Designing an efficient IPO mechanism: Evidence from e-IPOs

BIDISHA CHAKRABARTY and SAURABH GHOSH*

ABSTRACT

We examine the impact of a new technology-driven offering mechanism for new issues on two empirical regularities of IPO performance – the degree of underpricing and long run underperformance. Under the National Exchange Automated Trading (NEAT) system, the National Stock Exchange of India recently established an internet based transparent bidding scheme which allows simultaneous bidding for new issues by all retail investors. We examine the changes resulting from this new offering mechanism and document that (a) the degree of underpricing under the NEAT system is significantly lower, (b) the new system reduced the time lag between final allotment of shares and beginning of trading, and (c) although long run underperformance persists under the NEAT system, the second and third year performance of NEAT IPO firms is significantly better than non-NEAT firms. These results obtain after controlling for firm specific factors that have been shown to affect IPO performance.

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Chakrabarty is with Saint Louis University and Boeing Institute of International Business, email: chakrab@slu.edu. Ghosh is with the Reserve Bank of India, email: saurabhghosh@rbi.org.in. The authors are thankful to the National Stock Exchange of India for data used in this study. Chakrabarty acknowledges financial support from the John Cook School of Business. We thank Mr. Golaka Nath, former director of research at the NSE, for generous help with understanding the trading process on the NEAT system. Any remaining errors belong to us.

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Abstract

We examine the impact of a new technology-driven offering mechanism for new issues on two empirical regularities of IPO performance – the degree of underpricing and long run underperformance. Under the National Exchange Automated Trading (NEAT) system, the National Stock Exchange of India recently established an internet based transparent bidding scheme which allows simultaneous bidding for new issues by all retail investors. We examine the changes resulting from this new offering mechanism and document that (a) the degree of underpricing under the NEAT system is significantly lower, (b) the new system reduced the time lag between final allotment of shares and beginning of trading, and (c) although long run underperformance persists under the NEAT system, the second and third year performance of NEAT IPO firms is significantly better than non-NEAT firms. These results obtain after controlling for firm specific factors that have been shown to affect IPO performance.

1. Introduction

One of the most widely documented empirical regularities associated with an initial public offering (IPO) is the degree to which underpricing occurs in the process of a firm's going public. Loughran and Ritter (2002) show that the severity of underpricing, as measured by the first day return, has increased exponentially in the last three decades.[1] While a majority of the research focus on IPOs in the USA, the evidence on IPO underpricing is robust across countries. The international evidence seems to indicate that while there is significant money left on the table for new issues world wide, this phenomenon is more pronounced in the developing world. Table 1 shows that new issues in the more developed financial markets tend to face a lower degree of underpricing, as compared to issues in the developing markets.[2]

Of the various explanations offered for the observed empirical regularity of IPO underpricing, one group of theories models information asymmetry as the factor that gives rise to significant one-day returns for new issues. For example, using a principal-agent framework, Muscarella and Vetsuypens (1989) show that the issuing firm allows the underwriter to leave money on the table in return for the use of their information on investor demand. Another group of theoretical models use information asymmetry between the issuer (better informed) and the investor (less informed) in a setting similar to Ackerlof's (1970) *lemons* market. In these models, the better issuers deliberately underprice to avert the possibility of a pooling equilibrium in which they will be mistaken as low quality issuers. The funds they forgo may later be recouped using a follow-up seasoned offering (Welch (1989)), garnering better analyst coverage (Chemmanur (1993)) or better response to dividend announcements (Allen and Faulhaber (1989)). Turning around the informational advantage of the issuer, if the investor has (private) information about the issue, underpricing may avert a winner's curse problem (Rock (1986)) or a negative cascade (Welch (1992)). The logical implication of these

[1] The average first day return went from about 7% in the 1980s to nearly 15% during 1990-98 and then to almost 65% in the internet bubble days of 1999-2000.

[2] We thank Jay Ritter for the data and note here that since these numbers come from different studies, with varying sample periods, they are only indicative and not strictly comparable across countries.

models is that an offering mechanism that reduces information asymmetry should be able to reduce the degree of underpricing.

In late 1999, the National Stock Exchange of India (henceforth NSE) instituted a new issues offering mechanism to encourage large-scale direct participation of retail investors within a bookbuilding framework. This new system is designed to reduce information asymmetry between bidders while allowing the underwriters to aggregate orders and 'build the book.' Specifically, as bidding begins simultaneously in several cities, investors can see in real time all the other bids placed on the issue. In fact, the demand graph of the new issue is visible in real time to all bidders on their computer screens, and also available on the NSE's web site.[3] This new internet-based IPO offering mechanism is known as NEAT – National Exchange Automated Trading. Subsequent to its launch, the Bombay Stock Exchange (BSE) also augmented its traditional bookbuilding offering mechanism with an internet based bidding system, very similar in its operations to the NEAT IPO mechanism.

In this study, we examine this innovative "hybrid" offering mechanism and compare it with the traditional bookbuilding method. We note here that this hybrid offering method is a close empirical manifestation of the "hybrid solution" that is theoretically proposed by Sherman and Jagannathan (2005) in their NBER survey paper. Some of the (proprietary) data for the hybrid IPOs we use in this study come from the NSE. We characterize in detail the impact of this new technology-driven offering process on various aspects of the IPO market.[4] In particular, we examine how the reduction in information asymmetry between competing bidders for new issues affects the degree of underpricing. We also calculate measures of long run performance of the IPO firms and compare how these measures are affected by the offering mechanism.

Our trading data comes from the NSE. All other data relating to the new issues were obtained from the Centre for Monitoring the Indian Economy (CMIE). Our most striking finding is the significant reduction in underpricing of new issues under this new and more transparent offering

[3] See Figure I for a sample of the viewing screen (issue of BSL) for bidders in NEAT IPOs.
[4] We use the acronym NEAT for all the online new issues offering and note that all NEAT issues are not listed on the NSE but also on the BSE, which instituted a similar online bidding system for IPOs, as mentioned.

mechanism. Percentage underpricing falls from over 80% in the pre-NEAT era to around 40% under the NEAT system. Issues under the new offering mechanism are on average much larger, which could explain the reduced underpricing. So we control for issue size, and other factors that are known to explain initial underpricing of IPOs, and document that the NEAT system itself played a significant role in cutting down the amount of money left on the table in the new issues process.

One peculiar feature of the IPO process in India has been the extended time lag between final allotment of shares and the first date of trading. Listing delay affects underpricing because investors in the issue who have locked up investment (while the issuer earns the floating rate on the subscription funds) demand compensation by way of underpricing. We find that the NEAT mechanism cuts down the listing delay by about 9 days, which, after controlling for other factors, is a significant reduction.

Our results also show that while the NEAT system does not reduce long term underperformance of IPO firms, the second and third year performance of the firms that debut through the NEAT system is better than the non-NEAT firms' performance over the same time window. Taken altogether, our evidence indicates that by reducing information asymmetry, the internet-based NEAT bidding system has been an improvement over the earlier prevalent traditional bookbuilding method.

The rest of this paper is organized as follows. In Section 2 we describe the regulatory changes that have been introduced in the new issues market in India, and the introduction of the NEAT system as a response to the market's demand for greater transparency. We next describe the IPO process under the NEAT system from the retail investor's point of view, and the innovations it introduced. Section 3 presents our sample selection procedure and some initial comparisons between the pre-NEAT and NEAT offering mechanisms. In Section 4 we provide cross sectional evidence on underpricing in the two samples and relate the degree of underpricing to the offering mechanism after controlling for other interactive factors. Section 5 examines long run (under) performance issues of

the IPOs under the two different regimes and isolate the factors determining the likelihood of positive long run performance. Section 6 concludes.

2. IPOs in India and the NEAT offering system

Firms in most countries with active capital markets rely substantially on external sources of finance. In fact Singh and Hamid (1992) show that this trend is more pronounced in developing countries and India is no exception. For example, Shah (1995) reports that the amount of capital raised in the primary markets (initial public offering plus seasoned equity offering) in India in 1994-95 alone amounted to 20% of domestic savings.

2.1 Regulations governing new issues

Prior to May 1992, all public issues in the Indian equities markets were under the supervision of the Controller of Capital Issues (CCI). The issuing guidelines of the CCI were excessively restrictive, especially for the decade of the nineties, when India attracted large-scale foreign investment consequent to the government's economic liberalization policies. The need to change the old and archaic rules led to the abolition of the CCI and the Securities and Exchange Board of India (SEBI) became the regulator of the primary markets. Under its Disclosure and Investor Protector Guideline, the SEBI, in late 1999, determined that a firm could make a public issue of shares if it has:

i) A track record of distributable profits in terms of section 205 of the Indian Companies Act, for at least three out of the immediately preceding five years, and

ii) A pre-issue net-worth of not less than INR one crore[5] in three out of preceding five years, with the minimum net-worth to be met during the immediately preceding two years.

