy for the market portfolio. The market-model parameters were estimated over days −20 to −220. Table 5.1 presents the average abnormal returns (AARs) for initial listed options in Indian markets for both original and control stocks, as well as t-statistics following Brown and Warner (1985) that test the null hypothesis of no abnormal returns against the alternative hypothesis of positive abnormal returns. Results show that initial listing announcements were associated with a positive abnormal return for Indian sample of 108 listed option classes. Specifically the average

abnormal return (AAR) for the day '0' was 0.43% and was statistically significant at the 5 per cent level. Results for initial listing announcements were not associated with positive abnormal returns for a control sample of stocks suggesting that the observed abnormal returns around option listing were limited to original sample. The average abnormal return (AAR) for the control stocks on the day '0' was a statistically insignificant 0.05 per cent Thus, we reject the null hypothesis for original sample that AAR's are zero around initial options listing at 5 per cent significance level and fail to reject the null hypothesis for the sample of control stocks that the average abnormal returns around initial listing of options is zero at 5 per cent significance level.

Figures 5.1 and 5.2 plot the average abnormal returns for original and control sample respectively. As can be seen, original sample exhibit abnormal returns around day zero. Where as abnormal returns for control sample of stocks around initial listing of options is flat and close to zero at day '0'. Also plotted were cumulative average abnormal returns in figure 5.3. Cumulative average abnormal returns (CAAR) for original sample of stocks hover around zero per cent (X-axis) through day '-10' to day '-1'. However, from day '0' the CAAR's are seen moving above the X-axis and peaks on day +7 at 1.36 per cent. CAAR's for control sample remain below zero per cent through out except on day -8 and day -7 where it is 0.08 per cent and 0.04 per cent respectively. From day '-5' onwards the decline is steep and reaches a maximum of -4.09 per cent by day +10. The CAAR's for control stocks start to decline from day -5 onwards from -0.09 per cent and reaches -2.29 per cent on day +7 and slides to -4.09 per cent by day +10. The absolute difference between cumulative average abnormal returns for control and original sample is highest on day +10 at 2.96 per cent.

Original Sample stocks also exhibit a significantly higher cumulative average abnormal return (CAAR) than control stocks. Table 5.2 presents the results of CAAR of both original and control sample of stocks. The day (0, +1), (0, +2), (0, +6) and (0, +7) CAAR's for original sample of stocks were significant at 5per cent level. However the corresponding CAAR's for control stocks were not statistically significant. The difference in CAR's between original sample and control stocks were significant for day (0, +1), (0, +6), (0, +7) at 5 per cent significance level. This difference reaches to 2.16 per cent for day (0, +7). Thus the results reject the null hypothesis that there was no significant difference between CAR's in original sample and CAR's in control sample. There was a significant difference in abnormal returns of original and control sample of stocks lending credence to the observation that the apparent abnormal returns around initial listing of options was limited to the original sample but not to the control sample. It means that stocks that had options listing had positive price reaction. Similar abnormal returns were not observed in a sample of control stocks. These results suggest that the price effects can be attributed to option listing and were not a market wide phenomenon.

For the average stock in our sample, this excess return of 2.16 per cent was equivalent to Rs.1.07 billion increase in market value for each stock. The results thus indicate improvement in market values of stocks due to options listing. These efficiencies could be the result of incomplete Indian markets becoming more complete due to options listings and hence improving efficiency of capital markets as a whole leading to a better price discovery and reduction in transaction costs. Thus the results show significant positive price reaction due to initial option listing supporting evidence in US (Conrad

(1989)), UK (Watt, Yadav and Draper (1992)) and other developed countries.

