

# **DETERMINANTS OF IPO UNDER PRICING IN THE NATIONAL STOCK EXCHANGE OF INDIA**

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### *ABSTRACT*<sup>1</sup>

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*The National Stock Exchange (NSE) is India's first fully demutualized stock exchange. It is also the largest exchange in India in terms of volumes in both equity and derivatives segments. The previous studies on Initial Public Offerings (IPOs) in India have been largely confined to the Bombay Stock Exchange (BSE). This study looks at the pricing of IPOs in the NSE. In particular, it seeks to empirically explain the first day under pricing in terms of the demand generated during the book building of the issue, the listing delay between the closure of the book building and the first day listing of the issue and the money spent on the marketing of the IPO by the firms. It also seeks to understand any emerging patterns in Indian IPO market with reference to the previous studies. Moreover it seeks to find the post IPO returns for one month in the NSE. The results suggest that the demand generated for an issue during book building and the listing delay positively impact the first day under pricing whereas the effect of money spent on the marketing of the IPO is insignificant. We also find that in consonance with extant literature, the post IPO performance in one month after the listing for the firms under study is negative.*

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### 1. INTRODUCTION

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The IPO market in India has recently invited the attention of the media for scams in the allotment of shares. The charges are that few individuals got a large number of shares allocated in IPOs of various companies under fictitious names. The role of the banks as well as Depository Participants (DPs) has therefore come under scanner. The market regulator- Securities and Exchange Board of India (SEBI) has already passed an order asking the DPs for payment of a disgorgement amount of Rs. 1160 million<sup>2</sup>(approximately USD 28.3 million). The recent scam in the allotment of shares in IPOs raises an interesting question- What makes the investors rush towards IPOs? It seems that there is a significant difference in the prices at which the IPOs are offered to the investors and the price at which they trade on the day of the listing. So if the investors

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<sup>1</sup> An earlier version of this paper was presented at the APRIA Conference in Taipei in July 2007. The authors have benefited from the feedback received at the conference. Any errors are our own. We own the copyrights to this paper.

<sup>2</sup> Hindu Business Line, November 22,2006

get shares allotted in an IPO at a lower offer price and then sell them on the first day of listing at higher prices then they can make substantial gains. This phenomenon is known as “Under Pricing” in the IPO market. In other words, the market (on the day of the listing) seems to believe that the offer price of the stock was lower and deserves a higher price. The higher the under pricing, greater is the amount of money that can be made by investors who got allocations in the IPO and sell these on the day of listing. This phenomena is also referred to as “money left on the table” by the firms.

Studying the IPOs in the Indian markets is important for another reason. India has become the first country in the world to introduce a rating mechanism for the Initial Public Offerings (IPOs) prior to their listing. While rating of debt instruments is fairly common, equity ratings is a unique concept. Ostensibly the aim of this exercise started at the behest of the market regulator in India (SEBI or Securities and Exchange Board of India) is to make the investors more informed about the fundamentals of the firms where they are investing their money in. It is also likely to have an impact on the huge over subscriptions that most of the IPO issues in India generate. However as per SEBI, this rating is not going to be about the “quality or valuation” of the issue that is going to the public. Presumably then, the rating agencies are going to evaluate the firm with respect to the disclosures made in the prospectus. So in effect the rating agencies would be reducing thick documents of the firms’ prospectus to a simple letter based rating for the investors. This rating (although SEBI claims would not be about the valuation of the issue,) is likely to serve as a signal to a retail investor about the credibility of the firm. The efficacy of this regulation will be tested in the times to come. There could be a difference in assessment of the firms’ fundamentals as disclosed in its prospectus between the rating agencies and the informed institutional investors.

**Risk in investment in IPOs for retail uninformed investors-** Some investors feel that IPOs are low hanging fruits. If investors were to get allocations in IPOs and were to flip these shares on the day of the listing of the firm, then on an average they would be able to get returns higher than the market. There is however an element of risk here. The risk is in blocking one’s money in IPOs and getting no allocations. Rock (1986) demonstrated that retail uninformed investors might suffer from a winner’s curse problem. They might get all the allocations that they have asked for in IPOs which are going to earn very low

returns on the day of listing but may be rationed out in IPOs which will give very high returns on the day of listing, because of the high demand that such issues will generate. Thus retail uninformed investors might not be able to utilize the under pricing inherent in IPOs to their advantage. Besides this, uninformed investors might not be able to fully comprehend the risk factors which are outlined in the offer documents of the IPOs. To this extent, the rating mechanisms introduced in the Indian IPO markets would prove to be useful for the retail investors.

