

# Subscription patterns, offer prices and the underpricing of IPOs

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## Abstract

Certain unique characteristics of the Indian bookbuilding process allow us to study the timing and subscription pattern of different investor groups and to dissect underpricing into two distinct components: one relating to pre-listing, set by the underwriter and the other from the post-listing period, which is determined by the market. Our results show the presence of sequential learning among IPO investors. Retail and Non-institutional investors follow the Institutional investors' subscription patterns when bidding for shares. The transparency of the bookbuilding process in the Indian IPOs helps alleviate the winner's curse problem for the non-institutional and retail investors. We also show that market underpricing is primarily driven by the unmet demand of the non-institutional investor groups. This insight is unprecedented in the IPO literature.

JEL Classification: G11, G15, G18

Key words: IPOs, bookbuilding, underpricing, winner's curse.

The authors thank officers of Securities and Exchange Board of India (SEBI), Vidhu Shekhar and Sunil Gawde (National Stock Exchange of India), Saurabh Vijayvergia, Abhishek Goel and Aseem Goel (DSP Merrill Lynch), Kaushal Shah and Prateek Diwan (Kotak Investment Banking), Arun Panicker (CRISIL), Prithvi Haldea (PRIME Database) and M.T. Raju (Indian Institute of Capital Markets) for their help with details of the institutional features of the Indian IPOs. We also thank participants of the 2008 annual London conference of the World Council for Corporate Governance and the Capital Markets Conference, Mumbai, for helpful comments. Any errors are our own.

## Introduction

The underpricing of IPOs has been documented extensively in prior research. Ritter and Welch (2002), Loughran, Ritter and Rydqvist (1994), Ljungqvist and Wilhelm (2002) among others, establish the global nature of this phenomenon across many countries and capital markets. The regulatory set-up and design of Indian IPOs gives us an opportunity to make a distinct contribution to this literature.

Unlike in the US where bookbuilding has been the preferred method of IPO price discovery for more than two decades, the Indian IPO market did not use this method until 1999. However, by 2006-07, the book building mechanism has come to dominate the fixed-price method and more than 80% of the IPOs price their shares using the bookbuilding mechanism. The Indian IPOs' bookbuilding process is transparent and it is required by regulation that the subscribers' application information, by investor type, be available online during the IPO bookbuilding period. This allows us to observe the timing and subscription pattern, for the different investor groups, over the bookbuilding period.<sup>1</sup> This characteristic of the Indian IPO market is unique and helps investors to use information from the bookbuilding exercise concurrently. Such an arrangement stands in contrast to the bookbuilding exercise in markets such as those of the US and the UK, where any learning from the bookbuilding exercise is *ex post*.

The Indian data permits us to examine the association between over-subscription patterns and the pricing of IPOs and more interestingly, the relation between the unmet demand of the different types of investors and the IPO underpricing

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<sup>1</sup> A detailed discussion of the bookbuilding and other regulations governing the IPO process in India are given in the following section.

in the post-listing aftermarket. The pre-listing period can be split into a pre-bookbuilding period immediately following the road show, at which time the price band is determined followed by the mandated bookbuilding period, where the pattern and timing of various investor groups is visible, again by regulation.

We document that during the bookbuilding period, the non-institutional investors follow the lead of the more sophisticated institutional buyers. We also find that the IPO offer price is determined in large part by the level of oversubscription. In turn, the setting of the offer price (within the price band) is a significant explanatory variable for the post-listing IPO underpricing in the market. Investors react positively to this signal, the higher the offer price set within the price band, greater is the level of aftermarket underpricing.

Although the non-institutional buyers follow the lead of the institutional investors in the pre-listing (bookbuilding) period, this behavior does not carry through to the post-listing period. In the post-listing IPO aftermarket, our evidence indicates that the underpricing is driven primarily by the unmet demand of the non-institutional buyers. The more sophisticated investors appear not to participate in the aftermarket frenzy. This new finding is also possible only because the data permits us to dissect the components of demand by each investor type and the impact of each on the IPO underpricing in the aftermarket.

Thus a primary contribution of our study is to split the overall demand for IPOs and its underpricing into a pre-listing and post-listing IPO aftermarket components. Typically, underpricing is measured from the IPO offer price to the closing price in the

aftermarket on the offer date<sup>2</sup>. This is generally true because there is no access to the extent of the underpricing that may have been “designed” by the lead investment bankers in the pre-listing period. Other than the revisions in the filed IPO price range prior to the registration becoming effective (Hanley 1993, Loughran and Ritter 2002), the only information accessible to studies that have examined underpricing is the IPO offer price and the closing price on the first day of trade in the post-listing IPO aftermarket<sup>3</sup>. It has therefore, not been feasible to separate the pricing effects of the pre-listing period when the offer price is determined from those caused by investors’ demand in the post-listing IPO aftermarket.

The regulatory framework in developing countries is often designed to protect and encourage the participation of the retail investors in the capital market. The regulatory design for IPOs in developing capital markets, is often aimed at reducing the adverse selection problem faced by retail investors (commonly referred to as the “winner’s curse” (Rock (1986)).<sup>4</sup> In the Indian context, we find that the regulatory framework helps alleviate, and may even completely eliminate, the winner’s curse problem.