An unlisted company which does not satisfy the abovementioned requirements can make a public issue, provided a public financial institution or a scheduled commercial bank appraises the project to be financed through the proposed offer to the public and not less than 10% of the project

[5] One crore = 10 million; INR = Indian Rupee.

cost is financed by the said appraising bank or institution by way of loan, equity, participation in the issue of security in the proposed issue or combination of any of them in at least one day before the opening of the public issue. SEBI Guideline 2000[6] also provides a detailed description of the prospectus that issuers have to file, with the broad objective of providing retail investors as much information about the issue as possible and thereby reduce information asymmetry between the issuers and investors. Besides general information like company name, address, industry, prospects, project cost, plant and machinery, technology, exchange listing of the scripts, the offer document also requires additional details about the promoters' background, their involvement in other projects, contribution in the new project, risk factors, other issue highlights and detailed information about the lead managers along with other underwriters. While the issuing company is primarily responsible for the correctness and adequacy of all the relevant documents, the lead merchant banker (underwriter) is expected to exercise 'due diligence' to ensure that the company discharges its responsibility adequately.

These guidelines, with obvious emphasis on information production, have evolved in response to various cases of market manipulation that happened in the Indian stock markets during the nineties.[7] However, in spite of various new regulations, serious underpricing of new issues remained. In his study of 2056 firms that went public between 1991 and 1995, Shah (1995) documents an average underpricing of 105.6%. Using a longer sample period from 1991 to 2001, Ghosh (2004) finds over 90% underpricing of IPOs, after adjusting for the market (BSE index) return. Addressing this issue of better disclosure of information on IPO firms, the NSE launched the NEAT[8] system to offer new issues using an internet-based bidding scheme. In the following sections, we describe in detail the NEAT bidding platform.

2.2 The NEAT IPO Mechanism

[6] See http://www.sebi.com under "red herring documents – book-building issues"
[7] See Pal (2000) for an account of the corruption charges, irregularities and price rigging schemes that were uncovered during the mid-nineties.
[8] NEAT is also the acronym for the fully automated limit order trading platform of the NSE.

NEAT is a fully automated trading platform that facilitates online bidding for multiple issues and at various cities concurrently. The system has a pre-defined hierarchy amongst users – the corporate manager, the branch manager and the dealer, in that order. The lead underwriter assigns these user roles to the bidding public. The corporate manager is the user placed at the highest level and can perform all bid-related activities and receive reports for all branches of the trading member. Additionally, the corporate manager can define the bid value limits for the branches and individual dealers of his firm. This facility is available only to the corporate manager. A corporate manager can modify his own bids or bids of all dealers and branch managers of his trading member firm.

In the rung below is the branch manager, who can perform and view bid related activities for all dealers under that branch. A branch manager can modify his own bids or bids of any dealer in his branch. Dealers are the users at the lower-most level. A dealer can perform bid related activities and view information only for oneself (and clients) and does not have access to information on other dealers, under either the same branch or other branches. A dealer can only modify the bids entered by himself. Customers of a dealer can route their bids to the dealer and the dealer enters the customer bids. The customer (retail investor) can view the real time demand for the issue (either through the dealer's terminal or at the NSE NEAT web based screen) from both the BSE and the NSE before placing a bid.

2.2.1 The Order Book

As and when valid bids are received by the system, they are numbered, time stamped, and stored in the book. Each bid has a unique bid number and time stamp on it. All the bids placed in the system remain outstanding till the last day of the bookbuilding process. Trading members have the option to modify/cancel erroneous bids placed in the system from the start till the last day of the bookbuilding process.

2.2.2 Bidding Work Station

The following windows are displayed on the trader/individual client workstation screen:

Title Bar - displays the current time, bidding system name i.e. NEAT-IPO and the date.

Tool Bar - has functional buttons which can be used for quick access to various functions such as Buy Order Entry, Market By Price (MBP),[9] Outstanding Order (OO),[10] Activity Log (AL),[11] Order Status (OS),[12] Market Watch (MW), Order Modification, Order Cancellation, Security List, On-Line Backup, Supplementary Menu and Help.

Market Watch Window – lists the securities available for bidding.

Inquiry Window - enables the user to view information such as Market By Price (MBP), Outstanding Orders (OO), Activity Log (AL), Order Status (OS), On Line Backup, and other relevant information for the selected security.

Order Window - enables the user to enter/modify/cancel bids. The member can download only those securities for which he is eligible. Trading members can enter only buy bids in bookbuilding market. The system does not allow entry of bids at a price less then floor price or minimum bid size. The trading members have to enter the following details at the time of bidding: quantity, price, application number, participant ID, beneficiary ID, category, margin amount, and client name.

[9] Market By Price (MBP) enables the trading member to view aggregate bids in the book at given prices. Orders at the best five price points are displayed

[10] Outstanding Orders (OO) enable the user to view his own outstanding bids for a security. The corporate manager can view all the OO for all branches or for a specific branch. Within a specific branch, the corporate manager can view OO details for a specific dealer or for all dealers. Similarly it is possible to view OO for a particular application number or for all application numbers. The branch manager can view all OO details under that branch i.e. all OO for all dealers and for all clients or for all dealers or for a specific dealer. A dealer can view OO for own User Id only.

[11] The Activity Log (AL) shows all the activities that have been performed on any bid belonging to a particular user. These activities include bid modification and cancellation

[10] Order Status (OS) shows the status of a dealer's own specific bids. The screen provides the current status of bids and complete bid details

Message Window - enables the user to view messages broadcast by the Exchange such as bidding start and end dates, bidding time, bid confirmation, bid modification, bid cancellation and bids which have resulted in quantity freeze.

Demand Graph - The system has a functionality by which a bidder can view the demand at various price points. This is an online real-time graph available by clicking the demand graph icon on the Toolbar.

Since the launch of this new and more transparent IPO mechanism by the NSE, the BSE also adopted the automated bidding system. During the time an IPO is open for bidding, the BSE also provides an internet-based bidding platform very similar to the NSE, and the details of the price-quantity bids are available for viewing on the BSE web site.

In this study we compare the new issues that were launched via this redesigned offering platform with the traditional bookbuilding that was used before.

3. Data sources, sample selection summary characteristics

We use two data sources – CMIE's Prowess database for firm specific information on the IPO stocks, and the NSE data on real time trades. The Prowess dataset is similar to Compustat database for the US and contains information on over 8400 companies. It provides data on financial statements, ratio analysis, funds flows, product profiles, returns and risks, amongst other variables. The Capital History query, which supports a search function for firms based on their capital market activities, was used for firm specific information on issue size, age, issue data, year of incorporation, listing date, subscription by the market participants, and other variables used in the analysis. The query on Stock Price Indicators allows searching for companies based on their stock information. Daily stock returns

are also loaded from the stock price analysis section of the same dataset and cross-referenced against the NSE trade and quote data.

The NSE provides trade and quotes data, much like the TAQ data disseminated by the NYSE. For each month, there are seven files, which provide detailed trade and quote information on all traded stocks. We use the 'Bhavcopy' file, which contains real time information on all trades that take place in each security for that month, to construct the returns series for each IPO firm.

Since its launch in late 1999 and until December 2004, there have been 130 issues made via the internet-based bidding system.[13] However, all of these are not *initial* public offerings. The NEAT system is also used for reverse bookbuilding; so our first task in data collection is to identify the actual IPOs amongst these firms. For each of these sample firms, we first identify the 'issue date' on the CMIE's database. We then use the NSE's Trade files to examine each firm's price history. We expect that if the stock is a new issue, we should not find any record of price before its first trading date. Of the 130 firms, 15 of them have price history before the issue date, leaving us with a sample of 115.[14] Of these 115 firms, 25 had missing information on either the NSE trade files, or the Prowess database, or both. After eliminating these, we are left with out final NEAT sample of 90 IPOs. For verification purposes we cross check the price history of all 90 firms on the Prowess Database and confirm that the CMIE categorizes them as new issues. These firms form our NEAT IPO sample.

Our study aims to document the changes brought about to the IPO process as a result of the introduction of internet-based issues offering. Thus, we compare the NEAT IPOs to pre-NEAT IPOs that were conducted prior to 1999. Our selection algorithm for the pre-NEAT IPO sample is identical to the method used to select the NEAT sample in all but one aspect, this being the sample period. The

[13] We are grateful to Mr Golaka C. Nath, former director of research at the NSE, for help with understanding the regulatory procedures involved in the NEAT IPO method.
[14] For example, ICICI Bank, one of the largest Indian banks had a NEAT issue on April 2004, although it had been trading publicly since 1994 and was listed on the NSE in 1997. This issue was a reverse book building, which merged the Bank with its parent firm ICICI.

sample period for the pre-NEAT IPOs is January 1996 to December 1998. There are around 300 IPOs in this period, and after applying the same filters as the NEAT sample, we are left with a final sample of 215. This is our pre-NEAT IPO sample.