Given the rich and unique setting in the Indian IPO market, this study seeks to study the degree of under pricing in the Indian IPOs in recent times. While previous studies on the Indian stock markets like Shah (1995) and Majumdar (1999) have concentrated on the Bombay Stock Exchange (BSE), this study is carried out on all the IPOs listed in the National Stock Exchange (NSE) during the period 2004 to 2006. The National Stock Exchange (NSE) is India's first fully demutualised stock exchange. It is also the largest exchange in India in terms of volumes in both equity and derivatives segments. Therefore this study seeks to understand critical differences if any with the previous studies with regards to the under pricing of the IPOs. It also tries to find out whether the degree of under pricing is influenced by the demand for the IPO, delay in listing and the money spent on the marketing of the issue. Since the ratings have only recently (May 2007) been made mandatory, and the firms which have been rated are yet to get listed, this study studies the IPOs in a period prior to the ratings. It demonstrates that over the years, the degree of under pricing has decreased thereby pointing towards an improvement in the market in the valuation of new issues. It also demonstrates that in consonance with Benveniste and Spindt's (1989) model, the market views the final pricing of the issue in the offer band as a credible signal of the premium that the issue makes on the first day of trading. Thus if in a book built band of {a, b} the final offer price fixed by the firm is closer to "b" than it is to "a" then the after market regards this as a credible signal to under price (give premium to) the issue on the day of listing. This study also finds that on an average a delay of about 20 days exists between the closing of an offer and the firm being listed. Thus there exists a possibility of some off market trades happening prior to the date of listing if the offering has been priced on the higher side of the band. The listing delay also influences the degree of under pricing positively. However the study

does not find any evidence for the effort on marketing put in by the firm and its investment bankers to have a significant impact on its degree of under pricing.

. We also find that in consonance with extant literature, the post IPO performance in one month after the listing for the firms under study is negative.

Rest of the paper is organized as follows-section 2 does a literature review of studies carried out in IPOs, section 3 develops the hypotheses, section 4 develops the model, section 5 is on data collection, section 6 contains the results and section 7 concludes.

## **2.LITERATURE REVIEW**

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The literature review on IPOs can be divided in the following main heads-

**a) Reason and timing of going public-** Going public marks a watershed in the life cycle of the firm. While increased equity can support the firm's future plans of growth, the trade off for the firm is that of increased public scrutiny. Brealy and Myers (2005) state that in the context of USA the firms may seek private equity in their initial years and only later go for public issues. Pagano, Panetta and Zingales (1998) in their study of Italian firms, find that firms going public are not seeking money for growth but are rebalancing their accounts after high investment and growth. The post IPO period sees a reduction in leverage as well as investment. They state that going public is a conscious choice that some firms make while some others prefer to remain private. Thus going public is not a natural element in the life cycle of a firm. Lerner (1994) found that there are times (windows of opportunity) when the markets could be extremely optimistic about a particular industry and it may be a good time for the firms in that industry to go public. He found in the study of 350 venture capital backed biotechnology firms that firms go public when the equity valuations are high and when these are low, the firms choose the private placement route.

**b) Valuation of IPOs-** Benveniste and Spindt (1989) find that under writers try to resolve the information asymmetry problem between the firm and the investors by providing an incentive to the investors to reveal their private information about the firm. Kim and Ritter (1999) in their study of 190 firms find that under writers forecast the next years earnings numbers and multiply them with PE ratios of comparable firms in the industry to get the approximate price of the IPO. They argue that since most of the firms

going public are young firms, it is difficult to adopt the Discounted Cash Flow techniques for valuing these firms as the future cash flows as well as discount rates to be adopted are uncertain. However they also found that PE ratios using historical earnings numbers do not give accurate results whereas when forecasted earnings numbers are used then the valuation is much more accurate. Purnanandam and Swaminathan (2002) say that IPOs are priced 50% higher than industry peers. Also they find that more the IPO is overpriced with respect to its peers, worse is its long term performance.

**c) Allocation mechanism-** The allocation mechanisms are specified by the regulators in different countries. Loughran, Ritter and Rydqvist (1994) find 3 main categories across countries-Auctions, Fixed price offers and Book Building. Sherman (2005) finds that Book building is a superior mechanism for selling IPOs rather than auctions.

Benveniste and Spindt's (1989) model predicts that if the under writers are allowed to differentiate between investors by offering larger number of shares to those investors who have information that the firm does not have (for example the relative skills of its management) then the degree of under pricing can be reduced.

**d) Theories explaining under pricing-** There have been a number of theories to explain under pricing. The most prominent ones are discussed below-

(1) Leland and Pyle's model (1976) - Leland and Pyle's model says that the information asymmetry between issuers of IPOs and the investors can be reduced by observing the signal of the equity retained by the issuers. Moreover they were the first ones to suggest that financial intermediaries are required to resolve information asymmetry.

(2) Baron's model (1982) - Baron's (1982) model is for the contracting mechanism when the Investment Banker has better information than the issuer about the IPO market. Since the issuer cannot monitor the Investment Banker, without cost, in order to incentivize the investment banker, the issuer lets the investment banker under price the issue (optimal delegation). Baron uses the term "delegation contracting" to model the situation in which an issuer not only needs the services of the Investment Banker for distribution of the IPO but also needs his advice for setting the offer price.