Table 5.1: Average abnormal returns of original and control sample of Indian stocks

	Original sample		Control sample	
Relative day	**T**	**AAR**	**T**	**AAR**
-10	-0.41	-0.05%	-1.43	-0.43%
-9	0.07	-0.03%	-1.04	-0.27%
-8	1.17	0.26%	3.32**	0.78%
-7	-0.97	-0.19%	-0.23	-0.04%
-6	-0.01	0.04%	-1.07	-0.32%
-5	-0.34	-0.26%	1.5	0.19%
-4	0.13	0.00%	-2.58**	-0.84%
-3	0.93	0.30%	-2.89**	-0.65%
-2	-0.72	-0.19%	0.36	0.30%
-1	0.21	0.10%	-0.02	-0.13%
0	2.19*	0.43%	-0.23	0.05%
1	1.07	0.27%	-0.62	-0.34%
2	0.61	0.10%	1.26	0.31%
3	-0.8	-0.10%	-2.67**	-0.48%
4	1.54	0.41%	0.28	0.14%
5	-0.99	-0.35%	-1.64	-0.49%
6	1.77	0.41%	-0.42	-0.07%
7	1.05	0.21%	0.74	0.09%
8	-1.12	-0.38%	-3.53**	-1.05%
9	-2.06*	-0.57%	-1.9	-0.49%
10	-0.29	-0.18%	-0.54	-0.35%

Underlying stock average abnormal returns are computed using Brown and Warner (1985) methodology using market model estimated over (-220,-20) period and taking S&P CNX 500 index as the proxy for the market returns. Event window is from (-20,+20). Event day (day zero) is the day on which the announcement was made that an option class for a particular stock is getting listed on National Stock Exchange (NSE). The t-statistic takes into account assuming cross sectional independence in security specific excess returns. 't ' values are reported along with abnormal returns. The original sample includes option classes that were listed on NSE for the first time. Control sample was selected from a universe of stocks that do not have any options listed in the exchange during the period of study. For each of the 108 stocks in our sample, we select a matching stock based on the smallest difference in market capitalization.

The symbols *, and ** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

Figure 5.1: Graph of average abnormal returns of original sample for Indian stocks

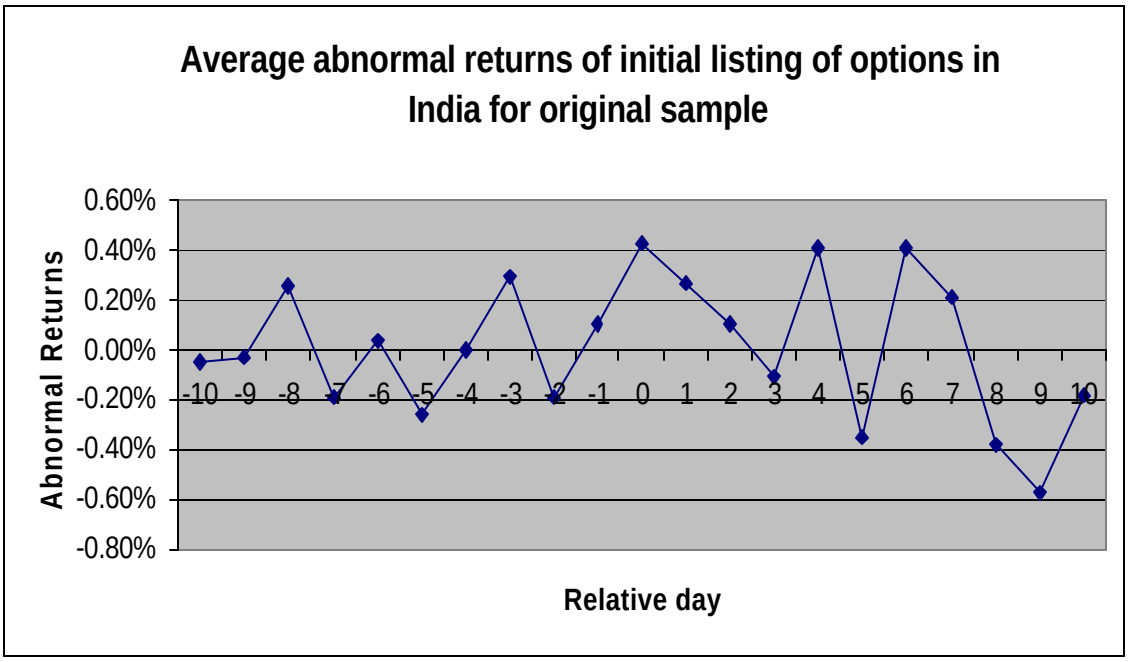


Figure 5.2: Graph of average abnormal returns of control sample for Indian stocks

