UNDER-PRICING AND LONG-RUN PERFORMANCE OF INITIAL PUBLIC OFFERINGS IN INDIAN STOCK MARKET

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INTRODUCTION

The transition from being a private company to a public one is one of the most important events in the life of a firm. It is also one of particular interest to institutional investors, and the transition is facilitated through the initial public offering (IPO) process. The IPO provides a fresh source of capital that is critical to the growth of the firm and provides the founder and other shareholders such as venture capitalists a liquid market for their shares. From an institutional investor's perspective, the IPO provides an opportunity to share in the rewards of the growth of the firm.

When a firm issues equity to the public for the first time, it makes an initial public offering consisting of two kinds of issues – the primary issue and the follow-on issue. In a primary, the firm raises capital for itself by selling stock to the public, whereas in the follow-on issue, existing large shareholders sell to the public a substantial number of shares they currently own.

It is a well documented fact that IPOs tend to be generally under-priced, though some issues tend to be overpriced. From the viewpoint of financial research, IPO under-pricing in the sense of abnormal short-term returns on IPOs has been found in nearly every country in the world. This suggests that IPO under-pricing may be the outcome of basic problems of information and uncertainty in the IPO process, and is unlikely to be a figment of institutional peculiarities of any one market.

There have also been various studies made to suggest the reasons for such under-pricing. From the investors' point of view, this under-pricing appear to provide the sure and quick profit that most dream about. Though first day return could vary, few of the issues tend to provide a very high return over the first day. One of the examples is VA Linux which had a first day return of 700%. It is also seen that for some of the issues, the first day return could

also be negative. It then becomes inevitable for most investors to measure the performance of IPOs by the short term (usually within one week of issue), as the general scheme is to buy the shares at a low initial offering price and sell it the next day when the price increases.

Pricing of the IPOs are done by the issuers with guidance from underwriters from investment banks. There are various ways to price the stocks but what is commonly used now is a process called book building. It is basically a capital issuance process used in an Initial Public Offer which aids price and demand discovery. It is also a process used for marketing a public offer of equity shares of a company. During the period for which the book for the IPO is open, bids are collected from investors at various prices, which are above or equal to the floor price. The offer/issue price is then determined by the issuing company after the bid closing date based on the various bids that have been collected. For a more detailed discussion of book building, one can visit any of the many stock exchanges. An example of the book building process can be seen from the National Stock Exchange. This Initial Public Offering can also be made through the fixed price method or a combination of both book building and the fixed price method.

There have been various studies conducted on the price changes of the shares after prolonged periods (six months to five years). These studies show that while the short-run performance of IPOs is often quite impressive, the long-run performance over the subsequent three to five years is not as impressive. Excluding the initial-day return, IPOs tend to under-perform various benchmarks. However, these studies focus mainly on developed economies and tend to neglect the developing counterparts. A study by Madhusoodanan and Thiripalraju studies the performance of Indian IPOs prior to 1996.

It is in the hope that the long term performance of IPOs in developing economies can also be a useful indicator to the potential investor that this study is to be undertaken. The

purpose of this paper is to examine the long-run performance of IPOs in Indian stock market which were issued during 2000-2001. The IPO literature has shown that the IPO issues and performance is based on a cycle. In some years there are a large number of IPOs while in some years, there are only a few IPOs. When it is a vintage year with a large number of IPOs, most IPOs tend to do well on the first day but tend to do poorly over a long term whereas in years when there are only a few IPOs, the results tend to be mixed. The long run performance is likely to be affected while we include IPOs from different time periods because the market movements in different market conditions are likely to be different. In order to see that results are not confounded by the time period when IPO was issued, it was decided to include IPOs that were issued within a one-year period. This has resulted in a sample of 116 companies which had IPOs in this period from various industries. This study is important mainly because the Indian stock market has been performing very well from the year 2001 and our research wants to show whether this performance is due to the established firms or the performance also gets to the newly issued shares through IPOs.

The study uses various methods to ascertain the significance of the over or under-performance of IPOs. Among the many reasons for the performance which we see, one of them could be the sensitivity of the results to the choice of benchmarks. Dimson and Marsh, Ritter, Gregory *et al*, Fama and French and Fama have successively demonstrated the sensitivity of the long-run performance of the IPOs the benchmark used in the study. For this reason, the effect of various benchmarks on the return measurements will be studied so as to elucidate the possibility that the magnitude of the performance is benchmark dependent.