However, alleviating the winner’s curse problem comes at a cost. The Indian regulatory structure has its drawbacks. Bubna and Prabhala (2008) have examined the impact of removal of underwriter discretion in allocation of IPO shares to QIBs on IPO

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<sup>2</sup> Some other measures have also been used. Barry and Jennings (1993) measure underpricing as open to close returns on the first day of trading. Aggarwal and Conroy (2000) measure underpricing as offer to open returns.

<sup>3</sup> Exceptions include Barry and Jennings (1993), Aggarwal and Conroy (2000) and Hogue, Loughran, Suchanek and Yan (2001).

<sup>4</sup> For instance, Taiwan permits subscribers to renege on their IPO allotments once the allocation levels are disclosed. From 2003 to 2006, South Korea gave its subscribers a put-back option which could be exercised if the IPO aftermarket price declined 20% below the offer price.

underpricing and found that this has resulted in increased underpricing. Thus the benefits of reduced adverse selection problems for the retail investors may be borne by the issuing firms. Hence an unintended consequence of this shift in the regulatory norms could be the adverse effect on the capital formation process for the economy.

The rest of the study is organized as follows. The set of institutional details pertaining to the IPO process in India are given in Section 2. The hypotheses are developed in Section 3. The data and methods are discussed in Section 4. The results are covered in Section 5 and the conclusions are given in Section 6.

## **2: Book building in India**

### **2.1: The institutional setup**

Until the early 1990s the Indian primary issue market was regulated by the Controller of Capital Issues (CCI), a government regulator, who also determined the price at which IPO firms offered their shares to the market. In 1992 the Capital Issues (Control) Act was abolished bringing an end to the control on pricing of new issues and the Securities and Exchange Board of India (SEBI) took over as the new market regulator. Even though SEBI introduced book building guidelines for primary markets as early as 1995, almost no book building activity was seen in the Indian IPO markets till the year 1999-2000. It is for this reason that Ljungqvist et al. (2003) excluded the Indian capital markets when conducting a cross country analysis of IPO book building activity.

In its early days book building mechanism was used by only 10% of the issuers (SEBI, Annual Report 1999-2000, Part B). However, by 2006-07, the book building

mechanism has come to dominate the fixed-price mechanism offerings and more than 80% of the IPOs price their shares using the book building mechanism (Prime Annual Report, Part II).

## **2.2: The dynamics of the book building process in India**

The firm conducting an IPO first selects its investment banker who is known as the Book Running Lead Manager. The bookrunner first files a Draft Red Herring prospectus with the regulator. At the draft red herring prospectus stage, a price band is not disclosed. The bookrunner then carries out the pricing of the firm and circulates it in the form of a report amongst its known institutional clients. The bookrunner and the firm then go on the road show among these institutional clients. At the end of the road show the bookrunner has enough information to arrive at a price band. It then files a Red Herring prospectus (RHP) with the regulator. The red herring prospectus contains the price band on which the book is then built.

The price band gives a maximum and a minimum price, a range within which the offer is priced. Unlike in the U.S., the price band is almost never revised upwards in practice. However, if weak demand is encountered, the price band may be revised downwards. In case of a revised price range, the bookbuilding period is extended by 3 days but has to be less than or equal to 10 days in all. By regulation, the maximum price given in the price range cannot exceed 120% of the lower end of the band. However, the maximum price actually chosen by firms to price their offer (henceforth referred to as MAXA), is invariably set lower than the maximum permissible price (henceforth MAXP). For example if the lower end of the price band is Indian Rupee

(INR) 200, then MAXP is INR 240 but very few firms choose MAXA equal to MAXP; it is typical to have MAXA set well below MAXP, say at INR 230.

Once the red-herring prospectus has been filed, the bookrunner forms a syndicate of brokers and banks/financial service providers to carry out the bookbuilding for the firm. The syndicate members have the right to accept the bids from investors. According to the Indian regulatory setup, investors are divided into three categories and the allocation tranches of these categories are pre-defined. Institutional investors (known as Qualified Institutional Buyers or QIBs) are to be allocated no more than 50% of the offered shares. Non-institutional investors (NIIs), defined as individuals investing more than INR 100,000 in the issue are allocated 15% of the offered shares and retail investors, who invest upto a maximum of INR 100,000 have to be allocated no less than 35% of the offered shares.

It is important to note that all investor types including QIBs have to place their bids through this syndicate only. The bids placed by all categories of investors can be modified during the bookbuilding period. Once the book closes, the non-QIB investors can still cancel their bids whereas the QIBs cannot. It is also important to note that while the NIIs and retail investors have to put in the full amount mentioned in their bid applications, the QIBs are permitted to apply with only 10% of their application money<sup>5</sup>. The retail investors are also allowed to make “cut off” bids instead of indicating a price within the band (price bid). Cut off bids allow retail investors to participate in the allocation process at what ever “cut off” price is determined by the

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<sup>5</sup> As per latest media reports this provision is currently under review by the SEBI.

book. For instance, if a retail investor bids for the shares at a price of INR 220 and the price determined by book building is INR 230, then such a retail investor would not get any shares. On the other hand, a cut off bid would consider this retail investors' application at a price of INR 230 for allocation purposes.