(3) Adverse selection and Rock's model of Winner's Curse problem- Rock's model (1986) is for firm commitment offerings. He showed that those investors who are more informed (than the firm as well as other investors) about high under pricing offers crowd

out uninformed investors. On the other hand these more informed investors withdraw in issues which are over priced leaving the uninformed investors with the winner's curse problem. Thus the uninformed investors would not participate in over priced issues. Hence in order to attract such investors, the firm must under price its IPOs.

(4) Information acquisition- Benveniste and Spindt's (1989) model is for book building and predicts that under pricing is necessary to acquire true information from the more informed investors. Thus those issues which are offered on the higher side of a price band mentioned in the book building will be more under priced than the others.

(5) Prospect theory- Loughran and Ritter (2003) found that during 1990-1998 firms which went public had total earnings of \$8 billion while they left \$27 billion on the table even though they paid \$13 billion as fees to the under writers. This made Loughran and Ritter propound a prospect theory for under pricing where they state that issuers of IPOs leave a lot of money on the table because they see a prospect of higher trading price in the first few days of listing consequently offsetting their loss of wealth in under pricing the IPOs and in fact resulting in net gains to their wealth levels. More importantly they found that **most IPOs leave little money on the table**. The minority of IPOs that leave a lot of money on the table result in net increases to the wealth of the issuers due to higher under pricing.

(6) Corruption Hypothesis-Loughran and Ritter (2003) while trying to investigate why under pricing has increased over time found that managers were not concerned in leaving large amounts of money on the table or in approaching under writers with a reputation of high under pricing because under writers allot hot IPOs (those with great demand) to the personal accounts of these managers.

(7) Signaling Hypothesis-The signaling hypothesis is based on the assumption that the firm knows about its prospects better than the investors. Allen and Faulhaber (1989), find that in some circumstances good firms want to "signal" to their investors about their good future prospects and therefore under price their IPOs. This is consistent with Ibbotson (1975-pg 264) conjecture that IPOs are under priced so as to leave a good taste in the investors' mouths so that future seasoned equities can be priced higher. Welch (1989) further formalized this in a two period model where high quality firms will under price but low quality firms will not be able to do so because of high imitation costs. Grinblat

and Hwang (1989) add to this body of literature by saying that the issuers signal higher quality in IPOs by under pricing as well as retaining some of the firms' shares in their personal portfolio.

8. A protection from legal liability- Tinic postulated that firms under price their IPOs as a form of insurance against legal liability. If litigation arises post the IPO, then it harms the reputation of both the issuers as well as the investment bankers and in order to guard against this possibility, firms under price their offerings. This postulate was also tested by comparing 134 IPOs in the post 1933 SEC regulations and 70 IPOs in the pre regulation period and it was found that in the post regulation period, under pricing had significantly increased. Hughes and Thakor (1992) provide a theoretical link between litigation risk and IPO under pricing, but they do not attribute this to be the sole cause of under pricing as under pricing is observed even in countries where the legal systems are not strong. They also contend that in all places the risk of loss of reputation of the under writer and institutional arrangements make the under writers under price the IPOs.

9. Models of Book Building- Sherman (2000)'s model of book building postulates that if the under writer knows that he will get to handle more issues in the future then he would be able to reduce the under pricing in the present issue. The under writer can do so by forming groups of regular informed as well as uninformed investors. Since the law of one price has to prevail, the uninformed investors would benefit from under priced issues in hot markets without revealing information (free riding), the under writer can make them accept over priced issues too in return for keeping them in his list of regular investors.

Sherman and Titman (2002) argue that although the issuers may want a high price at the IPO, they are more interested in accurate pricing of their issue since mis-pricing by the market can make them accept negative NPV projects or force them to abandon positive NPV projects. Moreover accurate pricing also helps the under writers to acquire high quality clients. They also say that if accurate pricing is desired then more informed investors would be invited to the offering and if enough investors are chosen then the informed investors would benefit as the gains from under pricing would exceed their cost of information.



Sherman (2005) models the book building procedure with respect to the auctions (both discriminatory and uniform price auctions) and tries to find reasons as to why the auction mechanism all over the world has given way to the book building mechanism. The reason for this, Sherman (2005) claims is that book building is a less risky process where the under writer is ensuring that at least a minimum number of informed investors participate in the offering. The same is not true for IPO auctions where the issuer may not be able to find investors who will take out time to evaluate the offering.