LITERATURE SURVEY

There have been numerous evidences which show that short-run under-pricing and the long-run underperformance are the two main patterns associated with IPOs. In 1975, Ibbotson wrote the article which was to spur the future development of research on IPO returns. In the

article, a negative relation between initial returns at the IPO and long-run share price performance was found. In 1991, Ritter analysed the performance of US IPOs issued between the years 1975 to 1984. He found that IPOs underperformed a control sample of matching seasoned firms for a three-year holding period. The natural conclusion was that IPOs are significantly undesirable as medium or long-run investments. In 1993, Levis conducted a study on UK IPOs and identified underperformance of a similar magnitude in the long run. In 1994, Loughran, Ritter and Rydqvist reported that market-adjusted three-year abnormal performance following an IPO is always small and mostly negative in all 25 countries investigated with higher IPO under-pricing in developing markets, with the exception of Japan. Also in 1994, Kinz and Aggarwal examine the returns on IPOs for a number of countries during a three year period after a company goes public. The IPOs are equally weighted and report under-performance. However in 1997, Brav and Gompers using US data find that underperformance is sensitive to the method used during evaluation of IPO performance. In their sample, underperformance is shared by small, non-IPO firms with similar low book-to-market values. Jones et al. in 1999 show that there is relatively more under-pricing in privatisation IPOs (PIPOs) than their private sector counterparts and according to them, this may perhaps reflect political motives. For the long-run performance of privatisation IPOs Researchers find a very different picture for the long-run performance of PIPOs. In 1997, in a study on Indian market, T P Madhusoodanan and M Thiripalraju analyse the Indian IPO market for the short-term as well as long-term underpricing prior to 1997. This study indicates that, in general, the underpricing in the Indian IPOs in the short-run was higher than the experiences of other countries. In the long-run too, Indian offerings have given high returns compared to negative returns reported from other countries.

In 2000, Megginson et al. examine 158 share issue privatisations from 33 countries during the period 1981-1997. They find statistically significant positive long-run returns for the sample firms for all holding periods as compared to a variety of benchmarks.[1]

METHODOLOGY

The methodology used by Aggarwal, Leal and Hernandez (1993) to measure the short-run performance for each IPO and for groups of IPOs. The total return for stock "*i"* at the end of the first trading day is calculated as:

$$R_{i1} = \left(P_{i1} / P_{i0}\right) - 1 \qquad (1)$$

where P_{i1} is the closing price of the stock *i* at the first trading day, and P_{i0} is its offering price and R_{i1} is the total first-day return on the stock. The return on the market index during the same time period is:

$$R_{m1} = \left(P_{m1} / P_{m0}\right) - 1 \qquad (2)$$

where P_{m1} is the closing market index value at the first trading day and P_{m0} is the closing market index value on the offering day of the appropriate stock, while R_{m1} is the first day's comparable market return.

Using these two returns, the market-adjusted abnormal return for each IPO on the first day of trading is computed as:

$$MAAR_{i1} = 100\left(\frac{1+R_{i1}}{1+R_{m1}} - 1\right) \qquad (3)$$

MAAR is the sample mean abnormal return for the first trading day and may be viewed as a performance index which reflects the return, in excess of the market return, on an investment divided equally among *N* new issues in a sample:

[1] Though the risk-return space for IPOs in the short-run is different from the risk-return space for the benchmarks, the risk-return space would be the same when the IPO performance is considered over a long-term, say 5 years. Thus, using benchmarks to measure long-term performance is appropriate.

$$\overline{MAAR_1} = \frac{1}{N}\sum_{i=1}^{N} MAAR_{i1} \tag{4}$$

To test the hypothesis that *MAAR* equals zero, we compute the associated *t* statistic:

$$t = \frac{\overline{MAAR_1}}{S/\sqrt{N}} \tag{5}$$

where *S* is the standard deviation of $MAAR_{i1}$ across the companies.

The market-adjusted long-run returns are calculated for a period of 36 months following the first trading month. The monthly return is measured by comparing the closing price on the last trading day of the month on which the stock is traded to the closing price of the previous month. Following Ritter, we make use of the size and book-to-market value as parameters. The reason for this is that it is a more sophisticated methodology since the size and book-to-market characteristics have been documented as important determinants of stock returns. The long-run returns in our study incorporate dividend payments and are adjusted for dividend and stock splits.

To formalize, this study employs the basic capital asset pricing model (CAPM), the Fama and French (1996) three-factor model and the average return model. In addition to the firm betas, Fama and French in their 1992 paper suggested that firm size and book-to-market effects also play a role in explaining returns, which resulted in their 1996 paper where they came up with a three-factor model to offer explanations for the many anomalies in 'efficient markets'. In this model, the factors are the excess returns on the market, the difference in returns between companies with high book-to-market value (BMV) and low BMV ratios, and the difference in returns between large and small companies.

For the long-run performance analysis, the standard event-study methodology is used. For each benchmark, monthly abnormal returns are computed for up to sixty months after the

IPO (excluding the month of new issue), companies with a minimum of twelve monthly observations post-IPO.