Table 2 shows some summary measures as well as distributional characteristics of various variables of interest for the NEAT and the pre-NEAT samples. Average offer price (the sum of face value and premium) in the NEAT period is much higher (Rs. 72.76) than in the pre-NEAT period (Rs. 22). Comparing across the distribution of offer price, in the NEAT period, 75% of all IPOs had an offer price of Rs. 69 or lower, the comparable number in only Rs. 10.5 for the pre-NEAT period. This big difference arises mainly from the difference in premia charged by the issuing firms, since by law, most new issues have a face value of Rs. 10. In the NEAT period, the average premium charged by issuing firms was Rs. 64, as compared to Rs. 11 for the pre-NEAT period.

Issue size in the NEAT period is much higher than in the pre-NEAT period. While the average issue size in INR was 124 crores (1 crore = 10 million) in the NEAT period, the same was 20 crores in the pre-NEAT era. Issue size distribution shows that the pre-NEAT IPOs were mainly small issues; 75% of them were under Rs. 10 crores. In comparison, the 75^{th} percentile issue size for NEAT IPOs was Rs. 94 crores. The variable AGE, which is the number of years a firm existed before going public, shows that the NEAT IPO firms were older and had longer histories as private firms (average 15.23 years) compared to the pre-NEAT firms (8.26 years). It is interesting to note that firms which were older and had chosen to not go public during the pre-NEAT period now came to the market to raise capital under this new technology-driven offering mechanism. Subscription by the public increased under the NEAT offering from 53% to 84% with a corresponding drop in the subscription by promoters from 24% in the pre-NEAT period to 10% in the NEAT period.

Moving on from the characteristics of issues in the two IPO regimes to actual measures of underpricing in the two eras, we present some initial evidence in Table 3. We calculate raw

underpricing as the closing price on the first day of trading minus offer price and percentage underpricing as the ratio of raw underpricing to offer price. The most striking result is the sharp drop in percentage underpricing in the NEAT system. From an average of 84.45%[15] in the pre-NEAT era, percentage underpricing drops to 39.29% in the NEAT era. Although raw underpricing is slightly higher (Rs. 15.27) in the NEAT system, as compared to the pre-NEAT system (Rs. 12.79), the NEAT IPOs have a much higher mean offer price (as shown in Table 2), leading to significantly lower underpricing in the NEAT system.

Another variable of interest that impacts the degree of underpricing in Indian IPOs is the variable TILL – the number of days between final allotment of shares and listing. The experience in Indian primary markets has been unique in that there is a very long delay between the issue day and the first day of trading. This delay was mainly due to time consuming administrative procedure and postponement of the listing day by the IPO company. During this time lag the market receives price sensitive information which has an adverse impact on underpricing and initial volatility on the listing day (Shah, 1995). Recognizing the adverse impact of this delay between allotment and listing, the SEBI has issued recommendations in the past several years to change this practice. We document that under the NEAT system, the average number of days between allotment and listing is 148 days, which is a slight reduction from the 157 days in the pre-NEAT system.

While the sample-wide measures point to improvements under the NEAT system, we now focus on the distribution of said gains by issue size and economic activity classification. We first partition the NEAT and pre-NEAT samples into three size portfolios – small, medium and large, each comprising of one-third of the whole sample, sorted on size. Table 3 shows that the medium sized issues are the ones that experienced the greatest reduction in percentage underpricing. From 113%

[15] Note here that our figure for underpricing in the pre-NEAT era is in harmony with prior research on Indian IPOs. Shah (1995) finds initial underpricing of 87.6% (96.3%) for his 2% trimmed raw (issue size weighted) sample for the time period between January 1991 and April 1995. Ghosh (2004) finds underpricing just over 90% for his sample period of 1991 to 2001.

underpricing under the pre-NEAT system, percentage underpricing fell to 25.39% under the NEAT system for the medium sized issues. For the large sized issues, the comparable drop was from 62.41% to 32.46%. The small sized IPOs gained the least; the drop was from 80% to 60%. This result is not surprising, given the higher risk of small firms.

Our rich dataset identifies the ownership group and economic activity codes of each IPO firm. In the last four columns of Table 3, we see that the largest gainers under the NEAT system were private foreign firms. Percentage underpricing went from over 700% to 20.34% for these firms. The greater transparency of the NEAT system along with mandatory information disclosure laws under this system helped foreign firms to provide better information to the investing public and this translated to more efficient new issues pricing and consequently lower underpricing.[16]

The only group that fared worse under the NEAT system was government enterprises that went public. For this group, percentage underpricing actually rose from 15.51% to 30.74%. During the NEAT era, while the Indian economy was thriving on huge amounts of private investments, both domestic and foreign, the government sector might have followed more conservative pricing to compete with the spate of new firms that entered the market that it had hitherto dominated. Private firms, as well as business groups both experienced reduction in underpricing under the NEAT system.

4. Underpricing in the NEAT system

Four major factors causing IPO underpricing have been established in the literature. These are asymmetric information, institutional factors, control considerations and behavioural approaches, the

[16] While the NEAT system definitely helped investors gauge better the market demand for shares of foreign firm, we also recognize that the financial liberalization policies that were adopted in Indian during the early to mid-nineties may have also contributed to this big drop by allowing more information dispersion about these hitherto unknown firms in the Indian financial markets.

first being the most well established amongst them. The information story is that underpricing is an increasing function of information asymmetry between the issuers and investors. With a slightly modified premise, Ritter (1984) states that underpricing is a function of ex-ante uncertainties, which may be different from non-congruent information sets. With much emphasis on information disclosure in recent times, Loughran and Ritter (2004) reported that IPO underpricing in the USA has actually doubled in 1990, as compared to 1980s. They argued that the IPOs in USA have become more risky over time. Yet others show that despite the fact that IPOs around the world are becoming more homogeneous, the institutional set up differs around the countries. In his survey article Ljungqvist (2004) noted that the precise details of institutional framework potentially have a bearing on the efficiency of the capital raising process.

In India, the changing characteristics of IPOs getting listed in the stock market, new institutional system under NEAT facilitating information dissemination and price discovery, and the emerging nature of the economy all make it an interesting destination for studies relating to IPO underpricing. The following sections evaluate the effect of the NEAT system on IPO underpricing with emphasis on the characteristics of the firms going public.

4.1 Univariate conditional means tests

While the results in Tables 2 and 3 provide some ideas on the magnitude and direction of change in various variables of interest between the pre-NEAT and the NEAT system, they do not provide any comment on the statistical validity of these differences. To that end, we conduct 'mean tests' where the null hypothesis is:

$H_0 : \mu_{NEAT} - \mu_{pre\text{-}NEAT} = 0$ against alternative hypothesis,

$H_1 : \mu_{NEAT} - \mu_{pre\text{-}NEAT} \neq 0$

where μ_{NEAT} is average value of the variable during NEAT period and $\mu_{pre\text{-}NEAT}$ for the pre-NEAT period. The test is done by regressing the variable under consideration over a dummy variable –*NEAT-Dummy* - which equals one if the IPO is done through the NEAT system, zero otherwise. The dependent variable *UNDP* represents percentage underpricing and the regression equation is:

$$UNDP = \alpha + \beta(NEAT\text{-}Dummy) + \upsilon \quad (1)$$

The expected value of *UNDP* conditional upon whether the issues are through the NEAT (pre-NEAT) system is give by

$$E(UNDP/\text{NEAT}) = \alpha + \beta \quad (2)$$

and

$$E(UNDP/\text{pre-NEAT}) = \alpha \quad (3)$$

So the difference between μ_{NEAT} and $\mu_{Pre\text{-}NEAT}$ turns out to be

$$E(UNDP/\text{NEAT}) - E(UNDP/\text{pre- NEAT}) = \beta \quad (4)$$

If β is significantly different from zero, then the average underpricing for NEAT period IPOs is different from that of their pre-NEAT counterparts. We run the same exercise for all the variables reported in Tables 2 and 3. The results are reported in Table 4.

Six out of the eight β coefficients are found to be statistically significant on the means test. The results in Table 4 confirm that the NEAT system has significantly bigger IPOs, as measured by issue size and offer price. The pre-NEAT IPOs are younger firms where the retail participation of investors was significantly lower than under the NEAT system. Our results show that although there is a reduction in underpricing in the NEAT system, the coefficient is not statistically significant, when considered in isolation. Likewise, the gap between final allotment and first trade has reduced but the difference is not statistically significant in a univariate means test.