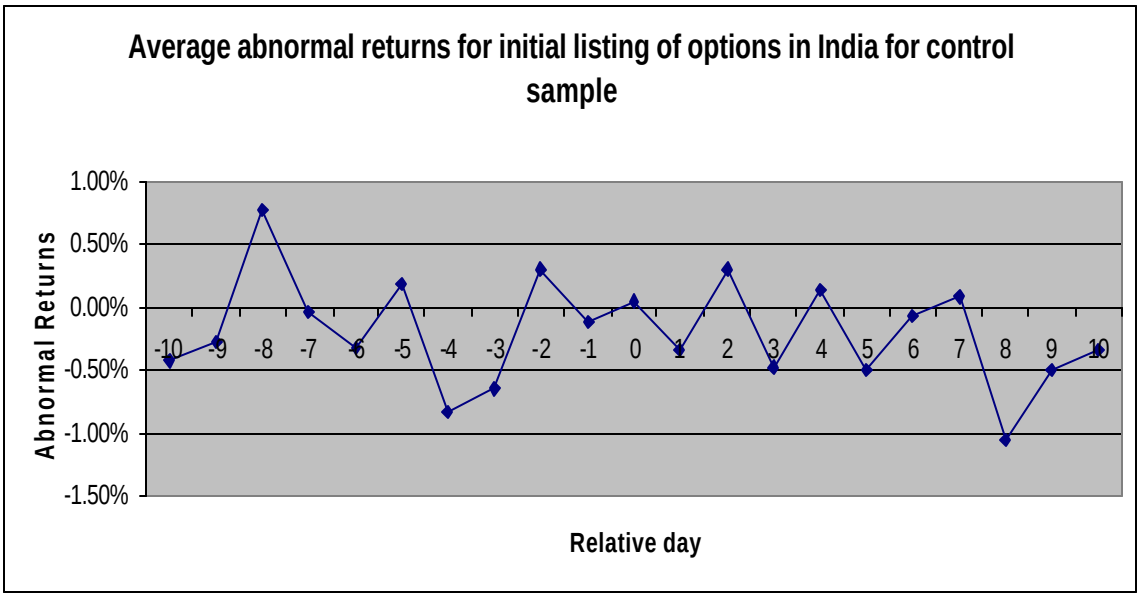


Figure 5.3: Graph of cumulative average abnormal returns of original and control sample for Indian stocks

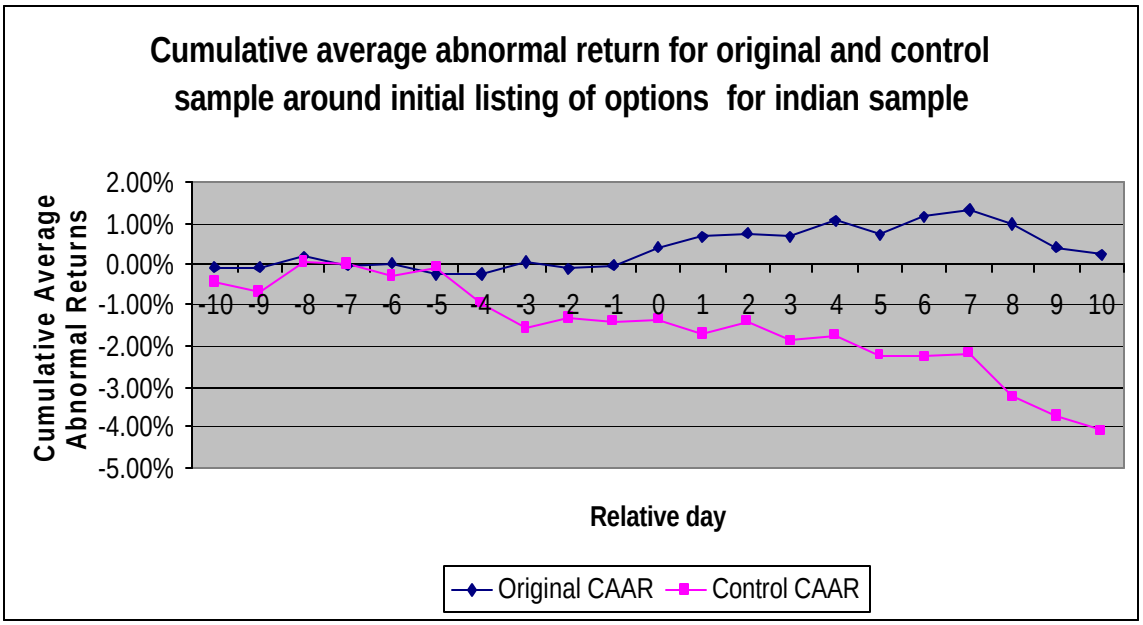


Table 5.2 : Cumulative average abnormal returns of Indian initial options listings