In the Indian context the studies on under pricing done by Shah (1995), Majumdar (1999) and others have concentrated on the Bombay Stock Exchange (BSE). This study is conducted on the IPOs which got listed in the National Stock Exchange (NSE) very recently (2004-06) and therefore attempts to understand the critical differences with the previous studies due to changes in regulation as well as the evolution of the IPO market. Secondly this study attempts to find returns in one month after the IPO to find out whether the effect of under pricing has been dissipated in the market in this period of one month or not. Thirdly this study looks at the impact of demand generated during book building as important factor affecting the degree of under pricing besides the delay in the listing of the stocks as well as the amount of money spent on the marketing of the issue.

### **3.METHODOLOGY**

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The study would empirically try to verify the following hypotheses-

**Hypothesis 1: The issues which are finally priced towards the higher end of the offer price band would be under priced more as compared to issues which are finally priced towards the lower end of the price band.**

The degree of under pricing is a function of the popularity of the IPO in the market. In a book building scenario, in consonance with Benveniste and Spindt (1989), the investment banker fixes an offer price based on the market demand. If there is good demand in the market for an issue, then the merchant banker fixes an offer price which is on the higher side of the price band available for bidding. On the contrary, if there is low demand for an issue, then the offer price would be fixed at the lower end of the band. The fixation of the price at the higher end of the band is likely to send a signal to the market about good

demand for the issue and is likely to result in a higher listing price as well as trading price on the opening day of the listing of the stock. Cornelli and Goldreich (2001) have shown that in many book built issues the demand may far exceed supply so the price cannot be arrived at by the intersection of the demand and supply curves. In fact the price may be fixed at a point where the demand curve shows the steepest descent. Thus the **oversubscription of an issue may not be a credible signal of the likely under pricing of the issue** but the price fixation by the under writer in the manner mentioned above could be such a signal. Since there is a time period of more than two weeks between the fixation of final price and the commencement of trading hence in this period the various market players can form opinions about their strategy on the day of listing. There could also be out of the market trades agreed between some players as mentioned earlier. Hence the first hypothesis that is being examined is that the issues which are finally priced towards the higher end of the offer price band would be under priced more as compared to issues which are finally priced towards the lower end of the price band.

**Hypothesis 2: The greater the listing delay for a firm, the lower would be the degree of under pricing.**

Unlike the US stock markets, the Indian stock markets have a delay of about three weeks from the date of closure of the issue to the date of listing. The degree of under pricing is hypothesized to be a function of this listing delay. If a firm takes too long in getting listed after the period of book building is over then the market revises its expectations about the firm. The market speculates that a big delay in the listing of the firm means that the firm has not been able to get clearances of its projects from the various regulatory authorities and consequently the firm may face a lower degree of under pricing or it may face over pricing on the day of listing. On the other hand, investors who face illiquidity because of the long delay in listing could demand more premium in the first day of listing and may take positions likewise in the market, (Shah, 1995). Moreover there is a possibility of greater number of out of the market trades being agreed to if there is substantial gap between setting the final offer price and the trading day. Thus whether the delay in listing would positively or negatively affect the degree of under pricing is *a-priori* not very clear.

**Hypothesis 3: The degree of under pricing of a firm would be lesser if a greater fraction of the issue proceeds is spent in the marketing fees.**

Habib and Ljungqvist (2001) have postulated that promotion costs affect under pricing. They view promotion costs and under pricing as substitute costs for the firm. Promotion seeks to decrease the adverse selection problem and therefore reduces under pricing. Moreover, the promoters will spend more on promotion, if they want to sell more shares. Their results found that every 1\$ of promotion costs seeks to reduce the promoters' wealth losses by 98 cents so the marginal costs of promotion equal the marginal benefits. Habib and Ljungqvist (2001) also say that one reason why the investment's banks in Muscarella and Vetsuypens (1989) tests of Baron's hypothesis get a high under pricing is because they may be selling very few shares as compared to other IPOs and therefore would be incurring lesser promotion costs. Cook et al (2006) build on earlier work on the marketing of IPOs to postulate that investment bankers promote the IPO amongst the retail (sentiment) investors as doing so benefits the firm, investment bankers themselves and the regular (informed) investors. They also find that issuers tend to change their investment bankers if the investment bankers are not able to generate sufficient pre-offer publicity. Frieder and Subrahmanyam (2004) find that individual investors are more likely to hold stocks of highly visible firms. High visibility is driven by marketing hence if a firm has higher marketing expenses, ceteris paribus it should have a lower degree of under pricing.

In addition to verification of the above hypotheses, this study would also find out the returns of the firms, one month after their listing, first without adjusting for market wide returns and then adjusting for the market wide returns.