4.2 Multivariate tests

Although the NEAT β coefficient has the expected negative sign in the conditional means tests, by their very nature univariate tests do not control for interactive variables. To adequately capture the effect of the change in offering mechanism while controlling for all other factors, we now conduct multivariate regressions. Below we provide a description of the variables and the expected signs of the regressions coefficients based on related literature. This is followed by the specifications of the regression equations that are estimated. The dependent variable in all cases is percentage underpricing.

UNDP = Percentage Underpricing = $\dfrac{(Close\,\mathrm{Pr}\,ice - Offer\,\mathrm{Pr}\,ice)}{Offer\,\mathrm{Pr}\,ice}$

Ln_Size = Natural logarithm of the issue size in Rs. Crores. We expect the coefficient to be negative. As Ritter (1991) shows, larger firms have better information disclosure and lower risk, and therefore suffer less from new issues underpricing than do smaller firms.

%Promoter = Percentage contribution of the IPO promoter in the total allotment. To the best of our knowledge no prior studies on underpricing has used this information in explaining the initial return of IPOs. We know from our earlier results (Tables 2 and 3) that retail participation was lower in the pre-NEAT period, hence a large proportion of the issue was absorbed by the promoters. Under the NEAT mechanism, this fraction was substantially reduced. We also know that underpricing was higher in the pre-NEAT era. Thus, a mechanistic effect should lead to a positive β coefficient for this variable.

% Rest = Percentage contribution of the retail investing public in the total allotment. This variable is the opposite of %Promoters: under the NEAT system, retail participation increased and underpricing fell. Thus, we expect the sign of the coefficient here to be negative.

Ownership Grp Dummy = A dummy variable which takes the value one, if the IPO is from the business group or government owned company otherwise (for individual and foreign private standalone companies), zero. This variable is included to differentiate the information availability of business group IPOs from their private standalone counterpart. In 1993, group affiliated firms accounted for more than 80% of the private sector's assets, profits and sales (Khanna, 1999). Many business groups companies, even prior to listing, already have a history of managing many listed or unlisted companies and have typically been in the Indian corporate world for a long time. The financial inter-linkages amongst companies within a business group and their reputation make the new companies from an existing business group apparently less risky. Investors are also likely to have more information about the IPOs coming from Indian business groups than their standalone private counterparts. With respect to corporate investment, this may imply that business group affiliates have better access to external capital, either from within the group or from outside (Gangopadhyay et.al 2003). The classification of ownership group in this study also includes the Public Sector Units (government owned companies) that are in Indian markets for considerable time and have taken the market route to raise funds in the post economic reform period. Given that this group has lower risk than their standalone counterpart, we expect the coefficient to be negative, denoting lower degree of underpricing for this group.

Ln_Age = Natural logarithm of the age (in number of years) of the firm, i.e., the difference between the IPO year and the year of incorporation. We expect the coefficient to be negative since Ritter (1991) documents that more established firms with longer histories have lower underpricing.

Offer price = Sum of face value of the new issue plus the premium charged per share.

NEAT-Dummy = A dummy variable that takes the value of 1 if the issue occurs in the NEAT period, zero otherwise.

First Trade Price = Closing price of the new issue on the first day of trading.

Till = the gap (in number of days) between the final allotment of shares and the first day of trading. We expect the sign on this to be positive. Earlier works on Indian IPOS[17] have shown that one of the reasons for very high rates of IPO underpricing in India is the historical peculiarity that allows abnormally long delays between allotment and listing.

We estimate regression equations to test the effect of the above variables on the degree of underpricing in univariate as well as multivariate frameworks. The most comprehensive test of the difference in underpricing between the pre-NEAT and NEAT system after controlling for all other variables is as stated below:

$$UNDP = \alpha + \beta_1 \%Promoter + \beta_2 \%Rest + \beta_3 NEAT\text{-}Dummy + \beta_4 Size + \beta_5 Offer\ Price + \beta_6 Number\ of\ Securities + \beta_7 Age + \beta_8 First\ Trade\ Price + \beta_9 Till + \varepsilon \quad (5)$$

The results of all our regressions are summarized in Table 5. The most important finding is the negative (-14.97) and significant (p-value = 0.00) coefficient of the *NEAT-Dummy* in column (7) of the table. The negative sign shows that after controlling for all other factors, the mean value of percentage underpricing (the dependent variable) is significantly lower in the NEAT period than in the pre-NEAT period. The new internet-based IPO offering mechanism has indeed succeeded in lowering the degree of underpricing in the Indian primary markets. We also find that the variable *Till* has the expected positive coefficient and it is significant at the 90% level of confidence. The coefficient on *Size* is negative and significant, lending support to Ritter's (1991) hypothesis that larger and more established firms are less risky and hence face lower degree of underpricing.

[17] See Shah (1995) for details.

Regression equations (1) through (5) in Table 5 test univariate specifications that correlate the degree of underpricing to variables that have been already established in the literature. We do this to verify that the Indian IPO experience has been the same as in all other countries. *Size* is significantly negatively correlated (coefficient = -22.77, p-value = 0.07) to underpricing. Another significant variable is *Ln_Age* (coefficient = -37.95; p-value = 0.00). The older the firm before it goes public, the lower is the degree of underpricing faced by its new issue. Both these verify Ritter's findings on IPOs in the US.

Column (7) in Table 5 shows that after controlling for all these factors that are known to influence IPO underpricing, the *NEAT Dummy* still has significant explanatory power. In other words, after controlling for all other factors, we still find a negative coefficient for the *NEAT Dummy*, which shows that the degree of underpricing under the NEAT system is significantly lower. In equation specifications for columns (8) and (9), we partition our sample into the below median issue size and above median issue size respectively and estimate the coefficients. The results again show that the NEAT Dummy is negative and significant for both groups. Thus we find that the new internet-based IPO mechanism has succeeded in reducing the degree of underpricing for both small issues as well as large ones.

5. Long run performance under NEAT

So far we have documented the one day returns of IPOs in India, and related this underpricing measure to various aspects of the issuing process, including the new offering mechanism. We show that after controlling for all other factors, the NEAT system had a significant impact in reducing initial underpricing in the Indian IPO market. In this section we look at the long run performance issues of IPOs and examine whether the NEAT offering mechanism impacted the one and three year returns of

the issuing firms, and isolate the factors that are significant in determining, ex ante, the long run positive performance of said firms.

5.1 Long run underperformance

Ritter (1991) was the first to document that IPO firms underperform in the first three to five years as compared to a benchmark index or to a matching set of already listed firms. This characteristic poor return performance was specially marked in small and young firms that went public in years with high IPO activity. Loughran and Ritter (1995) reinforced the above finding and documented that IPO firms underperform in terms of their stock return even in comparison to already listed firms from the same industry. Mikkelson et al. (1997) considered a sample of 283 U.S. IPOs and showed that operating performance of IPO firms deteriorated in the first ten years after going public. Poor operating performance of the newly listed firms was associated with the sample of small and young companies. Large and old companies displayed a higher level of performance before going public, and lower, but non-negative performance afterwards. Studies have also established that long run underperformance is temporally and spatially robust. One reason offered to explain this finding is the degree of information disclosure associated with new issues. While larger and older firms generate better and more verifiable information, smaller firms are riskier with less known about them.

While information disclosure has a direct effect on the reducing the asymmetric information and thereby reducing the underpricing of the firm, it also helps to channel resources to the most deserving new company and to the most buoyant industries. Therefore, besides impacting underpricing on the listing date, informational disparity is also likely to have an indirect impact on the long run performance of the IPO firms.

In this section we consider the IPOs from two different regimes – the pre-NEAT and NEAT period – marked by difference in information production during the initial bidding process – and examine their long run performance. Our aim is to document whether the enhanced transparency regarding initial demand for new issues under the NEAT system had any role in influencing the long

run performance of the IPOs. We use buy and hold return (BHR) as the metric to measure firm performance. For firm *i*, the BHR for *t* years is calculated as follows:

$$R_i = [\prod_{t-1}^{(12/36)/delist}(1 + r_{it})\ ] * 100\% \quad (6)$$

Here r_{it} is the raw return of firm *i* for event month *t*. The methodology used here is similar to that used by Ritter (1991) and Loughran & Ritter (1995).[18]

We use a 12 month and a 36 month BHR measure for reporting purposes. The holding period return is calculated for the 12 and 36 month horizons unless the IPO firm delisted within that time window. When a firm delists, there is no specific liquidation distribution information available in the Prowess database. To account for this we have used two different delisting returns – 0, which is the upper bound on possible return for a firm that delists, and -1 which is the lower bound.