For the first two models, abnormal returns with respect to each benchmark are computed, and are cumulated over time up to period ***T*** after the IPO, using the Cumulative Average Abnormal Return *(CAAR$_T$)* measure

$$CAAR_T = \sum_{t=1}^{T} \frac{1}{N} \sum_{i} \varepsilon_{it} \tag{6}$$

where the abnormal return in month *t* after the IPO for firm *I* is given by $\boldsymbol{\varepsilon}_{it}$ and N is the number of firms in the sample. The test for significance is based on the t-test of Brown and Warner which is given by:

$$t \sim \frac{\sum_{t=1}^{T} \bar{\varepsilon}_t}{\sqrt{\left(\sum_{t=1}^{T} \left(\bar{\varepsilon}_t - \frac{1}{T} \sum_{t=1}^{T} \bar{\varepsilon}_t \right)^2 \right) / (T-1)}} \tag{7}$$

where

$$\bar{\varepsilon}_t = \frac{1}{N} \sum_{i} \varepsilon_{it} \tag{8}$$

These t-test statistics are based on the Crude Dependence Adjustment test for the CAARs in order to correct for cross-sectional dependence.

The first benchmark is based on the Capital Asset Pricing Model (CAPM) which is given by:

$$\varepsilon_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_i \left(R_{mt} - R_{ft} \right) \right] \tag{9}$$

and the second benchmark makes use of the Fama-French three-factor model given by:

$$\varepsilon_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_{1i} \left(R_{mt} - R_{ft} \right) + \hat{\beta}_{2i} \left(SMB_t \right) + \hat{\beta}_{3i} \left(HML_t \right) \right] \quad (10)$$

For both models, R_{it} is the return on company i in event month t, R_{mt} is the return on the market in event month t measured by the NYSE ARCA index, β_t is the model beta which measures systematic risk due to the respective independent variables, SMB_t is the value weighted return on small firms minus the value-weighted return on large firms, formed by sorting all companies in each year by book-to-market value (BMV) and market capitalisations. Value weighted returns are calculated for the bottom and top 30% of companies by market capitalization. HML_t is the value-weighted return on high firms minus the value-weighted return on low BMV firms. Value weighted returns are calculated for the top 50% of companies by BMV and the bottom 50% of companies by BMV.

Lyon et al. document that the CAR approach should be employed to answer if sample firms persistently earn abnormal monthly returns. Though CARs implicitly assume frequent portfolio rebalancing, Fama justifies its use since it would produce fewer spurious rejections of market efficiency than would the use of other benchmarks. There also exists a good knowledge of the distribution properties and the statistical tests for CARs. Since in India, the majority of investors are individual investors, the frequency with which they trade will be much higher than those in other markets. Hence, CARs may be able to give a good estimate of the long-run performance of IPOs in the Indian market.

Background of the Indian IPO Market

There has been relatively little study done on IPO under-pricing and long-run performance in India except for the paper by Madhusoodanan and Thiripalraju. The primary market in India has been shaped uniquely by an unusual history of regulation coupled with the institutional details of how IPOs take place. The total funds raised on the primary market from 1994 to 1995 which includes IPOs and seasoned earnings were 20% of domestic savings. As a

channel for resource allocation, it is an interesting study to undertake so as to ascertain any positive long-run economic benefits the IPO market may have.

Up till November 1998, all capital issues were regulated and controlled by a government agency named the Controller of Capital Issues (CCI) and any public issues were subject to the clearing of the offering price by the CCI. The fair-price of issues was calculated by making use of accounting information, thereby often leading to severe under-pricing and over-subscription. With such an extent of under-pricing, many companies were deterred from going public. The result was relatively few issues taking place with debt playing a major role in financing projects.

Of interest is the Bombay Stock Exchange (BSE) episode which happened from October 1991 to May 1992. During this time, the BSE was then embroiled in a speculative bubble engineered by an illegal diversion of funds from the banking system. This resulted in issues being priced just before the incident to produce enormous returns from issue date to listing date, with the converse being true.

Soon after the incident, the CCI was abolished on 29 May 1992 and firms were free to price equity at whatever price they chose. A new regulator agency called the Securities and Exchanges Board of India (SEBI) was set up to govern financial markets. Under this new governing body, the number of public issues rose sharply, but this new period still saw high level of under-pricing by world standards.

The pricing of IPOs in India now follows a systematic process. Initially, the firm and the merchant banker will choose an offering price and prepare a prospectus about five months

before the issue date. The prospectus is then submitted to the SEBI for approval. After SEBI approves of the information disclosures in the prospectus, a mass media advertising campaign targeted at the lay investor will commence about a month before the issue date. The issue then closes four to ten days after it opens, after which investors apply for shares and pay an amount which is often less than the full offering price. After the issue closes, the allotment itself takes place. The actual listing and the date of first trading takes place long after the issue itself opens

The difference between the face value and offering price of the issues is called the share premium. It is prohibited by law to price equity with a positive premium unless the issuing company has been making profits for at least three recent years. The amount of equity sold also cannot exceed 75% of the total.