The book building process usually lasts for a period of 5 days (minimum of 3 days and a maximum of 10 days is prescribed by regulation). The bids are electronically entered in the software available with the syndicate members and using VSAT network the book is updated at the Bombay Stock Exchange (BSE)/National Stock Exchange (NSE) websites. The books on the BSE/NSE are updated every half-hour by regulation. At the end of the day the stock exchange websites show the cumulative bids at their respective prices. The web sites also show how many shares against each of the investor-categories have been applied for and the percentage of the issue that has been subscribed to.

After the book has been built, the issuing firm, in consultation with the bookrunner, decides an offer price for the IPO shares<sup>6</sup>. If the issue has been oversubscribed in any category, then the pro-rata allocation is made among the investors in that class by means of a lottery. Officials from the stock exchange have to be present to ensure that share allocation lottery is impartial. If the issue has been under-subscribed in any investor category then the firm can reallocate the leftover shares to any over-subscribed category as per the disclosures made on this subject in the prospectus. The basis of allocation document is now issued by the Registrar of the IPO

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<sup>6</sup> From November 27, 2007 the retail investors can be given a 10% discount in the offer prices as compared to the other categories.



and those investors who have been successful in getting share allotments receive the shares in their account whereas the unsuccessful subscribers get their money refunded. The allotment procedure has to be completed within 15 days of the closure of the book otherwise an interest of 15% has to be paid to the investors. The final prospectus containing the offer price is filed with the Registrar of Companies within 2 days of the close of the book building process.

### **2.3: Book building process: India vs. the US**

There are certain fundamental differences between the Indian book building process and that of the U.S. The biggest difference is in terms of transparency and information dispersion at the time of the book building process. While in India, the book building activity is shown live on the stock exchange websites, in the US it is built behind closed doors and any information on the book is almost never made public. At best, it is done in a cursory manner after the book has been closed.

Book building in the US, Europe and some other countries has been discussed extensively in Hanley and Wilhelm (1995), Aggarwal, Prabhala and Puri (2002), Cornelli and Goldreich (2001), Jenkinson and Jones (2004), among others. But the Indian regulatory structure is very different. In India, regulations governing the book building process mandate that fixed proportion of shares are allocated to different types of investors and these allocations are pro-rata in case of oversubscription. The investment banker does *not* have discretion in the allocation of shares. No such regulations exist for the US bookbuilding process and the book-running investment bank has the discretion to allocate shares to any investor they wish to. Historically, nearly two thirds of the US

IPO shares are usually allocated to institutional investors (Ljungqvist and Wilhelm 2002).

In India the book is built over a period of 3-7 days and the maximum price of the bookbuilding range cannot be more than 120% of the minimum price. In contrast, in the US the bookbuilding period is not mandated. It typically follows the road-show and the difference between the minimum and maximum filed price is almost always USD 2 (Ritter 2003). Further, unlike the US where the price range may be revised several times before the filing becomes effective, in India the price range is almost never revised upwards in practice and only rarely is it revised to a lower level, if the subscriber demand is unexpectedly low. Finally, for Indian IPOs the offer price is never set above the upper end of the price band (MAXP) whereas in the US, the offer price is set above the high end of the price range, even though it may have been revised upwards already, in almost 25% of the offers (Loughran and Ritter 2002).

A very important difference is that once the final prospectus is filed with the registrar of companies, it takes almost 21 days before the offer is listed. In US there is no delay between the offer becoming effective and its listing on NASDAQ or the Exchange of its choice.

#### **2.4: Pre-Listing and Market Underpricing**

In light of the institutional features of bookbuilding process in India, underpricing of IPOs can be understood in terms of two main components; one that belongs to the pre-listing period and the other that comes from the IPOs' post-listing aftermarket. The pre-listing period can be further broken down into pre-book and post-book periods. In the

pre-book period, the underwriter has the opportunity to underprice an issue by keeping MAXA below MAXP. In the post-book period, the underwriter has the opportunity to underprice further by keeping the offer price (OP) below MAXA. In the post-listing aftermarket, the traditional measure of underpricing is the difference of the first day closing and the offer price as a proportion of the offer price. However, in the Indian regulatory context, this definition can be modified to measure Market Underpricing (MUP) as the difference of the first day closing price and MAXP as a proportion of MAXP. We illustrate our definitions of the pre-listing underpricing by the underwriter and the underpricing witnessed in the post-listing aftermarket by means of an example. Reliance Petroleum had its INR 27 billion IPO in the year 2006. The book building range was INR 57 to INR 62. As per the regulations, the upper end of the price band could have been set at 120% of 57 or INR 68.40 but the underwriter chose to keep the upper end of the band at INR 62. Thus, in this example MAXA is 62 and MAXP is 68.40.

We measure pre-book underpricing as PUP1 where PUP1 equals  $(MAXP - MAXA) / MAXP$ . In our example PUP1 equals  $(68.40 - 62) * 100 / 68.4$  or 9.36%. After the book was built, the issue was found to be heavily oversubscribed (46 times). The underwriter decided to set the offer price at INR 60.

We have two measures for the post-book underpricing. We define the first of these measures as PUP2 where PUP2 equals  $(MAXP - OP) / MAXP$  i.e.  $(68.40 - 60) * 100 / 68.40$  or 12.28%. The second measure is defined as PUP3 where PUP3 equals  $(MAXA - OP) / MAXA$ . In this example, PUP3 equals  $(62 - 60) / 62$  or 3.23%. Thus PUP2 measures *post-book underpricing* by the setting of the offer price OP relative to the

maximum permissible price of the range MAXP, whereas PUP3 measures it relative to the actual maximum used in the price range MAXA.