Table 6 reports the one and three year raw and index adjusted buy and hold returns. This table documents the evidence of poor performance of Indian IPOs during 1996 to 2004, for both pre-NEAT (Panel A) and NEAT (Panel B) firms. The median return (both raw and index adjusted) were negative for one and three years, for both groups. The distribution also documents the existence of extreme winners and losers among these IPOs that influences the tails of the distributions. This is more pronounced for the pre-NEAT IPOs which show a uniformly greater range (difference between the minimum and maximum) for both the 12 and 36 month BHRs, both raw and excess returns. The underperformance we document here is very much in consonance with the international evidence on long run IPO underperformance.

To evaluate the relationship between different firm specific variables (age, size, industry, ownership groups, contribution by the promoters and Indian public) and the long run performance of IPO firms, we now conduct regressions analysis where each of the one year and three years buy and

[18] In India, many of the shares are not traded at all for some months and the Prowess data set does not report these months. For these months price was assumed to remain at previous month's level and the returns was therefore considered to be zero. Our BHR calculation is not extended beyond 36 months in order to retain a larger sample size. Recall that the NEAT system was introduced in late 1999, so NEAT firms have a returns history of about 5 years at the maximum.

hold returns (raw and index adjusted) is used in turn as the dependent variable. The regression results are reported in the Table 7.[19] The results based on raw BHR reveal that the size of the firm was the major determinant of performance, both for the 1-year and 3-year horizons. Both have positive coefficients and are significant at one percent and five per cent levels. The NEAT dummy has a negative coefficient which is significant at one per cent level for the first year. However, this coefficient lost its significance when three years buy and hold return was considered. Thus, while there is underperformance for the NEAT IPOs during the first year of their listing, by the three year horizon, this trend becomes less pronounced. To investigate this further, we construct a difference variable – (R_{36}-R_{12}) – which captures the improvement in performance during the second and third years of listing, and regress the same independent variables on this index. The results in Panel A of Table 7 show that the improvement over the two years had significant positive relation with the size, age of the firm *and* with the NEAT dummy, indicating that larger issues and firms with established history that were listed in the NEAT regime made a come back in terms of their returns.[20] The adjusted return that measures underperformance relative to the market index, reported in Panel B, also supports the above findings. These results indicate that the size of the issue was one of the most important determinants of the long run performance of the new companies. The age of the company had a significant impact on the recovery of the company over the second and third years. Most importantly, firms that were listed under the NEAT system underperformed in the first year, just like all other IPO firms, but show signs of (faster) recovery in the subsequent years. This is evident from the sign and

[19] The reported results are based on full sample regressions. To account for the extreme ends of the distribution, we also conducted a 2% trimmed analysis and the results are similar both in magnitude and direction. We note here that we used the BHRs with delisting return set to 0 for the regression results reported here. We also ran all the regressions with the BHRs using delisting return set to -1. While the coefficient estimates were lower in magnitude, as expected, the significance of our results remained unchanged.

[20] There were 21 companies that listed in the end of 2002 and did not have complete 36 month returns. These were dropped from the NEAT sample for this part of the study.

significance of the coefficient on the NEAT dummy when the improvement index is used as the dependent variable.[21]

Our results indicate that after the introduction of NEAT system of IPO in India, there were no significant difference in the long run IPO performance as the coefficients to the NEAT dummies were not significant for one and three years buy and hold returns both for the raw and index adjusted returns. However, the regression analysis shows that although firms that were listed in the NEAT regime did not perform well in the first year, their return performance improved in the next two years. Among the major firm specific factors that influenced the long run performance of the IPOs are size of the issue, age of the new company and the affiliation or the ownership group.

5.2 Factors Determining the Likelihood of Positive Long Run Performance

While the above section evaluates the relationship between the ex-ante observable firm specific characteristics of the IPOs during the pre-NEAT and NEAT period, this section concentrates on the determinants of the likelihood of being a gainer/loser from investing in an IPO by considering the pre-listing firm specific characteristics. In particular, the objective of this section is to identify the likelihood of finding the IPO that would give positive return by the end of one/three years on the basis of firm specific characteristics. Moreover, this exercise would also attempt to evaluate the influence of introduction of NEAT system on this likelihood, underlining any possible change in the influence of the firm specific variable in the pre-NEAT and NEAT period. We construct four limited dependent variables. The variable QD_1 takes value one if the raw returns from investing in IPO for a company in the first one year is positive, otherwise zero. Similarly the variables QD_2, QD_3 and QD_4 were constructed on the basis of three years raw return, one year market adjusted return and three years market adjusted return respectively. These dummy variables were used as dependent variable in the logit model below:

[21] To analyze the effect of extreme performers on these results, we performed a 2% trimmed regression for this sample also. However, the results support the same findings and are therefore not reported.

$$\Pr ob(Y_{it} = 1 \mid X_{it}) = \frac{e^{\alpha+\alpha_t+X'_{it}\beta+\varepsilon_{it}}}{1+e^{\alpha+\alpha_t+X'_{it}\beta+\varepsilon_{it}}} \quad (7)$$

Here the dependent variable Y_i takes the value of QD_1 to QD_4 each separately and X_{it} is the vector of firm specific characteristics (the same explanatory variables) used in multivariate regression (Table 8). This model aims to predict how the probability of receiving positive return from the IPO firm is influenced by the ex-ante observable characteristic of the new companies. The estimation results of equation (7) are reported in the Table 9.

Clearly, the most important determinant of the likelihood of positive return (on the basis of BHR) from an IPO over the one and three year windows is issue size. Estimation based on excess returns over the market index point to the same conclusion. In addition, the likelihood of positive three year market adjusted buy and hold return is also influenced by the affiliation or the ownership group and by the NEAT system. The NEAT dummy has a positive and significant coefficient for the 36 month market adjusted BHR, indicating that a firm that made a new issues offering under the NEAT system is more likely to have a positive 36 month return than a firm that went public in the pre-NEAT regime. Our results indicate that larger sized issues belonging to the Indian business group and public sector units that went public during the NEAT period had a higher probability of emerging as positive BHR earners than comparable non-NEAT issues.

6. Conclusion

In late 1999 the NSE introduced an automated internet based bidding mechanism for building the order book and allotting shares of newly listed firms. This system replaced the older traditional bookbuilding mechanism with a more transparent process where all bidders for IPO shares can see, in real time, the aggregate price-quantity schedules of both the demand for and the supply of shares. In this study we examine the impact of this technology-driven IPO process on two aspects of the

performance of new issues, (a) initial underpricing, and (b) long run underperformance, by comparing a sample of firms that went public in the pre-NEAT era with a sample of NEAT IPOs. We find the degree of underpricing under the NEAT system is significantly lower than was earlier prevalent; from an average of over 84% one day initial return, the drop was to about 40%. While this latter number is still high by international standards, it is a significant reduction within a 5 year time span. We document that although the NEAT mechanism saw, on average, larger issue sizes, which is significantly correlated to lower underpricing, even after controlling for all factors that are known to affect underpricing, the NEAT system has residual and significant power in explaining this reduction.

Another achievement of this new offering mechanism was in reducing the time lag between final allotment and beginning of trading. This long delay between allotment and listing has been a historical peculiarity of the new issues market in India, and has often been the subject of regulatory scrutiny. We show that although this time lag has been only marginally reduced (by 9 days) this is a significant reduction. Additionally, the NEAT mechanism also succeeded in garnering greater participation of retail investors in the new issues process, which was one of the stated motives for the introduction of this new platform.

Although long run underperformance persists under the NEAT system as it did prior to its introduction without any appreciable difference in the magnitude between the two samples, the second and third year performance of NEAT IPO firms is significantly better than non-NEAT firms. Again, these results obtain after controlling for all other firm specific factors that have been shown to affect IPO performance. The NEAT system of new issues offering is a little over 5 years old, and from initial results it appears to be a clear improvement over the system it replaced. Examining its long run performance is work that we leave for the future.

Reference

Ackerlof, G. (1970) The market for lemons: quality, uncertainty and the market mechanism. *Quarterly Journal of Economics* 84, 488–500.

Aggarwal, Reena, 2000, Stabilization activities by underwriters after initial public offerings, *Journal of Finance* 55, 1075-1103.

Aggarwal, Reena, N. Prabhala, and Manju Puri, 2002, Institutional allocation in initial public offerings: Empirical evidence, *Journal of Finance* 57, 1421-1442

Allen, Franklin and Gerald R. Faulhaber, 1989, Signaling by underpricing in the IPO market, *Journal of Financial Economics* 23, 303-324.