Event Window	108 Original Stocks	108 Matched Stocks	Difference (Original - Matched Stocks)
(-1,-5)	-0.04%	-1.13%	1.09%
T	0.09	-1.62	1.34
(-1,-2)	-0.09%	0.17%	-0.26%
T	-0.36	0.24	-0.41
(0,0)	0.43%*	0.05%	0.38%
T	2.19	-0.23	0.99
(0,1)	0.69%*	-0.29%	0.98%*
T	2.30	-0.60	1.96
(0,2)	0.79%*	0.02%	0.77%
T	2.23	0.24	1.16
(0,5)	0.75%	-0.81%	*1.56%*
T	1.48	-1.48	*1.87*
(0,6)	1.17%*	-0.88%	2.05%*
T	2.03	-1.52	2.25
(0,7)	1.37%*	-0.79%	2.16%*
T	2.27	-1.16	2.23

Underlying stock average abnormal returns and cumulative abnormal returns are computed using Brown and Warner (1985) methodology using Market Model estimated over (-220,-20) period and taking CRSP value weighted index as the proxy for the market returns. Event window is from (-20,+20). Event day (day zero) is the day on which the announcement was made that an option class for a particular stock is getting listed on National Stock Exchange (NSE). The t-statistic takes into account assuming cross sectional independence in security specific excess returns. 't ' values are reported along with the abnormal returns. The original sample includes option classes that were listed on NSE for the first time. Control sample was selected from a universe of stocks that do not have any options listed in the exchange during the period of study. For each of the 108 stocks in our sample, we select a matching stock based on the smallest difference in market capitalization.

The symbols * and ** denote statistical significance at the 5% and 1% levels, respectively, using a 2-tail test.

VI. Conclusion and limitations

Important issue that concern option listing studies is endogeneity in exchanges decision to list options. Endogeneity in the exchange's decision to list options makes it difficult to separate out changes that cause the exchange to list the option from changes that occur due to the option listing While the problem of endogeneity in exchanges decision to option listing might cast the doubt on almost all the previous results, including our results, it is difficult to disentangle options listing effects from factors that cause exchanges to list options.[9]

This study tests for initial listing of options in India. Using an event study methodology and for a sample of 108 stocks in India results show significant abnormal returns around options listings. For a control sample, used to verify that the results are not due to market wide factors, the results show that there is no significant abnormal return around options listings. Indian results support market completion hypothesis, suggesting that option introduction could contribute towards more complete, efficient and perfect capital market. Option introduction could make market more complete as it results in greater trading alternatives for investor. The market could be more efficient, as additional information may now be quickly released and impounded on the underlying stock prices due to greater coverage by analysts and institutional investors. The market could be more perfect as transaction costs in taking a position in stock get reduced. For the average stock in the original sample the market capitalization increased by Rs. 0.68 billion from day 0 to day 7 of initial option listing.

[9] Mayhew and Mihov (2004) Using a control sample methodology designed to correct for endogeneity find that volatility does not decline with option introduction. They say exchanges select to list options with high trading volume, volatility and market capitalization.