The closing price (CP) of Reliance Petroleum on the day of its listing was INR 85.40. Since we expect the market to know that the maximum price at the upper end of the band could have been INR 68.40, the MUP is  $(85.40-68.40)*100/68.40$  or 24.85%. The traditional measure of underpricing would have been  $(CP - OP)/OP$  or  $(85.40-60)*100/60$  or 42.33%. Since in India there is a three week gap between the closure of the book and the first day of trading, the traditional measure of underpricing when adjusted for the market return for this period would have been 38.76%.

### **3: Related literature and testable hypotheses:**

Hanley (1993) and Loughran and Ritter (2002) discuss the partial-adjustment phenomenon, based on the model by Benevineste and Spindt (1989). Discretionary powers to allocate IPO shares allow book-running investment bankers to seek input from buy-side clients. The buy-side investors have an incentive to reveal their assessment of the stock's value and they are in turn rewarded with allocations of the high-demand IPO shares, which are priced by the bookrunner below the reservation prices revealed by the investors. That is, there is an inbuilt "underpricing" and the offer price is adjusted only partially by the bookrunner to incentivize the buy-side investors to reveal their true assessment of the IPO firm. The extent of this underpricing is not visible to investors. However, investors at large can observe the revisions of the price range and can thereby infer the demand (the subscription levels) for the IPO. Accordingly, there is a surge once the IPO is listed which is reflected in the closing price

of the first day's trade. Ritter (1998) describes it as the market-feedback or the bandwagon hypothesis for IPO underpricing.

As is evident from the above discussion, the underpricing resulting from the partial adjustment in the pre-listing period is not publicly revealed and underpricing is measured only as the difference between the offer price and the closing price on the first day of trade. Therefore, we cannot distinguish where the underwriter may have planned to price the IPO in the pre-listing period and the extent to which the closing price is driven by investors' demand in the post-listing IPO aftermarket.

The nature of the regulatory constraints in the Indian context stands in sharp contrast and permits us a few tests that are not feasible elsewhere. In the Indian context, the price band, the timing and subscription patterns of the QIBs and the non-QIBs are transparent. However, the bookrunners have been stripped of their discretionary allocation powers since 2005 (Bubna and Prabhala 2008). Thus it is neither very obvious what the pattern and timing of the subscriptions from each investor group will be, nor how any investor group may influence or "lead" the subscription patterns of the other groups. For instance, absent the discretionary powers of the bookrunner and hence their ability to incentivize the institutional investors, it is not obvious whether the QIBs wait until the last day of the bookbuilding period to submit their bids. It is also not obvious (i) whether the offer price is affected by the subscription levels of any specific investor group, (ii) where the offer price is set relative to MAXA, (iii) whether setting the offer price relative to MAXP has any relation to the underpricing observed in the post-listing

IPO aftermarket and finally, (iv) whether any specific investor group contributes more to the underpricing observed in the post-listing IPO aftermarket.

Our objective is to resolve these questions with empirical evidence and the factors discussed above give rise to the hypotheses examined in this study. The hypotheses tested in this study, in their null form, are:

**H1:** There is no discernible pattern in the subscriptions of any of the investor groups and none of the investor groups are influenced by the timing and subscription patterns of the others.

**H2:** The level of subscription does not influence the determination of the IPO offer price, relative to the maximum actual price (MAXA) of the price band.

**H3:** The underpricing observed in the post-listing IPO aftermarket is influenced equally by the unmet demand (subscription levels) of each investor group.

**H4:** The pre-listing underpricing i.e. the IPO offer price set relative to MAXP is not related to the underpricing observed in the post-listing IPO aftermarket.

#### **4: Sample Construction**

To investigate the affect of unmet demand from the different categories of investors on IPO underpricing, we take the entire population of book-built IPOs in India. Book building in IPOs in India started in 1999. Therefore, we include the book-built IPOs in the period March 1999 to March 2008 (nine years) for the purpose of our analyses. During this period, there were 245 IPOs. Out of these, 6 issues failed and were recalled by the issuers before the completion of the bookbuilding exercise. The remaining 239 issues in these 9 years form a part of our data. In the year 2003, a new

regulation was introduced whereby the cap of the book building band could not be more than 120% of the floor price. This made the book building band to be between (a, 1.2a) where “a” is the lower end of the band. In our sample the number of issues which fall into this category is 218. We use these 218 IPOs to test our hypotheses.

Our first source for collecting the prospectus for 239 IPOs was the web-site of SEBI. This web-site provides 3 kinds of documents as the offer documents. The first document is a Draft Red Herring Prospectus (DRHP) which has the offer document without the price band. The next document is the Red Herring Prospectus (RHP) which has the price band but not the final price. Finally the Prospectus includes the price determined after book building and therefore the various fields which use the price of the IPO are populated in this document. In contrast, the red herring prospectus contains all the details as that given in the final prospectus but the fields which use the final price for their calculations are not populated. For instance, the variable amount of money spent in the advertising and publicity expenses in the IPO will be populated in the prospectus but unpopulated in the red herring prospectus. In case the final prospectus was not available on the web-site of SEBI, we collected the red herring prospectus and complemented this by search on Thomson One Banker. We obtained the prospectuses of 174 IPOs since 1999 from the web-site of SEBI. In addition we obtained the red herring prospectus of 11 other firms from Thomson One Banker and SEBI website. For 54 firms, we obtained the final prospectuses/red herring prospectus from Prime Database, a private agency which tracks Indian IPOs and maintains a database for the same.