Before 1 April 1995, SEBI required the offering price to be precisely chosen at the time the prospectus is submitted for vetting. In comparison, the offering price can be adjusted to be between the submitted price or 1.2 times that. While underwriting arrangements were mandatory before January 1995, they are now optional. An underwriter guarantees to bring forth application forms, either from lay investors or from their own funds, and upon successful delivery will be paid a fee typically 2.5% of the initially submitted offering price. In the case of over-subscription, the money paid at the time of application may be returned some months later. For issues where the issuer chose to not put together an underwriting consortium, the issuing company is required to refund all applications within 90 days if the subscriptions received fall below 90% of the shares offered. Highly over-subscribed issues may yield no allotment and in the case where there are, the allotment process is often delayed due to the volume of paperwork.

In 1997, in a study on Indian market, T P Madhusoodanan and M Thiripalraju analyse the Indian IPO market for the short-term as well as long-term underpricing prior to 1997. This study indicates that, in general, the underpricing in the Indian IPOs in the short-run was higher than the experiences of other countries. In the long-run too, Indian offerings have given high returns compared to negative returns reported from other countries.

Data

The sample consists of 116 IPOs issued by companies in the Indian market during the period from 2000 to 2001. Since our dataset ends in 30th April 2006, only issues with a first trading day earlier than 30th April 2001 were considered so that the aftermarket performance within the first five years can be analysed. The sample only considers the Indian domestic companies listed on the Bombay Stock Exchange and National Stock Exchange. Monthly share prices, BMV figures and market capitalisation data are collected from Bloomberg. The market indices used are the Bombay Sensitive 30 for India and the Shanghai Composite for China. Both Indices are gathered from Yahoo Finance World Indices. Discrete (not log) returns are computed from the share prices. This is to avoid any downward bias in returns caused by Jensen's inequality when averaging returns across portfolios. The returns are computed from the last price of the shares for each month and used in the cross-sectional regressions.

Results and Analysis

Table 1 gives the average first day returns for the entire sample of Indian Stocks. Figure 1 shows the frequency of the market-adjusted initial returns of IPOs for the entire sample of Indian stocks. For the Indian market, the $\overline{MAAR_1}$ is found to be 17.2% with an associated *t*-statistic of 3.46, which is significantly different from zero at the 5% level. The $\overline{MAAR_1}$ has a median of 10.7% and a standard deviation of 24.7%.

Table 2 shows the cumulative average abnormal return for up till 60 months using the CAPM. Among the sixty (60) monthly cumulative average abnormal returns, none of them are negative with only one of them having t-statistics lower than 2.0 and the other fifty-nine (59) of them having t-statistics higher than 2.0. Figure 2 shows the abnormal returns over 60 months for India using the CAPM. The cumulative abnormal returns steadily increases from 8 percent in the second month to 264 percent in the 60th month. Average monthly returns up to the 60th trading month are all positive.

Table 3 and Table 4 show the cumulative average abnormal return for the top and bottom 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns for the top 30%, none of them are negative with 34 of them having t-statistics lower than 2.0 and 26 of them having t-statistics higher than 2.0. As for the bottom 30%, 4 of them are negative with 13 of them having t-statistics lower than 2.0 and 47 of them having t-statistics higher than 2.0. Figure 3 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the CAPM model. From the results, it can be seen that smaller companies tend to outperform the bigger companies in the long run while CAPM is used as the benchmark. .The average abnormal return per year is found to be 21 percent for the whole sample, 32 percent for the portfolio of smaller companies and 17.5 percent for the portfolio of bigger companies, while using CAPM as the benchmark.

Table 5 shows the cumulative average abnormal return for up till 60 months using the Fama-French three-factor model as the benchmark. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than

2.0. Figure 4 shows the abnormal returns over 60 months for India using the Fama-French three-factor model. The cumulative abnormal returns steadily increases from 11 percent in the second month to reach 548 percent by the month 60.

Table 6 and Table 7 show the cumulative average abnormal return for the top and bottom 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model used as the benchmark. Among the 60 monthly cumulative average abnormal returns for the top 30%, none of them are negative with 2 of them having t-statistics lower than 2.0 and 58 of them having t-statistics higher than 2.0. As for the bottom 30%, 1 of them is negative with 3 of them having t-statistics lower than 2.0 and 57 of them having t-statistics higher than 2.0. Figure 5 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the Fama-French three-factor model. It can be seen that until month 48, the smaller companies portfolio provides a higher abnormal return but by the end of year 5, both portfolios provide similar positive cumulative abnormal returns of about 48 percent per year.

Under-pricing or First day return

It is clear from the results that under-pricing exists in Indian Market. Under-pricing is not a violation of no-arbitrage condition nor is it a market inefficiency which will vanish when some agents become aware of it. Instead, under-pricing is structural in the sense that it derives from sound microeconomics underlying the behaviour of firms and investors. There are a number of explanations offered below which can help shed some light on the nature and extent of under-pricing.