Annexure I: Original and control (matched) sample of stocks for Indian markets

Original Stock Name	Control Stock Name	Control Stock Price	Control Mcap(Rs. 10 Million)	Original Stock Price	Original Mcap(Rs. 10 Million)
A B B Ltd.	Sesa Goa Ltd.	686.95	2703.97	1297.4	5498.6
Allahabad Bank	Pantaloon Retail (India) Ltd.	780.77	1643.08	87.35	3901.92
Alok Industries Ltd.	Ipca Laboratories Ltd.	320.05	800.13	60.7	813.48
Andhra Bank	Indo Rama Synthetics (India) Ltd.	49	645.95	36.15	1446
Arvind Mills Ltd.	M R F Ltd.	1433.75	608.07	44.7	866.89
Ashok Leyland Ltd.	Micro Inks Ltd.	564.5	1404.02	21.15	2515.36
Aurobindo Pharma Ltd.	Apollo Tyres Ltd.	268.95	1031.1	274.8	1395.16
Bajaj Auto Ltd.	Container Corpn. Of India Ltd.	129.75	843.26	257.5	2605.48
Ballarpur Industries Ltd.	Divi'S Laboratories Ltd.	986.5	1264.56	100.15	1626.73
Bank Of Baroda	Monsanto India Ltd.	877.8	757.64	131.35	3887.96
Bank Of India	Alfa Laval (India) Ltd.	381.15	692.19	45.8	2232.27
Bharat Electronics Ltd.	Lupin Ltd.	148.15	594.69	196.15	1569.2
Bharat Forge Ltd.	Gujarat Mineral Devp. Corpn. Ltd.	311.75	991.37	248.91	1074.97
Bharat Heavy Electricals Ltd.	Gillette India Ltd.	350.5	1142.11	178.05	4357.95
Bharat Petroleum Corpn. Ltd.	E I H Ltd.	235.6	1234.39	188	5640
Bharti Airtel Ltd.	Jet Airways (India) Ltd.	1246.45	10761.1	204.15	37836.48
Bongaigaon Refinery & Petrochemicals Ltd.	Birla Corporation Ltd.	174.7	1345.28	93.25	1863.3
C E S C Ltd.	S K F India Ltd.	197.05	1039.09	188.05	1398.84
Cadila Healthcare Ltd.	Sundram Fasteners Ltd.	108.3	1137.85	224.18	1408
Canara Bank	Aditya Birla Nuvo Ltd.	174	1041.58	112.75	4622.75
Century Textiles & Inds. Ltd.	Indraprastha Gas Ltd.	97.7	1367.8	229.7	2137.26
Chambal Fertilisers & Chemicals Ltd.	Gujarat Alkalies & Chemicals Ltd.	137.95	1013.06	28.9	1173.34
Chennai Petroleum Corpn. Ltd.	Balrampur Chini Mills Ltd.	65.5	1518.3	231.05	3441.33
Cipla Ltd.	Moser Baer India Ltd.	140.8	659.04	228.61	1371.03
Colgate-Palmolive (India) Ltd.	Sterling Biotech Ltd.	83.65	1437.36	191	2597.46
Cummins India Ltd.	Marico Ltd.	241.05	1398.09	108.4	2146.32
Dabur India Ltd.	Kansai Nerolac Paints Ltd.	514.45	1312.24	57.15	1636.89
Dr. Reddy'S Laboratories Ltd.	Pfizer Ltd.	458.75	1075.32	803.88	3070.92
Escorts Ltd.	Automotive Axles Ltd.	384.85	581.58	80.15	578.94
Essar Oil Ltd.	Kotak Mahindra Bank Ltd.	126.34	1558.07	34.15	3700.42
Federal Bank Ltd.	Dena Bank	31.4	900.62	148.15	970.32
G A I L (India) Ltd.	Jindal Saw Ltd.	159.35	618.27	122.8	10384.6
Glaxosmithkline Pharmaceuticals Ltd.	Glenmark Pharmaceuticals Ltd.	287.95	3415.7	716.1	6253.17
Grasim Industries Ltd.	Aventis Pharma Ltd.	397.2	914.78	300.85	2757.88
Great Eastern Shipping Co. Ltd.	Centurion Bank Of Punjab Ltd.	13.85	1446.51	150.55	2865.57
Gujarat Ambuja Cements Ltd.	Pentamedia Graphics Ltd.	76.36	364.68	24.68	363.12
Gujarat Narmada Valley Fertilizers Co. Ltd.	Patel Engineering Ltd.	200.25	973.31	70.6	1034.12
H C L Technologies Ltd.	Hinduja T M T Ltd.	188.15	669.51	159.85	4609.5
H D F C Bank Ltd.	Essar Steel Ltd.	24.05	1230.96	281	7965.82