Information on the year of incorporation of the firm, issue size, number of shares offered, the name of the book-running investment banker, the price band as well as the final price, and the regional location of the firm's registered office in India is picked up from the final prospectus. If there are many lead managers to an IPO, then one of them is chosen by the firm as the book-running lead manager, and the name of this investment banker appears on the bottom left of the prospectus. The book-running lead manager is also known as the underwriter and is the investment bank which is responsible for the due diligence process prescribed by the regulator. In order to capture the reputation variable of the book-running lead manager, we rely on Prime Database, which brings out their annual rankings based on their market share. We use an indicator variable which is set equal to 1 if the book-running lead manager is in the top 10 ranks of Prime Database, else it is set equal to 0.

The age of the firm is calculated as the difference in year of the firm going public and the year of its incorporation. We took the earliest year of incorporation even if the firm was incorporated in a name different than the one in which it went public.

In order to collect the closing price on the day of listing, we referred to the website of NSE. If the firm was listed on both the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) we took the NSE closing prices. Since there is a lag of almost 3 weeks between the closure of the book and the listing of the firm, we take into account the market returns during this period by following the S&P CNX Nifty 500, which is an index composed of 500 firms listed on the NSE. This broad based index was



chosen to take care of the heterogeneity of the firms going public and to give due representation to the industry category where they were coming from.

For the purpose of allocations to the three categories of Investors, namely Retail, non-institutional investors (or NIIs) and QIBs we relied on the Master Response Sheet published by Prime Database which gives us information on the applications, allotments and subscription levels for the aforementioned classes of investors. We also cross checked a sample of this data with the details on the basis of allotment documents published by the various Registrars.

Our first hypothesis relates to the day by day book building for the three classes of investors. To the best of our knowledge the public availability of this data is for 143 firms for IPOs between April 1, 2006 and March 31, 2008. We assiduously collected the data from our self observations of the live book building of the IPOs in the NSE and BSE for 109 firms. The demand was captured from the NSE web-site at 1900 hours on each day of book building of the IPO. We obtained the data for remaining 34 firms from Prime Database. This data gives us information on the category wise demand (subscription) for each day of the book building for QIBs, NIIs and Retail investors. The book building period in this sample ranges from 3 to 9 days. The demand levels in this data are given by the subscription levels for each category of investors for each day. The subscription level is the ratio of the number of shares subscribed in that category to the number of shares on offer for that category. Therefore, a subscription level of 0.5 at the end of a day for the QIB category implies that 50% of shares reserved for QIBs were bid

for subscription by them on that particular day. The data for these demand levels is cumulated by the day.

#### **4.1: Description of variables**

We have previously defined our underpricing variables. The variables not yet covered in our discussion are:

**IBREP** = reputation of the book running investment banker, as published by Prime Database rankings. Prime Database uses the market share of the Investment Bankers to determine these rankings. IBREP is set equal to 1 if the book-running lead manager is in the top 10 ranks of Prime Database, else it is set equal to 0.

**AGE** = number of years since incorporation of the firm to the IPO date

**QIB\_sub** = level of subscription (or oversubscription) by Qualified Institutional Buyers (QIBs) with reference to the number of shares they are eligible to apply for.

**NII\_sub** = level of subscription (or oversubscription) by Non-Institutional Investors (NIIs) with reference to the number of shares they are eligible to apply for.

**RET\_sub** = level of subscription (or oversubscription) by Retail Investors with reference to the number of shares they are eligible to apply for.

**Issuesize** = the amount raised in the IPO (in '00,000 INR)

**Market return** = Return on the S&P CNX Nifty 500 index from the date of the closure of the book to the listing date.

A complete list of the variables used in this study is given in Table 1.

## 5: Results

### 5.1: Sample description & Univariate results

Table 2, Panel A gives the frequency of the book-built IPOs in India with respect to the year of issue and the issue size. Issues, which are less than INR 1 billion, are considered relatively small issues in the Indian context. Prestigious investment banks generally do not handle such issues. Issues above INR 5 billion are considered to be large issues. When bookbuilding first arrived in the Indian markets in 1999, very few firms (9.8%) chose to price their shares using this method. By 2004-05 almost 65% of all the IPOs were bookbuilt. This increased to more than 86% from 2006 onwards. As can be seen from the table, along with small and medium sized issues, the number of large IPOs has also gone up. Panel B shows the variation of underpricing over the years in bookbuilt IPOs. From the year 2005-06 to 2006-07, the number of firms with bookbuilt IPOs increased, yet the underpricing went down. This trend reversed in 2007-08 when the number of firms and the underpricing both increased.

Table 3 provides descriptive statistics of the variables used in the study. The amount raised (Issuesize) varies from 0.2175 billion INR to 102.6 billion INR with a standard deviation of 11.69 billion INR. These huge differences in the issue size make it a very important variable for our analysis. Accordingly, in Table 5 the demand by different categories of investors is broken up by issue size. Our definition of Market Underpricing (MUP) which is the excess of the Closing Price to the Maximum Permissible upper band price (MAXP) has a mean of 24.15 percent whereas the conventional measure of underpricing shows it to be 31 percent, on average. Our

measures of pre-listing underpricing (PUP1, PUP2 and PUP3) are, on average, 4.37%, 6.37% and 2.06% respectively. Note that the sum of the Market Underpricing, as defined by us and the pre-listing underpricing (PUP2) approximates the traditional measure.