For India, the delay between choosing an offering price and the issue date has somewhat diminished after the setting up of a new SEBI policy which allows firms to choose a price

band at the time of vetting the prospectus instead of a precise price. However, the Registrar of Companies still requires a precise offering price 21 days before the issue opens, and the price band which SEBI tolerates is rather narrow. Hence the IPO market is still characterised by an early choice of offer price. If we follow the Brownian motion model of stock prices, uncertainty about the future stock price blows up as the delay between offer price date and listing date increases. This can imply that the degree of under-pricing will worsen as the delay increases. The delay between date of setting the offer price and the listing date clearly seems to be an important factor here.

We can also look at the interest rate float to account for the under-pricing. The issuing company controls the application money for a few months. The interest rate on stock investment accounts of around 12% is quite low. At equilibrium, markets would compensate investors for this low rate of return through under-pricing. This interest rate float argument may account for under-pricing of around five to ten percent.

Taking a look at liquidity, investors who apply for public issues lose liquidity on the amount paid at issue date. At equilibrium, markets would compensate them for this by paying a liquidity premium and this premium shows up in IPO under-pricing. The existence of such a premium follows inexorably from finance theory. It is difficult to empirically test whether it is indeed at work in IPO under-pricing in India, and to quantify its role. This is especially true in the light of the ex-ante unpredictability of the delays from issue date to listing date.

Long-run performance

In the regression analysis, we find a significant positive long-run performance of IPOs in India. The Indian IPOs tend to provide positive abnormal return against both benchmarks, with better performance when the three factor model is used as a benchmark. Further, the smaller

firms tend to provide a superior return as compared to bigger firms. The IPOs have been issued by companies in various industries and hence it can not be termed as industry effect. The possible explanation could be that the well known big companies in the Indian market may be overpriced leading to lower return and hence the investors are looking for better return in the IPOs.

Conclusion

Using the CAPM and the three-factor models as benchmarks, we have examined the evidence on the long-run underperformance of IPOs in the Indian market using a data set of firms over the period 2000-2002. In line with Fama's conclusion, the results on long-run under-performance of the IPOs depend very much on the choice of technique. For both benchmarks, there are significant positive abnormal returns. However, the three-factor model implies a greater positive return when compared to the CAPM. the long-run.

When we compare the relevance of the two benchmarks, the CAPM seems mis-specified when we take into consideration the empirical significance of size effects and the observation that IPOs are typically small stock. As such, the three-factor model may be better suited for explaining long-run underperformance.

There are various features in India which contribute to the under-pricing and are unique by world standards. For one, the delay from issue date to listing date is enormous in India when compared with other countries. Among the other features are the ways the offer price is fixed and the availability of information to lay investors. The offer price is chosen by the firm months before the issue opens and a lack of feedback mechanism means that there is no channel through which the market demand can alter the price. Coupled with the fact that IPOs

are sold directly to uninformed investors rather than institutional investors, there is likely to be under-pricing.

The long-term performance of these companies show that investment in Indian IPOs provides positive abnormal return by the end of 60 days. The abnormal return is greater for investment in smaller companies compared to investment in larger companies. This finding is contradictory to the results found in major developed markets where the companies provide negative abnormal returns by the end of 60 months.

This study shows that investment in IPOs generally provides positive benefit to Indian investors.

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Table 1 First Day returns for India and China

	India
Mean (%)	17.2
Standard Deviation (%)	24.7
t-statistics (%)	3.46
Median (%)	10.7
Minimum (%)	-40.4
Maximum (%)	104.8
Total Number of Issues	116

Figure 1 Distribution of First Day Returns India

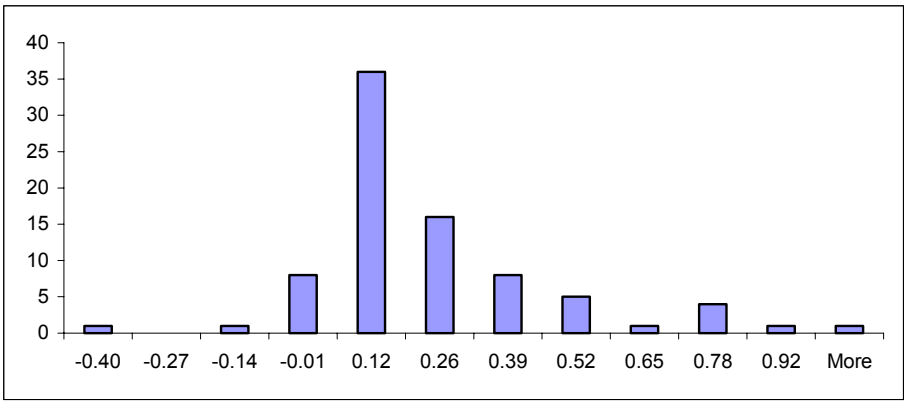

Table 2 Cumulative Abnormal returns – India using CAPM (Whole sample)