Annexure –I Continued…

Original Stock Name	Control Stock Name	Control Stock Price	Control Mcap(Rs. 10 Million)	Original Stock Price	Original Mcap(Rs. 10 Million)
Hero Honda Motors Ltd.	C M C Ltd.	492.3	745.83	255.25	5097.02
Hindalco Industries Ltd.	Engineers India Ltd.	101.4	569.42	78.09	581.5
Hindustan Lever Ltd.	J S W Steel Ltd.	71.75	9263.93	205.4	45213.55
Hindustan Petroleum Corpn. Ltd.	Procter & Gamble Hygiene & Health Care Ltd.	534.6	1156.9	158.05	5363.11
Housing Development Finance Corpn. Ltd.	Punjab Tractors Ltd.	187	1136.13	345.15	4144.8
I C I C I Bank Ltd.	Rashtriya Chemicals & Fertilizers Ltd.	16.6	915.8	149.95	9192.45
I F C I Ltd.	Asian Hotels Ltd.	332	757.08	11.75	750.44
I T C Ltd.	Merck Ltd.	345.25	582.13	50.28	1233.95
I V R C L Infrastructures & Projects Ltd.	S A L Steel Ltd.	20.15	171.21	83.12	171.63
I-Flex Solutions Ltd.	I C I India Ltd.	142.45	582.2	435.5	1625.32
India Cements Ltd.	Torrent Power A E C Ltd.	138.9	878.89	65.3	911.23
Indian Hotels Co. Ltd.	Motherson Sumi Systems Ltd.	62.2	1461.01	639.2	2983.69
Indian Oil Corpn. Ltd.	Igate Global Solutions Ltd.	235.2	638.9	352.5	41172.43
Indian Overseas Bank	Amtek Auto Ltd.	159.55	1613.12	70.35	3832.67
Indian Petrochemicals Corpn. Ltd.	Ingersoll-Rand (India) Ltd.	208.8	659.14	93.9	2330.84
Indusind Bank Ltd.	Madras Cements Ltd.	990	1195.7	54.15	1574.15
Industrial Development Bank Of India Ltd.	Petronet L N G Ltd.	41.1	3082.5	86.45	5644.15
Infosys Technologies Ltd.	Tata Teleservices (Maharashtra) Ltd.	9.45	1328.03	937.16	6200.08
Ispat Industries Ltd.	Bajaj Hindusthan Ltd.	152.4	1330.89	26.5	1835.36
Jammu & Kashmir Bank Ltd.	I N G Vysya Bank Ltd.	145.65	1325.22	367.05	1779.37
Jindal Stainless Ltd.	Lakshmi Machine Works Ltd.	7946.5	982.92	96.65	1062.28
Jindal Steel & Power Ltd.	Mcdowell & Co. Ltd.	285.05	1474.28	1019.05	3137.89
Karnataka Bank Ltd.	F D C Ltd.	43.05	824.24	67.55	819.11
Kochi Refineries Ltd.	Bank Of Maharashtra	32.5	1399.19	156.6	2168.44
L I C Housing Finance Ltd.	Adani Enterprises Ltd.	61.1	1378.05	252.15	2141.58
Larsen & Toubro Ltd.	Glaxosmithkline Consumer Healthcare Ltd.	401.85	1823.62	438.4	10896.43
Mahanagar Telephone Nigam Ltd.	Britannia Industries Ltd.	613.55	1708.76	126.15	7947.45
Maharashtra Seamless Ltd.	United Phosphorus Ltd.	149.58	495.46	171.93	495.55
Mahindra & Mahindra Ltd.	3M India Ltd.	392	441.59	40.23	444.48
Mangalore Refinery & Petrochemicals Ltd.	Biocon Ltd.	413.6	4136	46.45	8142.23
Matrix Laboratories Ltd.	Apollo Hospitals Enterprise Ltd.	338.5	1408.11	171.65	2569.31
Mphasis B F L Ltd.	Pritish Nandy Communications Ltd.	37.9	39.67	25.03	39.7
Nagarjuna Fertilizers & Chemicals Ltd.	Gujarat N R E Coke Ltd.	59.38	560.07	13.5	562.98
National Aluminium Co. Ltd.	Mastek Ltd.	561.15	787.03	89.9	5792.34
Neyveli Lignite Corpn. Ltd.	Motor Industries Co. Ltd.	2170.35	6956.29	68.1	11425.2