The average age of the Indian firm is about 14 years at the time of going public which is virtually identical to that of the US firms (Habib and Ljungqvist 2001). There were five firms with an age of more than 50 years and if we remove these firms, then the average age of the firms becomes 13.33 years.

Within the three categories of investors, namely Retail, non-institutional investors (NIIs) and the qualified institutional buyers (QIBs), the NII category shows the highest level of over subscription levels. On an average, NIIs oversubscribe by over 37 times their tranche of shares in the IPO (with a standard deviation of 52.59). This could be driven by their relatively smaller pre-determined tranche size and/or growth in this investor class. The minimum level of interest shown by NIIs in our sample was in Advanta India, where only 5% of their tranche was subscribed. In contrast, the NII tranche for the Vishal Retail IPO was oversubscribed by more than 300 times. QIB and Retail subscriptions are relatively lower as compared to those of NII investors. A more detailed analysis of the subscription levels is discussed later in Table 5. The offer price is, on average, INR 218.35 with MAXA, the *actual* band maximum in close proximity at INR 223.86. The *maximum permissible* band price MAXP is, on average, approximately INR 12 above it with a value of INR 235.45.

Table 4, presents the pair-wise correlations of the variables used in this paper.<sup>7</sup> PUP1 is not related to either MUP or to that of subscription levels for any of the investor groups. But it is highly correlated with IBREP. It appears that the higher reputation investment bankers set the higher end of the price band closer to the maximum allowable by regulation. Although we do find that QIB subscription levels are highly correlated with IBREP, and to a lesser extent that of the NIIs as well, surprisingly, this factor is ignored by investors. If it were a selection issue i.e. better quality firms worked with higher quality investment bankers, then we would have expected to find PUP1 also related to the subscription levels and/or underpricing in the aftermarket. But that does not appear to be the case.

On the other hand, PUP2 is highly correlated with the subscription levels. Interestingly, the correlations are similar for subscriptions levels across the three investor groups. This indicates that the offer price is set higher for offers with greater demand, but it is not influenced in particular by the demand from any specific group. Similar to PUP2, our alternative measure of post-book underpricing, PUP3, is also significantly correlated with the subscription levels and with market underpricing. PUP3 does not appear to be influenced by the demand level of any specific group. The important ingredient that differs between the pre-bookbuilding measure PUP1 and the post-bookbuilding measures PUP2 or PUP3 is the offer price. The offer price is determined at the end of the bookbuilding period. It appears to be closely related to the subscription levels and also to the post-listing IPO aftermarket underpricing.

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<sup>7</sup> The non-parametric correlation measures (not reported) are very similar which indicates that our results are not driven by outliers.

Surprisingly, underwriter prestige measure IBREP is not related to the underpricing measures MUP or to PUP2. This result is very different from the extant evidence from studies on US IPOs.

## **5.2: Pre-listing period Analyses**

Table 5, Panel A analyzes the first day's bookbuilding demand for the three categories of investors according to the issue size of the IPO. The retail investors show very little demand on the first day of bookbuilding regardless of the size of the issue (median oversubscription does not exceed 0.03). The NIIs do not show much demand on the first day either (median oversubscription does not exceed 0.02). On the other hand, if the issue size is greater than INR 5 billion, the QIBs oversubscribe the issue 3.31 times, on average (median is 2.04 times).

Table 5, Panel B analyzes the penultimate day of bookbuilding. By the penultimate day, the QIBs have oversubscribed all IPOs regardless of the issue size. The median oversubscription is 1.15 times for issues less than INR 1 billion and increases to 8.59 times for issues greater than INR 1 billion. The NII and retail median oversubscriptions are however still less than one for all issue sizes.

Table 5, Panel C analyzes the last day of bookbuilding. All categories of investors show oversubscriptions, regardless of the issue size. When the issue size is between INR 1 to 5 billion, the NII and QIB demands are almost similar. Retail oversubscriptions are also the highest for this category and decrease for issue size greater than INR 5 billion. This is because the retail investors have a limit of INR 100,000 per IPO, hence the retail

level can match the QIB and NII level of oversubscriptions only if the number of retail investors were to multiply manifold.

Table 5, Panel D analyzes the underpricing of the IPOs, by issue size. The mean as well as median underpricing is the highest when the issue size is between INR 1 to 5 billion. Interestingly this is also the IPO size range in which the NIIs and Retail investors show the maximum amount of median oversubscriptions.

The multivariate regression results in Tables 6 and 7 confirm the results in Table 5. The demand build up of the Retail and NII categories is influenced by the QIB subscription patterns. In Table 6, the regression analyzes the determinants of the retail subscriptions as the book gets built. The retail subscriptions are significantly related to the penultimate-day QIB subscriptions, but not with the penultimate-day NII subscriptions. The oversubscriptions significantly decrease with higher issue sizes because there is an investment limit of INR 100,000 in any IPO for the retail investors. The oversubscription of the retail investors with issue size can, therefore, only increase if the number of retail investors multiply manifold for large issue sizes. The tolerance and VIF figures are within acceptable limits indicating the absence of multicollinearity. Overall, the results of Table 6 indicate that Retail investors show sequential learning from QIB investors but not from NII investors.