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.09	3.12	**31**	1.31	8.09
2	0.08	1.86	**32**	1.32	8.02
3	0.12	2.29	**33**	1.32	7.92
4	0.17	2.95	**34**	1.35	7.98
5	0.21	3.19	**35**	1.30	7.57
6	0.23	3.28	**36**	1.30	7.46
7	0.26	3.43	**37**	1.33	7.54
8	0.33	3.98	**38**	1.36	7.61
9	0.35	4.07	**39**	1.39	7.66
10	0.40	4.32	**40**	1.42	7.76
11	0.43	4.43	**41**	1.45	7.83
12	0.50	5.00	**42**	1.50	7.97
13	0.51	4.88	**43**	1.51	7.94
14	0.60	5.56	**44**	1.57	8.14
15	0.66	5.89	**45**	1.65	8.50
16	0.74	6.39	**46**	1.74	8.87
17	0.80	6.65	**47**	1.81	9.12
18	0.81	6.59	**48**	1.87	9.29
19	0.89	7.01	**49**	1.93	9.53
20	0.95	7.33	**50**	1.99	9.72
21	1.01	7.58	**51**	2.12	10.25
22	1.07	7.85	**52**	2.17	10.36
23	1.06	7.65	**53**	2.32	11.01
24	1.08	7.58	**54**	2.36	11.05
25	1.11	7.69	**55**	2.47	11.51
26	1.14	7.73	**56**	2.50	11.50
27	1.21	8.03	**57**	2.60	11.88
28	1.22	7.97	**58**	2.64	11.95
29	1.25	8.01	**59**	2.67	11.96
30	1.26	7.92	**60**	2.64	11.75

Figure 2 Cumulative Abnormal returns – India using CAPM (Whole sample)

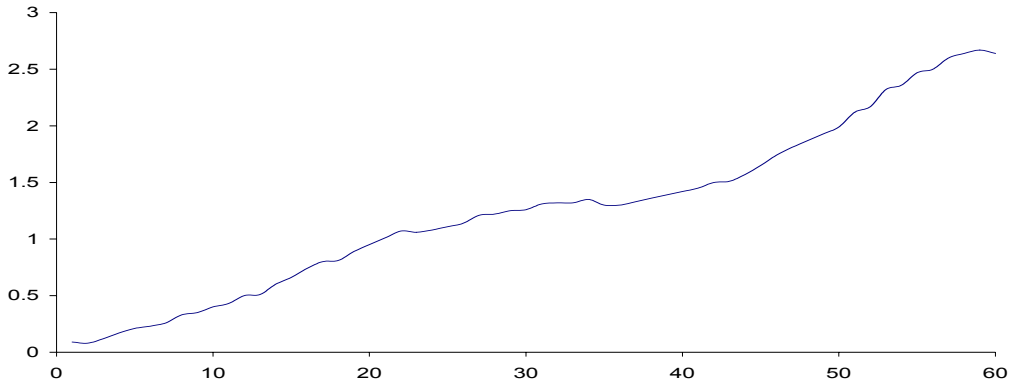

Table 4 Cumulative Abnormal Returns – India using CAPM (Top 30% of the companies)

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.49	4.55	**31**	0.92	1.52
2	0.52	3.42	**32**	0.92	1.50
3	0.54	2.85	**33**	0.98	1.58
4	0.67	3.10	**34**	0.99	1.57
5	0.63	2.62	**35**	0.88	1.38
6	0.62	2.34	**36**	0.87	1.33
7	0.69	2.42	**37**	0.98	1.49
8	0.74	2.43	**38**	0.97	1.45
9	0.80	2.47	**39**	1.03	1.53
10	0.81	2.38	**40**	1.07	1.56
11	0.82	2.28	**41**	1.13	1.63
12	0.76	2.03	**42**	1.16	1.65
13	0.80	2.04	**43**	1.23	1.73
14	0.81	1.98	**44**	1.24	1.73
15	0.75	1.78	**45**	1.26	1.74
16	0.78	1.81	**46**	1.46	1.98
17	0.79	1.77	**47**	1.47	1.98
18	0.85	1.85	**48**	1.51	2.01
19	0.86	1.82	**49**	1.54	2.03
20	0.88	1.81	**50**	1.60	2.08
21	0.90	1.81	**51**	1.73	2.23
22	0.86	1.70	**52**	1.86	2.37
23	0.81	1.55	**53**	1.90	2.40
24	0.77	1.44	**54**	1.91	2.40
25	0.76	1.40	**55**	2.01	2.50
26	0.77	1.40	**56**	1.93	2.38
27	0.80	1.42	**57**	2.19	2.67
28	0.81	1.41	**58**	2.30	2.78
29	0.91	1.57	**59**	2.30	2.76
30	0.83	1.39	**60**	2.24	2.67