Annexure –I Continued…

Original Stock Name	Control Stock Name	Control Stock Price	Control Mcap(Rs. 10 Million)	Original Stock Price	Original Mcap(Rs. 10 Million)
Nicholas Piramal India Ltd.	Bharat Earth Movers Ltd.	497.2	1826.94	208.67	3965.06
Oil & Natural Gas Corpn. Ltd.	Fertilisers & Chemicals, Travancore Ltd.	28.65	1016.42	375.1	53486.78
Orchid Chemicals & Pharmaceuticals Ltd.	Bhansali Engineering Polymers Ltd.	41.4	686.85	201.57	688
Oriental Bank Of Commerce	Wyeth Ltd.	313.95	713.3	173.35	3337.68
Patni Computer Systems Ltd.	Uco Bank	29.85	2386.09	332.8	4162.17
Polaris Software Lab Ltd.	Godrej Consumer Products Ltd.	100.05	579.71	152.75	786.58
Punjab National Bank	Alstom Projects India Ltd.	119.8	802.95	159.9	4242.19
Ranbaxy Laboratories Ltd.	Information Technologies (India) Ltd.	51.45	715.15	150.94	1749.33
Reliance Capital Ltd.	Dredging Corpn. Of India Ltd.	500.05	1400.14	181.65	2312.52
Reliance Energy Ltd.	Morepen Laboratories Ltd.	95.55	864.73	198.25	2730.41
Reliance Industries Ltd.	Nirma Ltd.	396.25	3145.52	368.5	38830.95
S R F Ltd.	Geodesic Information Systems Ltd.	127.9	655.41	103	664.62
Satyam Computer Services Ltd.	G T L Ltd.	172.05	1208.69	170.8	5372.34
Shipping Corpn. Of India Ltd.	Raymond Ltd.	99.85	612.89	64.4	1818.03
Siemens Ltd.	New Delhi Television Ltd.	164.55	1000.51	349.38	1157.79
State Bank Of India	N I I T Ltd.	767.3	2965.56	216.85	11412.79
Sterlite Industries (India) Ltd.	Shree Cement Ltd.	341.9	1191.08	129.08	1418.71
Sterlite Optical Technologies Ltd.	Gujarat Gas Co. Ltd.	606	777.2	339.2	1899.34
Strides Arcolab Ltd.	Hindustan Oil Exploration Co. Ltd.	122.23	718.04	204.25	713.94
Sun Pharmaceutical Inds. Ltd.	Ultratech Cement Ltd.	370.2	4605.24	461.6	8563.2
Syndicate Bank	Torrent Pharmaceuticals Ltd.	290.45	614.38	25.25	1191.72
T V S Motor Co. Ltd.	Bombay Dyeing & Mfg. Co. Ltd.	341.8	1318.72	69.55	1652.12
Tata Chemicals Ltd.	Indiabulls Financial Services Ltd.	112.8	1502.94	149.95	3225.46
Tata Motors Ltd.	Himachal Futuristic Communications Ltd.	88	693.63	60.52	1548.44
Tata Power Co. Ltd.	I B P Co. Ltd.	354.75	785.54	129.3	2558.82
Tata Steel Ltd.	Asian Paints Ltd.	166.68	1069.85	76.83	2825.59
Tata Tea Ltd.	Finolex Cables Ltd.	169.5	582.03	184.9	1039.51
Titan Industries Ltd.	Gujarat State Fertilizers & Chemicals Ltd.	112.35	895.38	221.79	937.65
U T I Bank Ltd.	Jaiprakash Associates Ltd.	179	3154.28	226.4	6198.75
Union Bank Of India	Sundaram-Clayton Ltd.	343.75	652.01	42.4	1950.9
Videsh Sanchar Nigam Ltd.	Corporation Bank	146.3	1755.6	318.45	9075.83
Vijaya Bank	Max India Ltd.	518.35	1412.43	59.75	2590.27
Wipro Ltd.	H M T Ltd.	16.5	772.48	234.78	5459.86
Wockhardt Ltd.	Gammon India Ltd.	219.35	1687.04	358.45	3911.45

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