**4. MODEL**

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a) In order to measure the degree of demand of an issue, the data set was divided into two parts. Those issues whose final offer price was greater than the **mean of the price band** were classified as high demand issues, while those with an offer price less than or equal to the mean of the band size were classified as low demand issues. Thus if the final price of offer of an issue being bid in the price band of Rs 100-120 was Rs110 or less , then the issue was classified as a low demand issue otherwise it was classified as a high demand

issue. Next a dummy variable *demand* was used in the OLS regression with a value 1 if the issue is in high demand and 0 if the issue is in low demand.

b) The listing delay of the firm was measured as the time period in days from the last day of the offer to the day of listing.

c) The marketing expenses were measured as a logarithm of the total money spent in marketing in Indian rupees.

d) The degree of under pricing was measured as the ratio of the difference in closing price on the day of listing and offer prices to the offer price

$\text{deg\_under pricing} = (P_{\text{closing on listing day}} - P_{\text{offer}}) / P_{\text{offer}}$  where P is the price of the stock

Since the degree of under pricing could be influenced positively or negatively by the market wide volatility on the day of listing, the percent change in the S&P CNX Nifty 500 index on the day of listing of the various firms is included in the variables as the **first control variable**. Since the degree of under pricing is also likely to be negatively affected by the size of an issue, with firms coming out with large size issues using a low degree of under pricing to signal their quality, the issue size is included as a **second control variable**. The natural log of the issue size was taken to avoid heteroscedasticity.

The Regression model to be estimated then is

$$\text{Degree Under pricing} = \beta_0 + \beta_1(\text{Demand}) + \beta_2(\text{Listing Delay}) + \beta_3(\ln\_issuesize) + \beta_4(\ln\_marktngexp) + \beta_5(\text{percent\_market\_change}) + \varepsilon$$

where  $\varepsilon$  is the error term with the distribution  $\sim N(0,1)$

## 5. DATA

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The data for the study was obtained from the web site of the National stock Exchange (NSE) <http://www/nse-india.com/> under the heading of book building in IPOs. The period for which the data was taken for the study was 26th March 2004 to 31<sup>st</sup> October 2006. NSE was selected for the purpose of this study because it is the largest exchange in the country in terms of trading volumes and there have not been studies on NSE to estimate the degree of under pricing in the stocks getting listed there. In 2003-04 NSE reported a turnover of Rs.10, 995.35 billion in the equities segment.<sup>3</sup> The data on the

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<sup>3</sup> <http://www.nse-india.com/>

web-site yielded a total of 121 companies for study. Out of these 18 companies were excluded as these had come out with Follow-On equity issues. There were 8 companies which couldn't be listed up to 31<sup>st</sup> October, 2006. These were also excluded from the study. The final prospectus filed by the firms were obtained from the web-site of SEBI <http://www.sebi.gov.in/>- 40 firms are either not listed in the SEBI website in the section of final prospectus or have not clearly indicated in their final prospectus the expenditure made in the issue towards the marketing expenses of the issue. Hence these firms had also to be excluded. The final data set is therefore of **55 firms**. The data for the opening and closing prices on the day of the listing for individual companies was obtained from the date wise "bhavcopy" records of NSE. The data for one month returns was also obtained from the "bhavcopy" records. If the day on which one month was ending was a Saturday/ Sunday then the closing prices of Monday were taken. For calculating the returns of the market the values of S&P CNX Nifty 500 was used. This was also obtained from the NSE web site.

## **6. RESULTS**

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- a) **Descriptive Statistics-** The descriptive statistics of the various variables in the model are as follows-

Variable	No of data points	Minimum	Maximum	Mean	Standard deviation
Deg_upricing	55	-33.04%	82.50%	22.62%	29.10%
Issue size (in millions of Rs)	55	359.6	53681.5	3556.4	8324.1
Issue size (in millions of USD)	55	8.56	1278.13	84.68	198.19
Ln_issuesize	55	3.58	8.59	4.98	1.10
Listing delay(in days)	55	14	26	19.91	2.38
Marketing_exp (in millions of Rs.)	55	3.00	296.3	26.14	41.50
Marketing_exp(in millions of USD)	55	0.07	7.05	0.62	0.99
Ln_Marketing_exp	55	-1.20	3.39	0.52	0.82
Percent market change on the day of listing	55	-2.62	3.53	-0.02	1.2

**Table1- Descriptive Statistics of the Sample**

As can be seen from the above, the degree of under pricing in the sample is varying from -33.04% to 82.5% with a mean value of 22.62%. There were only 15 firms (27.27%) in our sample which got listed at a discount to their offer price (over pricing) whereas 40 firms (72.73%) in the sample got listed at a premium (under pricing). The average under pricing of 22.62% is remarkably different from 105.6% reported by Shah (1995) for the sample of IPOs listed from 1991 to 1995. This reduction in under pricing can be attributed in part to the change in regulation whereby the allocations to informed institutional investors was allowed. We took the prices on the first day of trading rather than a window of first few days of trading because Miller and Reilly (1987) by doing an examination of daily returns, daily volume, and daily bid-ask spreads, both from the offering date to 5 trading days following the offering and 21 days after the offering found that the market adjusts to any mispricing during the first day of public trading and that excess returns are not available to investors in the after-market.