Table 5 Cumulative Abnormal Returns – India using CAPM (Bottom 30% of the companies)

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	-0.16	-1.71	**31**	2.21	4.29
2	-0.19	-1.45	**32**	2.19	4.19
3	-0.13	-0.81	**33**	2.11	3.98
4	-0.06	-0.34	**34**	2.26	4.20
5	0.03	0.14	**35**	2.21	4.04
6	0.10	0.43	**36**	2.21	3.98
7	0.10	0.39	**37**	2.21	3.92
8	0.21	0.81	**38**	2.28	4.00
9	0.17	0.60	**39**	2.26	3.91
10	0.30	1.04	**40**	2.36	4.04
11	0.41	1.35	**41**	2.46	4.16
12	0.62	1.95	**42**	2.57	4.30
13	0.58	1.73	**43**	2.54	4.18
14	0.79	2.28	**44**	2.60	4.24
15	1.00	2.78	**45**	2.74	4.41
16	1.14	3.07	**46**	2.76	4.41
17	1.24	3.26	**47**	2.89	4.56
18	1.28	3.26	**48**	2.97	4.64
19	1.36	3.38	**49**	3.19	4.93
20	1.49	3.59	**50**	3.28	5.02
21	1.58	3.72	**51**	3.55	5.38
22	1.79	4.12	**52**	3.59	5.38
23	1.79	4.04	**53**	3.66	5.43
24	1.84	4.06	**54**	3.77	5.55
25	1.97	4.27	**55**	3.93	5.73
26	2.02	4.28	**56**	3.95	5.71
27	2.15	4.47	**57**	4.04	5.78
28	2.17	4.43	**58**	4.05	5.76
29	2.14	4.31	**59**	4.08	5.75
30	2.20	4.35	**60**	4.02	5.62

Figure 3. Cumulative Abnormal Return (CAPM) for Top 30% and Bottom 30% of the companies

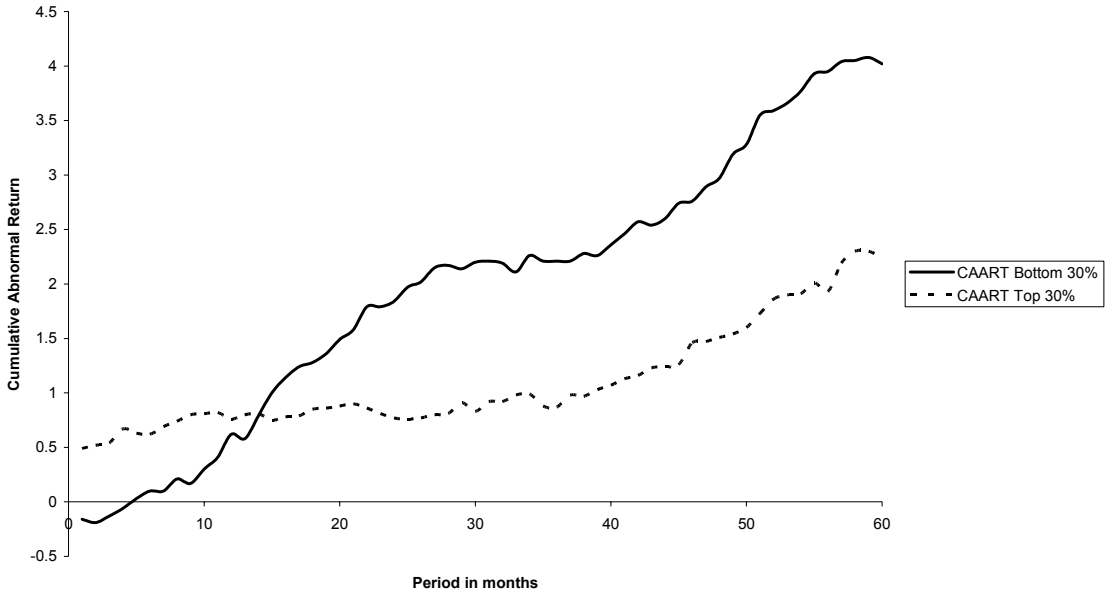

Table 6 Cumulative Abnormal returns – India using Fama-French Model (Whole sample)