Beatty, Randolph P. and Jay R. Ritter, 1986, Investment banking, reputation, and the underpricing of initial public offerings, *Journal of Financial Economics* 15, 213-232.

Benveniste, Lawrence M., and Walid Y. Busaba, 1997, Bookbuilding vs. fixed price: An analysis of competing strategies for marketing IPOs, *Journal of Financial and Quantitative Analysis* 32, 383-403.

Benveniste, Lawrence M. and Paul A. Spindt, 1989, How investment bankers determine the offer price and allocation of new issues, *Journal of Financial Economics* 24, 343-362.

Benveniste, Lawrence M. and William J. Wilhelm, 1990, A comparative analysis of IPO proceeds under alternative regulatory environments, *Journal of Financial Economics* 28, 173-208.

Biais, Bruno, and Anne Marie Faugeron, 2002, IPO auctions: English, Dutch, …French and Internet, *Journal of Financial Intermediation* 11, 9-36.

Bradley, Daniel, and Brad Jordan, 2002, Partial adjustment to public information and IPO underpricing, *Journal of Financial and Quantitative Analysis* 37, 595-616.

Brav, Alon and Paul A. Gompers, 1997, Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies, *Journal of Finance* 52, 1791-1821.

Brennan, Michael J. and J. Franks, 1997, Underpricing, ownership and control in initial public offerings of equity securities in the UK, *Journal of Financial Economics* 45, 391-413.

Chemmanur, Thomas J., 1993, The pricing of initial public offers: A dynamic model with information production, *Journal of Finance* 48, 285-304.

Chowdhry, Bhagwan and Vikram Nanda, 1996, Stabilization, syndication, and pricing of IPOs, *Journal of Financial and Quantitative Analysis* 31, 25-42.

DuCharme, Larry L., Shivaram Rajgopal, and Stephan E. Sefcik, 2001, Why was internet underpricing so severe?, unpublished University of Washington working paper.

Gangopadhyay, S., R. Lensink, and R, Van der Molen, 2003, Business groups, financing constraints and investment: the case of India, *Journal of Development Studies 4*, 22-40.

Ghosh, Saurabh, 2004, Underpricing of IPOs: The Indian Experience over the Last Decade, Reserve Bank of India, *Working Paper*.

Ibbotson, R. G., 1975, Price performance of common stock new issues, *Journal of Financial Economics* 2, 235-272.

Keloharju, Matti, 1993, The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland, *Journal of Financial Economics* 34, 251-277.

Khanna, T., 1999, Emerging market business groups, foreign investors and corporate governance, in NBER Volume on Concentrated Ownership, Ed. R. Morck, *University of Chicago Press* (forthcoming).

Ljungqvist, Alexander, 2004, IPO Underpricing: A Survey, in Handbook in Corporate Finance: Empirical Corporate Finance, Ed. Eckbo, E. B. (forthcoming).

Loughran, Tim and Jay R. Ritter, 1995, The New Issues Puzzle, Journal of Finance 50, 23-51.

Loughran, Tim, and Jay R. Ritter, 2000, Uniformly least powerful tests of market efficiency. *Journal of Financial Economics* 55, 361-389.

Loughran, Tim, and Jay R. Ritter, 2001, Why has IPO underpricing increased over time? unpublished University of Florida working paper.

Loughran, Tim, and Jay R. Ritter, 2002, Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies* 15, 413-443.

Loughran, T., and J.R. Ritter, 2004, Why Has IPO Underpricing Increased Over Time?, Financial Management 33, 5-37.

Loughran, Tim, Jay R. Ritter and Kristian Rydqvist, 1994, Initial public offerings: International insights, *Pacific-Basin Finance Journal* 2, 165-199.

Maksimovic, Vojislav, and Pegaret Pichler, 2001, Technological innovation and initial public offerings, *Review of Financial Studies* 14, 459-494.

Mikkelson, W.H., M.M. Partch, and K. Shah, 1997, Ownership and Operating Performance of Firms that Go Public, Journal of Financial Economics 44, 281-307.

Muscarella, Chris J. and Michael R. Vetsuypens, 1989, A simple test of Baron's model of IPO underpricing, *Journal of Financial Economics* 24, 125-136.

Pagano, Marco, Fabio Panetta, and Luigi Zingales, 1998, Why do computers go public? An empirical analysis, *Journal of Finance* 53, 27-64.

Pal, R. M., 2000, Right to Information and Empowerment of People, PUCL (October) Bulletin

Ritter, Jay R., 1984, The hot issue market of 1980, Journal of Business 57, 215-240.

Ritter, Jay R., 1987, The Costs of Going Public, Journal of Financial Economics 19, 69-81.

Ritter, Jay R., 1991, The Long run Performance of Initial Public Offerings, Journal of Finance 46, 3-27.

Ritter, Jay R., 1998, Initial public offerings, *Contemporary Finance Digest*.

Ritter, Jay R., 2002, Investment banking and securities issuance, North-Holland *Handbook of the Economics of Finance* edited by G. Constantinides, M. Harris, and R. Stulz.

Rock, Kevin, 1986, Why new issues are underpriced, *Journal of Financial Economics* 15, 187-212.

Schultz, Paul, and Mir Zaman, 2001, Do the individuals closest to internet firms believe they are overvalued? *Journal of Financial Economics* 59, 347-381.

Shah, Ajay (1995): The Indian IPO Market: Empirical Facts. Technical Report, Centre for Monitoring Indian Economy, Mimeo.

Sherman, Ann, 2000, IPOs and long-term relationships: An advantage of bookbuilding, *Review of Financial Studies* 13, 697-714.

Sherman, Ann E. and Jagannathan, Ravi, 2005, Reforming the Bookbuilding Process for IPOs" NBER working paper

Singh & Hamid (1992), Corporate financial pattern in developing countries, IFC Technical Paper, Washington D. C.

Welch, Ivo, 1989, Seasoned offerings, imitation costs, and the underpricing of initial public offerings, *Journal of Finance* 44, 421-450.

Welch, Ivo, 1992, Sequential sales, learning, and cascades, *Journal of Finance* 47, 695-732.

Table 1: International Evidence on IPO underpricing aggregated by index of economic development

	Countries	Sample Size	Avg. Initial Ret. (%)	Time Period	Source/Study
More Developed					
	Austria	83	6.3	1984-2002	Aussenegg
	Belgium	86	14.6	1984-1999	Rogers, Manigart and Ooghe
	Denmark	117	5.4	1984-1998	Jakobsen and Sorensen
	Finland	99	10.1	1984-1997	Keloharju; Westerholm
	France	571	11.6	1983-2000	Husson and Jacquillant
	Germany	407	27.7	1978-1999	Ljungqvist
	Italy	181	21.7	1985-2001	Arosio, Guidici and Paleari
	Netherlands	143	10.2	1982-1999	Wessels; Eijgenhuijsen and Buijs
	Norway	68	12.5	1984-1996	Emilsen, Pedersen and Saettem
	Spain	99	10.7	1986-1998	Ansotegui and Fabregat
	Sweden	332	30.5	1980-1998	Rydqvist; Schuster
	Switzerland	120	34.9	1983-2000	Drobetz, Kammermann & Walchli
	UK	163	17.4	1959-2001	Dimson; Levis; Ljungqvist
	Canada	500	6.3	1971-1999	Joe and Riding; Jog & Srivastava
	USA	14978	18.3	1960-2003	Ibbotson, Sindelar and Ritter
	Australia	381	12.1	1976-1995	Lee, Taylor and Walter; Woo
	NewZealand	201	23.0	1979-1999	Vos and Cheung; Camp & Munro
	Japan	1689	28.4	1970-2001	Fukuda; Dawson and Hiraki
			Σ/n =16.76		
Developing					
	Greece	338	49.0	1987-2000	Kazantis and Thomas; Nounis
	Poland	140	27.4	1991-1998	Jelic and Briston
	Portugal	21	10.6	1992-1998	Almeida and Duque
	Brazil	62	78.5	1979-1990	Aggarwal, Leal and Hernandez
	Chile	55	8.8	1982-1997	Aggarwal, Leal and Hernandez
	Mexico	37	33.0	1987-1990	Aggarwal, Leal and Hernandez
	China	432	256.9	1990-2000	Datar and Mao; Gu and Qin
	Hong Kong	857	17.3	1980-2001	McGuinness; Zhao and Wu
	India*	2056	87.6	1991-1995	Shah
	Indonesia	237	19.7	1989-2001	Hanafi; Ljungqvist and Yu
	Israel	285	12.1	1990-1994	Sarig & Wohl; Amihud & Hauser
	Korea	477	74.3	1980-1996	Dhatt; Kim and Lim; Choi & Heo
	Malaysia	401	104.1	1980-1998	Isa; Isa and Yong
	Philippines	104	22.7	1987-1997	Sullivan and Unite
	Singapore	441	29.6	1973-2001	Lee, Taylor and Walter; Dawson
	Taiwan	293	31.1	1986-1998	Lin and Sheu; Liam, Liu and Wei
	Thailand	292	46.7	1987-1997	Lonkani and Tirapat
	Turkey	163	13.1	1990-1996	Kiymaz
			Σ/n =53.49		

* 2% each of the top and bottom of the distribution trimmed results.