However the under pricing still seems to be high as compared to some of the developed International markets as shown in the table below<sup>4</sup>-

**Table2: Degree of Under Pricing in different countries**

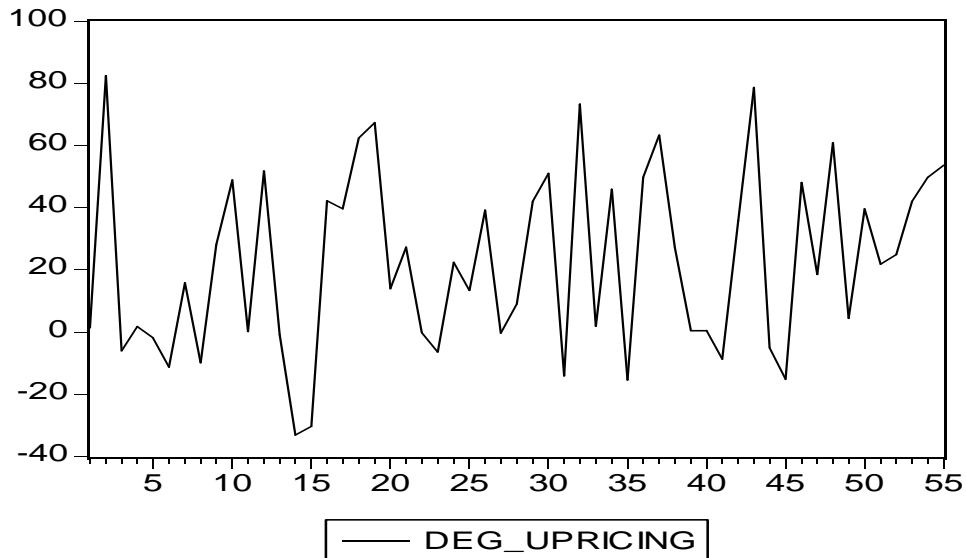
Country	Average under pricing %	Period studied	Sample size
Malaysia	80	1980-1991	132
Brazil	79	1979-1990	62
South Korea	78	1980-1990	347
Thailand	58	1988-1989	32
Portugal	54	1986-1987	62
Taiwan	45	1971-1990	168
Sweden	39	1970-1991	213
Switzerland	36	1983-1989	42
Spain	35	1985-1990	71
Mexico	33	1970-1991	472
Japan	33	1987-1990	37
New Zealand	29	1979-1991	149
Italy	27	1985-1991	75
Singapore	27	1979-1987	66
Hong Kong	18	1980-1990	80
Chile	16	1982-1990	19
United States	15	1960-1992	10,626
United Kingdom	12	1959-1990	2133
Australia	12	1976-1989	266
Germany	11	1978-1992	170
Belgium	10	1984-1990	28
Finland	10	1984-1992	85
Netherlands	7	1982-1991	72
Canada	5	1971-1992	258
France	4	1983-1992	187

In our sample, the firms are on an average spending about 1.43% of the issue size as marketing expenditures. The issue size is varying widely from Rs 360 millions to more than Rs 53,680 millions and so is the marketing expenditure from Rs 3 million to Rs 296

<sup>4</sup> Financial Markets and Corporate strategy-Mark Grinblat and Sheridan Titaman, Tata Mcgraw Hill, 2<sup>nd</sup> edition,exhibit 3.5 pg 83

million. The listing delay is 19.9 days on the average and varies between 14 and 26 days. This is again in sharp contrast to the studies of Shah (1995) and Majumdar (2003). Shah reports an average listing delay of 11 **weeks** whereas Majumdar reports an average delay of over 151 days. Since both these studies have IPOs listed in the first half of the nineties, in the BSE, changes in regulation as well as improvements in functioning of markets could be the possible reasons for improvement in the listing time. On the day of listing, on an average the market index has changed by -0.02% and has varied from -2.62% to 3.53%.

**b) Checking the data for stationarity of the time series-**A plot of the degree of under pricing with respect to the number of observations (55 firms) was obtained. Since the issues listed by close of October 2006 were the most recent and the count was from them backwards up to March 2004, the plot shows that the degree of under pricing has by and large not changed substantially from March 2004 to October 2006.