Table 7, Panel A shows the regression results which confirm that NII subscription is significantly dependent on the build up of the QIB demand till the penultimate day. Log of issue size is negative as expected since issues with much higher size cannot be as highly over-subscribed by the NIIs as the small issues. Panel B

checks the robustness of the results by winsorizing the bottom 2% of the data. Panel C takes the difference of the final NII subscription and the penultimate day NII subscription to get the last day NII buildup. This last day build up is also significantly determined by the penultimate day QIB build up.

These results negate our first hypothesis. The timing and the subscription pattern clearly shows that the QIBs act first and their subscription level on the penultimate day of the bookbuilding period influences the subscription levels of NIIs and retail investors. The transparency of the bookbuilding process in India seems to have solved the winner's curse problem for retail investors in India.

In order to test what determines the setting of the offer price OP below MAXA we regress PUP3, defined as  $(MAXA - OP)/MAXA$ , on AGE, Issue size, Investment Banker Reputation (IBREP) and the demands of the three categories of investors, namely Retail, NIIs and QIBs. Table 8 regressions illustrate that this difference is significantly driven by IBREP and QIB demand and the age of the IPO firms. The offer prices are set higher for older, more mature firms and for greater level of the QIB demand. Thus, a high QIB demand drives OP very close to MAXA. This negates our second hypothesis. Surprisingly, we find that the prestigious investment bankers (higher IBREP) are associated with a *lower* setting of the offer price relative to MAXA, indicating that the prestigious underwriters have a higher "designed" underpricing and are leaving more money on the table.



### 5.3: Post-listing IPO aftermarket analyses

Since IPOs are oversubscribed many times, we treat the subscription levels as proxy of unmet demand. From the correlations (Table 4) we observe that the market underpricing MUP, measured after the IPO is listed, is highly correlated with the demand from the NIIs and Retail investors and to a lesser extent by the subscription levels of the QIBs. This suggests that although the NII and Retail demand is influenced by the QIB subscription levels in the pre-offer period, it is the unmet NII and Retail demand that is largely responsible for the post-listing aftermarket IPO underpricing. The regressions results in Table 9 support this observation.

Table 9, Model 1 shows that Market Underpricing is significantly driven by the subscription levels of the NII and the Retail investors. The market return between the close of bookbuilding to the listing day also contributes significantly to the underpricing. The pre-listing underpricing before bookbuilding (PUP1) is negatively related to Market Underpricing.

If we use the QIB subscription variable QIB\_sub in place of NII\_sub and RET\_sub (not reported in tables) we find that the explanatory power of the model (Adj R-square) drops to 28.4% and the constant term assumes significance thereby suggesting a missing variables problem. Also, when included in the regression with the subscription levels of the non-institutional investors (not reported in tables), QIB\_sub becomes insignificant. We therefore infer that the QIB unmet demand in the after market has less explanatory power than the unmet demands of the Retail and NII investors. This rejects our third hypothesis.

Table 9, Model 2 uses PUP2-our measure of post-book underpricing as an explanatory variable rather than PUP1 which is our measure of *pre-bookbuilding* underpricing. The results remain the same as in Model 1 with the unmet demands of NII and retail investors, market return and PUP2 retaining significant explanatory power. Clearly, the setting of the offer price relative to the maximum permissible within the price band MAXP is significantly related to the aftermarket IPO underpricing (MUP). These results negate our fourth hypothesis. However, the market underpricing is driven primarily by the unmet demand of the non-institutional investors. We can infer from these results that QIBs do not appear to participate in the after-market frenzy.

Table 9, Model 3 includes both PUP1 and PUP2 as explanatory variables. We find that in the presence of PUP2, the explanatory power of PUP1 is no longer significant. This indicates that on a comparative basis, the setting of the offer price (OP) after the book has been built is a stronger underpricing signal to the market than the setting of MAXA below MAXP.

## **6: Conclusions**

Household savings in India contribute nearly 23% to the GDP of the country. However, only a very small fraction of these households invest in the Indian capital markets. Hence, one of the stated objectives of the regulators is to encourage the participation of retail investors in the capital markets and to safeguard their interests. As a result, Indian IPOs are set in a fairly unique regulatory framework. The transparency of the bookbuilding process appears to have achieved the desired goals, at least partially.

Investors can easily observe the subscription patterns of the Qualified Institutional Buyers (QIBs) and our results indicate that retail investors do follow the lead of their more sophisticated counterparts. This should alleviate the winner's curse problem confronting smaller investors in IPO markets across most countries and capital markets. It remains to be seen if this will increase participation by retail investors in the Indian IPO market.

Prior studies have not been in a position to examine the relation between subscription levels, pricing, the pre-listing and the post-listing underpricing of IPOs due to the unavailability of such data and/or regulatory norms. The regulatory constraints in the Indian market permit us to dissect underpricing into two components, one before the IPO gets listed and the other in the post-listing aftermarket. The most important evidence from our study is a unique set of tests possible in the Indian scenario based on the ability to dissect the IPO underpricing into its different components from the pre-listing period "designed" by the investment banker to that observed in the IPO aftermarket in the post-listing period. To summarize, we are able to observe pre-bookbuilding underpricing, post-bookbuilding underpricing as well as the underpricing in the post-listing IPO aftermarket which has not been done in the IPO literature so far.