Table 2: Summary Statistics of NEAT and pre-NEAT IPO samples

This table reports some summary measures as well as distributional characteristics of IPOs in India. Panel A presents the results for the new issues that were offered under the NEAT (National Exchange Automated Trade) system and panel B presents results for the pre-NEAT IPOs. Offer price is the sum of face value per share and premium charged above face value. Issue Size is the amount (in Rs. Crores) raised by the public issue. Age is measured as the number of years the firm had a history before going public. Promoters' Subscription %(Public Subscription %) is the amount of the new issue absorbed by the promoter (retail investing public) divided by issue size.

Panel A: NEAT IPOs

Variables	Mean	Std. Dev.	Percentile						
			Minimum	5th	25th	50th	75th	95th	Maximum
Offer Price (Rs.)	72.76	127.43	10	10	10	21.5	69	308.25	850
Premium (Rs.)	64	129	0	0	0	14	60	301	839
Face Value (Rs.)	8.75	2.49	1	3.45	10	10	10	10	10
Issue Size (Rs. Crore)	124	366	2	3	5	19	94	389	2684
Age	15.23	24.6	1	1	4	7	14.67	78.1	137
Promoter's Subscription (%)	10	18	0	0	0	0	17	44	100
Public Subscription (%)	84	24	0	36	76	99	1	1	1
No. of shares Issued ('0,000)	3419	9886	127	219	336	529	992	18,299	73,867
Panel B: Pre-NEAT IPOs									
Offer Price (INR)	22	56	10	10	10	10	10.5	59.5	600
Premium (INR)	11	48	0	0	0	0	0.5	49.5	500
Face Value (INR)	10.84	8.66	10	10	10	10	10	10	100
Issue Size (Rs. Crore)	20	78	1.25	2.64	4	5.77	9.06	49.7	850
Age	8.26	14.43	0.5	1	2	4	8	31.9	96
Promoter's Subscription (%)	24	16.11	0	0	10.5	26	33.33	50	69
Public Subscription (%)	53	21	0	25.8	36.9	50	63.33	1	1
Number of shares Issued	857	1442	20	197	372	466	800	2,740	15,000

Table 3: Underpricing in NEAT versus pre-NEAT IPO samples

This table reports some summary measures of underpricing in IPOs in India. Panel A presents the results for the new issues that were offered under the NEAT (National Exchange Automated Trade) system and panel B presents results for the pre-NEAT IPOs. Results are presented for the full sample, as well as for sub-samples sorted on issue size as well as sub-samples classified by ownership groups. Close price day 1 refers to the closing price of an issue on its first day of trading. Raw underpricing = Close price day1-Offer price. Percentage underpricing = Raw underpricing/Offer Price. TILL is the number of days between final allotment and first day of trade. Numbers in parenthesis are standard deviations.

Panel A: NEAT IPOs

Underpricing Measures	Full Sample		Issue Size			Ownership Groups			
	Mean	Standard Dev.	Small	Medium	Large	Private	Govt.	Business Houses	Pvt. Foreign
Close Price Day 1	88.03	150.35	17	64.93	182.2	60.94	30.12	172.15	251.11
			(11.90)	(50.81)	(227.10)	(88.66)	(20.86)	(266.50)	(238.40)
Raw Underpricing	15.27	51.60	6.36	2.19	37.27	12.28	6.48	27.38	31.82
			(11.38)	(37.86)	(76.47)	(55.80)	(11.35)	(45.51)	(64.89)
Percentage Underpricing	0.3929	0.88	0.6002	0.2539	0.3246	0.4846	0.3074	0.1509	0.2034
(UNDP)			(1.11)	(0.87)	(0.53)	(1.03)	(0.59)	(0.27)	(0.22)
TILL (Days)	148.27	335	287	122	36	204	31	48	36
			(510)	(224)	(12)	(403)	(13)	(20)	(17)
Panel B: Pre-NEAT IPOs									
Close Price Day 1	35	86	21	27.86	55.26	24.07	214.64	46.81	89.43
			(33.51)	(61.05)	(131.03)	(45.29)	(323.16)	(88.66)	(112.09)
Raw Underpricing	12.79	53.18	7.77	15.65	14.97	9.61	37.77	20.56	74.43
			(31.40)	(56.25)	(66.35)	(41.82)	(139.36)	(69.05)	(116.15)
Percentage Underpricing	0.8445	3.51	0.7999	1.13	0.6241	0.8206	0.1551	0.4485	7.29
(UNDP)			(3.12)	(4.32)	(2.94)	(3.47)	(0.28)	(1.73)	(11.75)
TILL	157.5	257	125	243	102	171	26	86	250
			(197)	(354)	(156)	(267)	(228)	(171)	(163)

Table 4: Mean Test

This table reports the results of univariate analysis (mean test) for IPOs in India. The dependent variables are reported in Column (1). Each of these dependent variables is regressed using a dummy variable to capture the difference between the pre-NEAT and NEAT period. The slope coefficients of the regressions show the difference in mean values and are reported in Column (2). The significance (p-value) of each coefficient is reported in Column 3. Size is the issue amount (in Rs. Crores) raised by the public offering. Offer price is the sum of face value of each share and the premium charged per share. Promoters' Subscription %(Public Subscription %) is the amount of the new issue absorbed by the promoter (retail investing public) divided by issue size. Age is measured as the number of years the firm had a history before going public. TILL is the number of days between final allotment and first day of trade. UNDP stands for percentage underpricing which is calculated as Raw underpricing/Offer Price, where Raw underpricing = Close price on day1-Offer price.

Variable	*Intercept* (β) *Coefficient*	*P-Value*
Size	104.20	0.00
Offer Price	50.93	0.00
Promoters Contribution	-0.14	0.00
Public Subscription	0.31	0.00
Subscription by Rest	-0.17	0.00
AGE	6.97	0.00
TILL	-9.20	0.80
UNDP	-45.17	0.23

Table 5: Regressions Analysis

This table reports the results for univariate as well as multivariate regression analyses for IPOs in India. The dependent variable for all 8 equations is UNDP = (Closing Price-Offer Price)/Offer price. Columns (1) through (5) test univariate specifications to verify pre-established hypotheses in the IPO literature in the Indian context. Columns (7) and (8) test the performance of the NEAT offering mechanism after controlling for interactive factors. Regression estimation (7) reports the whole sample results and (8)/(9) reports results for the below-median/above-median issue sizes. P-values are in parentheses

	Coefficient Estimates								
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	124.55 (0.00)	73.76 (0.00)	130.49 (0.00)	8.45 (0.83)	92.33 (0.00)	55.87 (0.07)	2.88 (0.67)	0.14 (0.95)	4.74 (0.68)
Ln_Size	-22.77 (0.07)								
% Promoter						44.67 (0.64)	-8.27 (0.45)	-3.30 (0.24)	-13.67 (0.51)
%Rest						34.66 (0.71)	3.71 (0.66)	-0.56 (0.81)	6.17 (0.66)
Ownership Grp. dummy		-12.19 (0.76)							
Ln_Age			-37.95 (0.00)						
Inv_OfferPrice				834.57 (0.08)					
%Premium					-0.82 (0.07)				
NEAT_DUMMY							-14.97 (0.00)	-5.88 (0.00)	-18.94 (0.00)
Security Amount							-0.02 (0.01)	0.33 (0.29)	-0.01 (0.31)
Offer Price							-0.74 (0.00)	-0.99 (0.00)	-0.65 (0.00)
# of securities							0.01 (0.02)		
Age							-0.09 (0.28)	0.01 (0.88)	-0.03 (0.77)
First Trde price							0.73 (0.00)	0.99 (0.00)	0.64 (0.00)
Till							0.01 (0.06)	-0.00 (0.41)	0.02 (0.22)
Adj-R^2							0.74	0.88	0.64
F							94.24 (0.00)	1230.06	34.95

Table 6: Distribution of 12-Month and 36-Month Returns

This table reports the one and three year Buy and Hold returns (BHR) of IPOs in India. The i^{th} period BHR, r_i denotes the return accruing to an investor who purchases an IPO at its first day's closing price and holds it until the i^{th} period. When a stock delists during the i-period window, due to unavailability of liquidation distribution data, we use two alternatives for the delisting return. r_i_Max (r_i_Min) denotes returns calculated using delisting return = 0 (= -1). r_i_Adj refers to excess returns over the market index. We use the Nifty index as the proxy for the market's return.