**Fig1: Degree of under pricing –Firms to the extreme left in the X axis were listed in March 2004 and those to the extreme right in October 2006. Other firms got listed in the intervening months. Y axis shows the degree of under pricing in percentage terms.**

In order to test whether the series is stationary or not, the plots of Auto correlation functions (ACF) were checked and were found to be within confidence intervals. To



further establish stationarity, a unit root stationarity test (Phillips Peron test because of the small sample size) was carried out and the following values were obtained-

Null Hypothesis: DEG\_UPRICING has a unit root

Exogenous: Constant

Bandwidth: 6 (Newsy-West using Bartlett kernel)

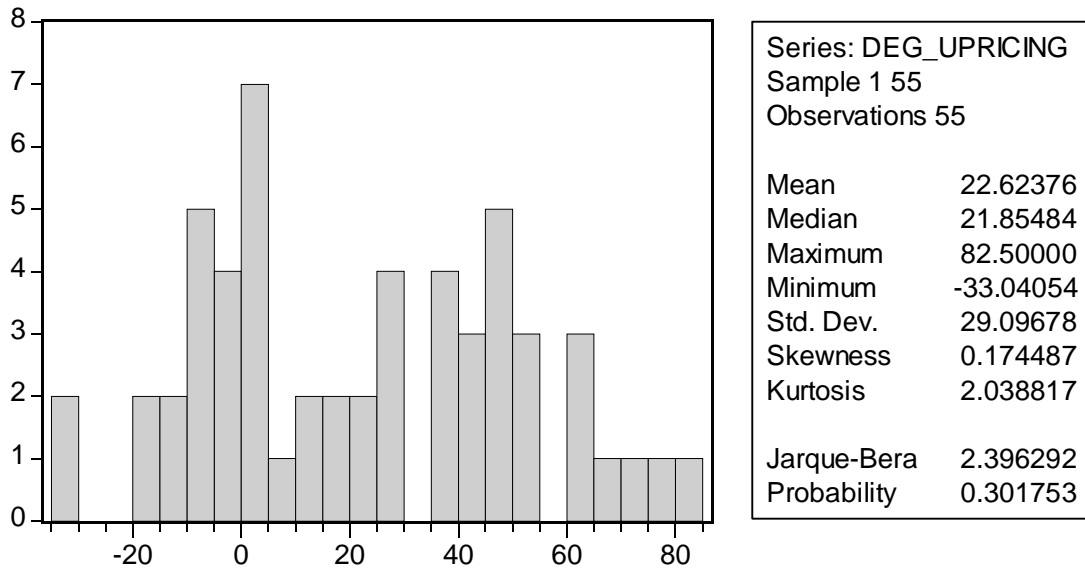
	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-7.548403	0.0000
Test critical values: 1% level	-3.557472	
5% level	-2.916566	
10% level	-2.596116	

\*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	837.3302
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As can be seen from the above, the null hypothesis that deg\_under pricing has a unit root is rejected at a 1% level which implies that the series is stationary. However no prediction of the degree of under pricing using time series models is considered desirable because the number of firms coming out with an IPO in a month is very small and sometimes zero.

**(c) Testing for normality of the dependent variable-** In order to find out whether the dependent variable which is degree of under pricing follows the normality assumption or not, we plotted the histogram and conducted the Jarque Bera test which gave the following results-



**Fig2- Testing for the Normality assumption of the degree of under pricing**

The values of both skewness and kurtosis are near the accepted values of zero and three respectively for a normal curve and the Jarque Bera test does not reject the assumption of normality at 5% level. This is not in consonance with the results reported by Ruud (1993) and Majumdar (2003) whose samples did not have a normal distribution. Although the sample for this study also has a small positive skewness, yet the skewness is not large enough to reject the normality assumption and therefore this study carries out parametric tests which were not possible for Majumdar (2003). The robustness of the normality assumption was further verified by carrying out the non parametric tests.

**(d) Estimating the Regression Equation-**

Based on the hypothesis and the control variables defined earlier, the following regression equation is estimated-

$$\text{Degree\_Under pricing} = \beta_0 + \beta_1(\text{Demand}) + \beta_2(\text{Listing Delay}) + \beta_3(\ln\_issuesize) + \beta_4(\ln\_marktng\_exp) + \beta_5(\text{percent\_market\_change}) + \varepsilon$$

where  $\varepsilon$  is the error term with the distribution  $\sim N(0, 1)$

The variables are defined as follows-Demand is a dummy variable which takes a value 0 if the issue is offered close to the lower end of the band and 1 otherwise, listing delay is the time in days between the day of close of the offer and the day of listing, issue size and marketing expenditure are in millions of rupees and their natural log is taken to avoid

heteroscedasticity. Percent market change is the percent change in the S&P 500 CNX Nifty index on the day of listing of the issue.

To take into account any unknown heteroscedasticity, we use White's (1980) covariance estimator approach.