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.11	3.40	**31**	3.25	18.63
2	0.13	2.87	**32**	3.38	19.10
3	0.21	3.90	**33**	3.44	19.15
4	0.31	4.97	**34**	3.53	19.36
5	0.39	5.57	**35**	3.44	18.55
6	0.47	6.19	**36**	3.41	18.13
7	0.56	6.78	**37**	3.40	17.86
8	0.67	7.60	**38**	3.39	17.59
9	0.75	7.99	**39**	3.39	17.34
10	0.85	8.54	**40**	3.39	17.14
11	0.92	8.90	**41**	3.41	17.00
12	1.05	9.71	**42**	3.45	17.01
13	1.12	9.92	**43**	3.45	16.79
14	1.28	10.94	**44**	3.48	16.77
15	1.39	11.49	**45**	3.62	17.24
16	1.53	12.23	**46**	3.76	17.69
17	1.65	12.77	**47**	3.91	18.21
18	1.72	12.95	**48**	4.02	18.55
19	1.86	13.61	**49**	4.18	19.07
20	1.98	14.16	**50**	4.30	19.44
21	2.09	14.58	**51**	4.51	20.16
22	2.21	15.08	**52**	4.59	20.34
23	2.26	15.05	**53**	4.80	21.08
24	2.35	15.33	**54**	4.89	21.27
25	2.46	15.71	**55**	5.09	21.90
26	2.60	16.30	**56**	5.17	22.07
27	2.78	17.07	**57**	5.35	22.64
28	2.87	17.32	**58**	5.44	22.82
29	2.98	17.68	**59**	5.50	22.88
30	3.08	17.98	**60**	5.48	22.58

Table 7 Cumulative Abnormal Returns – India using Fama-French Model (Top 30% of the companies)

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.28	4.25	**31**	2.51	6.84
2	0.25	2.68	**32**	2.63	7.05
3	0.23	1.99	**33**	2.78	7.33
4	0.33	2.53	**34**	2.90	7.52
5	0.30	2.04	**35**	2.81	7.19
6	0.31	1.89	**36**	2.84	7.16
7	0.41	2.33	**37**	2.99	7.45
8	0.46	2.49	**38**	3.08	7.56
9	0.55	2.77	**39**	3.28	7.95
10	0.56	2.66	**40**	3.49	8.36
11	0.59	2.68	**41**	3.75	8.88
12	0.60	2.62	**42**	4.00	9.34
13	0.70	2.95	**43**	4.28	9.88
14	0.76	3.09	**44**	4.49	10.26
15	0.77	3.01	**45**	4.74	10.71
16	0.87	3.30	**46**	5.15	11.50
17	0.95	3.50	**47**	5.42	11.97
18	1.08	3.86	**48**	5.64	12.33
19	1.16	4.05	**49**	5.86	12.68
20	1.25	4.24	**50**	6.03	12.90
21	1.34	4.42	**51**	6.27	13.29
22	1.38	4.46	**52**	6.51	13.67
23	1.42	4.47	**53**	6.64	13.81
24	1.48	4.57	**54**	6.73	13.86
25	1.58	4.77	**55**	6.91	14.12
26	1.79	5.32	**56**	6.92	14.01
27	1.98	5.78	**57**	7.28	14.61
28	2.11	6.05	**58**	7.48	14.88
29	2.31	6.50	**59**	7.52	14.82
30	2.33	6.45	**60**	7.49	14.63

Table 8 Cumulative Abnormal Returns – India using Fama-French Model (Bottom 30% of the companies)

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	-0.01	-0.15	**31**	5.00	11.06
2	0.07	0.63	**32**	5.15	11.21
3	0.25	1.77	**33**	5.07	10.86
4	0.40	2.46	**34**	5.23	11.03
5	0.56	3.07	**35**	5.15	10.71
6	0.72	3.61	**36**	5.14	10.55
7	0.81	3.75	**37**	5.12	10.36
8	1.01	4.39	**38**	5.15	10.29
9	1.04	4.27	**39**	5.08	10.00
10	1.25	4.88	**40**	5.07	9.87
11	1.43	5.30	**41**	5.06	9.73
12	1.68	5.96	**42**	5.10	9.69
13	1.69	5.78	**43**	4.99	9.36
14	1.98	6.52	**44**	4.97	9.23
15	2.25	7.15	**45**	5.15	9.45
16	2.45	7.54	**46**	5.21	9.45
17	2.62	7.83	**47**	5.35	9.61
18	2.72	7.90	**48**	5.50	9.77
19	2.86	8.08	**49**	5.78	10.16
20	3.04	8.38	**50**	5.93	10.31
21	3.19	8.57	**51**	6.25	10.77
22	3.48	9.12	**52**	6.32	10.78
23	3.54	9.07	**53**	6.42	10.86
24	3.68	9.25	**54**	6.57	10.99
25	3.90	9.61	**55**	6.79	11.26
26	4.06	9.80	**56**	6.86	11.29
27	4.32	10.22	**57**	7.00	11.41
28	4.47	10.40	**58**	7.06	11.40
29	4.62	10.55	**59**	7.10	11.37
30	4.84	10.88	**60**	7.02	11.16

Figure 4. Cumulative Abnormal Return (Fama-French Model) for Top 30% and Bottom 30% of the companies