Panel A: pre-NEAT IPOs

	Raw Return				Market Index Adjusted Return			
Percentiles	r_{12}_Min	r_{12}_Max	r_{36}_Min	r_{36}_Max	r_{12}_Min_Adj	r_{12}_Max_Adj	r_{36}_Min_Adj	r_{36}_Max_Adj
Minimum	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
1st	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
5th	-1.0	-0.9	-1.0	-1.0	-1.0	-0.9	-1.0	-1.0
10th	-0.9	-0.8	-1.0	-0.9	-1.0	-0.8	-1.0	-0.9
25th	-0.6	-0.5	-0.9	-0.7	-0.6	-0.5	-0.9	-0.7
Median	-0.1	-0.1	-0.4	-0.2	-0.2	-0.1	-0.5	-0.2
75th	0.2	0.2	0.2	0.3	0.2	0.2	0.0	0.1
90th	1.1	1.5	1.1	1.2	1.1	1.2	1.1	1.4
95th	2.8	2.8	2.6	2.6	2.3	2.5	2.4	2.4
99th	6.6	6.6	10.3	10.3	4.7	4.7	9.6	9.6
Maximum	10.7	10.7	39.1	39.1	11.1	11.1	37.2	37.2

Panel B: NEAT IPOs

	Raw Retunes				Market Index Adjusted Return			
Percentiles	r_{12}_Min	r_{12}_Max	r_{36}_Min	r_{36}_Max	r_{12} Min_Adj	r_{12} Max_Adj	r_{36}Min_Adj	r_{36} Max_Adj
Minimum	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
1st	-0.9	-0.9	-1.0	-1.0	-0.9	-0.9	-1.0	-1.0
5th	-0.9	-0.9	-1.0	-1.0	-0.9	-0.9	-1.0	-1.0
10th	-0.9	-0.9	-1.0	-0.9	-0.8	-0.8	-0.9	-0.9
25th	-0.8	-0.8	-0.9	-0.8	-0.7	-0.7	-0.8	-0.8
Median	-0.4	-0.4	-0.2	-0.2	-0.4	-0.4	-0.3	-0.3
75th	0.3	0.3	0.6	0.6	0.3	0.3	0.2	0.2
90th	1.2	1.2	3.1	3.1	0.8	0.8	1.8	1.8
95th	2.1	2.1	6.0	6.0	2.1	2.1	2.8	2.8
99th	9.5	9.5	11.9	11.9	5.9	5.9	8.0	8.0
Maximum	9.8	9.8	14.9	14.9	8.4	8.4	8.4	8.4

Table 7: Regression Results

This table reports the results of multivariate regression analyses with Buy and Hold Returns (BHR) as the dependent variable. The independent variables are firm specific characteristics of the IPOs. Columns (1) and (2) test multivariate specifications to verify pre-established hypotheses in the IPO literature in the Indian context using raw BHR. Column (3) uses the difference between three years raw BHR and one year raw BHR (Improvement Index) to analyze the improvement in IPO performance over long run. Columns (4) through (6) report the same set of regression result using index adjusted BHRs.

	Annual Return	36 Months Return	Improvement Index	Annual Index Adjusted Return	36 Months Index Adjusted Return	Improvement Index (Index Adjusted)
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	Coeff	Coeff	Coeff	Coeff	Coeff	Coeff
Constant	-0.58	-0.42	-0.36	-0.22	-0.32	-0.55
	(0.02)	(0.18)	(0.29)	(0.32)	(0.23)	(0.06)
Ln_SIZE	0.13	0.14	0.07	0.06	0.12	0.11
	(0.01)	(0.05)	(0.37)	(0.10)	(0.04)	(0.07)
%Premium	0.02	0.01	0.01	0.01	0.02	0.01
	(0.77)	(0.12)	(0.36)	(0.17)	(0.22)	(0.11)
%Promoters	0.41	0.34	-0.14	0.13	0.06	-0.19
	(0.25)	(0.45)	(0.77)	(0.69)	(0.87)	(0.66)
%Public	0.47	-0.21	-0.25	0.14	-0.38	-0.16
	(0.08)	(0.55)	(0.51)	(0.57)	(0.19)	(0.63)
Group_Dummy	0.02	-0.19	-0.19	0.01	-0.28	-0.25
	(0.87)	(0.26)	(0.28)	(0.93)	(0.05)	(0.11)
Ln_AGE	-0.03	-0.01	0.15	-0.05	0.00	0.14
	(0.49)	(0.90)	(0.02)	(0.17)	(0.92)	(0.01)
SERVICE_DUMMY	-0.09	0.05	0.09	-0.12	0.05	0.13
	(0.30)	(0.65)	(0.49)	(0.14)	(0.59)	(0.22)
NEATD_DUMMY	-0.34	-0.12	0.29	-0.26	-0.03	0.17
	(0.00)	(0.45)	(0.09)	(0.02)	(0.84)	(0.04)
Adj-R^2	0.11	0.09	0.08	0.10	0.08	0.12
F-Stat (Pvalues)	0.02	0.07	0.06	0.03	0.03	0.02

Table 8: Factors Influencing Likelihood of Positive Return

This table reports the results of the multivariate logit model $\Pr ob(Y_{it} = 1 \mid X_{it}) = \frac{e^{\alpha+\alpha_t+X'_{it}\beta+\varepsilon_{it}}}{1+e^{\alpha+\alpha_t+X'_{it}\beta+\varepsilon_{it}}}$. The dependent variable is a limited dependent variable that takes value one if one year (three years) BHR is positive, zero otherwise. The independent variables are firm specific characteristics of the IPOs. Columns (1) and (2) report the coefficients using raw BHR. Column (3) and (4) reports the coefficients when the dependent variable is modified to take the value one if the one year (three years) index adjusted buy and hold return is positive, otherwise zero.

	Annual Return	36 Months Return	Annual Return (Index Adjusted)	36 Months Return (Index Adjusted)
	(1)	(2)	(3)	(4)
Variable	Coeff	Coeff	Coeff	Coeff
Constant	-0.95	-1.30	-0.62	-1.88
	(0.00)	(0.00)	(0.03)	(0.00)
Ln_SIZE	0.35	0.32	0.18	0.29
	(0.01)	(0.01)	(0.14)	(0.02)
Ln_AGE	-0.14	0.09	-0.10	0.16
	(0.25)	(0.48)	(0.42)	(0.22)
Group_Dummy	0.05	0.02	0.58	0.46
	(0.89)	(0.95)	(0.09)	(0.09)
SERVICE_Dummy	-0.26	-0.17	-0.30	0.28
	(0.31)	(0.51)	(0.24)	(0.30)
NEATD_Dummy	-0.28	-0.07	-0.42	0.14
	(0.36)	(0.83)	(0.18)	(0.10)
Ln_Likelihood	-189.17	-188.01	-191.01	-174.19

Bharati Shipyard Limited			
Symbol - Series	BSL - EQ		
Issue Period*	Dec. 02, 2004 to Dec. 08, 2004		
Issue Size	1,25,00,000 equity shares	Subscription Details**	
Issue Type	100% Bookbuilding		
Face Value	Rs. 10/-	**Price Range**	Rs. 55/- to Rs. 66/-
Tick Size	Rs. 1/-	**Market Lot**	100
Minimum Order Quantity	100 shares		
IPO Market Timings*	10.00 a.m. to 5.00 p.m.		
Book Running Lead Manager	1. SBI Capital Market Limited 2. Enam Financial Consultants		
Syndicate Members	Enam Securities Pvt.Ltd		
Trading Members taking part in IPO	click here		
No. of Cities with Bidding Centers	62		
Prospectus	click here**		
Application Form	click here**		

VIEW NSE DEMAND GRAPH** **VIEW NSE-BSE DEMAND GRAPH****

* Market Timings for December 04, 2004 : 10.00 a.m. to 3.00 p.m. ** Underlined items are hyperlinks on NEAT screen.

Subscription Details as on Dec. 06, 2004 (NSE + BSE)

Sr.No.	Category	Quantity Subscribed	% to total subscription
1	Body corporate	163100	0.17%
2	HUF	428400	0.45%
3	Individuals	14673200	15.47%
4	Mutual Funds	26550000	28.00%
5	FI	14627600	15.42%
6	FII	38380000	40.47%
7	NRI	6700	0.01%
8	OTHERS	1900	0.00%
	Total	94830900	100.00%

Figure I: Example of a NEAT Issue at NSE (Firm: Bharati Shipyard Limited)