**Following were the regression results-**

Dependent Variable: DEG\_UPRICING

Method: Least Squares

Sample: 1 55

Included observations: 55

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
	-			
C	67.52010	32.69109	-2.065398	0.0442
DEMAND	30.00754	8.091992	3.708300	0.0005
LISTNG_DELAY	2.884643	1.694807	1.702048	0.0951
LN_MARKTNG_EX	-			
P	1.329685	7.477423	-0.177827	0.8596
LN_ISSUESIZE	1.000581	2.536208	0.394519	0.6949
PERCEN_CHG_MK				
T	0.920667	3.037142	0.303136	0.7631
R-squared	0.260841	Mean dependent var		22.62376
Adjusted R-squared	0.185416	S.D. dependent var		29.09678
S.E. of regression	26.26109	Akaike info criterion		9.476723
Sum squared resid	33792.60	Schwarz criterion		9.695705
	-			
Log likelihood	254.6099	F-statistic		3.458305
Durbin-Watson stat	2.025933	Prob(F-statistic)		0.009359

As can be seen from the above results, the regression model developed is itself significant as the probability of it being insignificant is 0.009 which is very close to zero (even at a 1% level). The adjusted R squared is 18.54%. The low value could be because of the wide heterogeneity in the firms considered in the sample. The coefficient of DEMAND is significant at 1% whereas the coefficient of LISTNG\_DELAY is positive and significant at the 10% level. The constant term is significant at the 5% level which indicates that there are some more variables to explain under pricing which were not included in our model. The coefficient of LN\_MARKTNG\_EXP is negative as hypothesized although not significant. It was mentioned earlier that how the listing delay affects the degree of under pricing is not clear. However from the regression results we find that such a delay increases the degree of under pricing. In fact a one day increase in listing would increase the under pricing by 2.88%. It seems that the investors demand a greater premium for their locked in money. The Durbin Watson statistic is close to 2 which indicates that the degree of under pricing is not affected by first order autocorrelations. In fact we check for the robustness of these results by using the ARMA (1, 1) model and find that although the Akaike Information Criterion (AIC) improves slightly, yet the coefficients of both the AR as well as the MA terms are insignificant. However our results should be interpreted with caution. Since our sample was of IPOs which were listed in 31 months selected for our period of study we cannot conclusively say that the degree of under pricing is not auto correlated with its past in all cases.

**(e) One month returns-** Next we check whether the average under pricing of 22% on the day of listing found in our sample gets dissipated within the next 30 days. We took a period of one month because Ibbotson (1975) had found that under pricing disappears in few weeks in the period post listing. We calculated the one month returns with respect to the closing prices of the listing day. If one month was falling on a Saturday or Sunday, then the closing prices of Monday were taken. We first check all the 55 firms on the basis of raw returns and then we check these returns net of the market. To calculate the market wide returns we use the index S&P CNX Nifty 500. The results are as follows-

	Raw unadjusted returns (in %)	Returns adjusted for the market (in %)
Mean	1.06	-1.13
Median	-3.44	-4.21
Minimum	-36.87	-43.19
Maximum	84.06	79.11
Standard deviation	22.87	20.76
Number of Firms which showed positive returns	25(45.5%)	23(41.82%)
Number of Firms which showed negative returns	30(54.5%)	32(58.18%)

**Table 3 - Returns of the 55 firms one month after listing**

As can be seen from the above, contrary to popular perceptions that the IPOs in India list at a huge premium and hence provide an opportunity to make short term gains, there are a large number of firms (54.5%) in our sample which give a negative return, unadjusted for market returns just one month after their listing. When adjusted for market returns more than 58% of the firms in our sample give a negative return in a period of one month. Since only 27% of the firms in our sample suffered from over pricing (refer to the section on descriptive statistics) the number of firms generating negative returns for the investors in a period of one month has more than doubled. If an investor would have invested in the IPOs of all firms of our sample, got allocation in each one of these and waited for a month then he would have on an average earned returns of 1.06%. But it is noteworthy that this is 1.13% below the market returns. Hence an investor would be better off perhaps by investing in index based mutual funds during the period of our study rather than investing in IPOs if only a short term horizon of one month was considered.

## 7. CONCLUSION

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This study has several important contributions. It demonstrates that the degree of under pricing in the Indian stock markets has reduced over the years which is good for the firms getting listed as under pricing is an indirect cost to the firm. A unique contribution of this study is that the after market in India regards the final offer price which has been set after book building as a credible signal for the firm's under pricing. Another important parameter driving the under pricing positively is the listing delay whereas the money spent on marketing the issue is not reducing the under pricing of the firms significantly. This study also finds that the gains from IPOs get diffused within one month of the listing of the firms and on an average the gains in one month after listing are lesser than those of the market.

There are some limitations of our study. IPO studies can give contradictory results based on the periods in which they are studied and there is no one size fits all model in these studies. Our study horizon of 31 months is rather short and perhaps a longer horizon of more than 100 months could be considered. We did not take such a horizon for two reasons. One was of data availability for the National Stock Exchange. Second was the change in regulations in 2001 which was likely to confound our results . Moreover we wanted to study the under pricing in very recent times considering that some scams in allotment in IPOs took place in the Indian markets very recently. Our study does not study the allocation pattern between the retail and institutional investors which drives the degree of under pricing. Such a study can be taken up in future. We have also not been able to study the flipping behavior of retail and institutional investors so as to determine the extent to which the money left on the table is picked up by these investors. These are areas of possible future research.

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