We find that the subscription level of the non-institutional investors' demand is significantly influenced by the subscription patterns of the Qualified Institutional Buyers (QIBs). Just as interestingly, the market underpricing is influenced more by the unmet demand of the non-institutional buyers. The more sophisticated investors (QIBs)

seem content with their allocations, and in this the non-institutional investors do not seem to follow their lead.

We also find that reducing or removing the winner's curse for the retail investors can be achieved, but that fact alone does not necessarily reduce the underpricing of IPOs, especially if the investment bankers are stripped of their discretionary allocation power. The ability to incentivize the buy-side investors helps in the price discovery process and Bubna and Prabhala (2008) have argued persuasively that its removal increases the IPO underpricing. Despite the many positive aspects of the changes brought about in the regulatory framework over the past decade, an unintended consequence of the removal of the discretionary allocation powers of the book-running lead managers may have been to increase the underpricing of Indian IPOs. This could have an adverse affect on the capital formation process in the country. Regulators would be well-advised to pay close attention to this specific outcome of their current policies.

## References

- Aggarwal, R. and Conroy, P., (2000) Price Discovery in Initial Public Offerings and the Role of the Lead Underwriter, *Journal of Finance*, Vol. 55 (6), pp. 2903-2922.
- Aggarwal, R., Prabhala, N.R. and Puri, M., (2002) Institutional Allocation in Initial Public Offerings: Empirical Evidence, *Journal of Finance*, Vol. 57(3), pp. 1421-1442.
- Barry, C., and R. Jennings, (1993) The Opening Price Performance of Initial Public Offerings of Common Stock, *Financial Management*, Vol. 22, pp. 54-63.
- Benveniste, L.M. and Spindt, P.A., (1989) How Investment Banks Determine the Offer Price and Allocation of New Issues, *Journal of Financial Economics*, Vol. 24, pp. 343-361.
- Bubna, A. and Prabhala, N.R., (2008) When Bookbuilding Meets IPOs, *Working paper*, University of Maryland.
- Cornelli, F., and Goldreich, D., (2001) Bookbuilding and Strategic Allocation, *Journal of Finance*, Vol. 56, pp. 2337-2369
- Habib, M. and Ljungqvist, A. (2001) Underpricing and entrepreneurial wealth losses in IPOs: Theory and Evidence, *Review of Financial Studies*, Vol. 14, pp. 433-458.
- Hanley, K.W., (1993) The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon, *Journal of Financial Economics*, Vol. 34, pp. 231-250.
- Hanley, K. W., and Wilhelm, W. J., (1995) Evidence on the Strategic Allocation of Initial Public Offerings, *Journal of Financial Economics*, Vol. 37, pp. 239-257.
- Houge, T., Loughran, T., Suchanek, G., Yan, X. (2001) Divergence of Opinion, Uncertainty, and the Quality of Initial Public Offerings, *Financial Management*, Vol. 30, pp. 5-23.
- Jenkinson, T. and Jones, H., (2004) Bids and Allocations in European IPO Bookbuilding, *Journal of Finance*, Vol. 59(5), pp.2309-2338.
- Ljungqvist, A. and Wilhelm, W.J., (2002) IPO Allocations: Discriminatory or Discretionary? *Journal of Financial Economics*, Vol. 65 (2), pp. 167-201.
- Ljungqvist, A., Jenkinson T. and Wilhelm, W.J., (2003) Global Integration of Primary Equity Markets: The Role of U.S. Banks and U.S. Investors, *Review of Financial Studies*, Vol. 16(1), pp.63-99
- Loughran, T. and Ritter, J.R. (2002) Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs? *Review of Financial Studies*, Vol. 15(2), pp. 413-443.
- Loughran, T., Ritter, J.R. and K. Rydqvist (1994) Initial Public Offerings: International Insights, *Pacific-Basin Finance Journal*, Vol. 2 (2-3), pp. 165-199.

Ritter, J. R.(1991) The Long run Performance of Initial Public Offerings, *Journal of Finance*, Vol.46(1),pp.3-27.

Ritter, J. R., (1998) Initial Public Offerings, *Contemporary Finance Digest* 2, 5-30.

Ritter, J. R.(2003) Differences between European and American IPO Markets, *European Financial Management*, Vol. 9(4), pp.421-434.

Ritter, J. R. and I. Welch, (2002) A Review of IPO Activity, Pricing, and Allocations, *Journal of Finance*, Vol. 57(4), pp. 1795-1828.

Rock, K., (1986) Why New Issues are Underpriced, *Journal of Financial Economics*, Vol. 15, pp. 187-212.

**Table 1: Description of the variables used in the study**

<i>Variable</i>	<i>Description</i>
OP	Offer Price (INR*)
CP	Closing Price(INR)
MAXP	Maximum permissible upper end of the price band(INR)
MAXA	Upper end of the price band actually used(INR)
MUP	Market Underpricing = $(CP - MAXP) * 100 / MAXP$
PUP1	Pre-listing Underpricing= $(MAXP - MAXA) * 100 / MAXP$
PUP2	Pre-listing Underpricing= $(MAXP - OP) * 100 / MAXP$
PUP3	Pre-listing Underpricing= $(MAXA - OP) * 100 / MAXA$
IBREP	This variable is a proxy for the reputation of the book running investment banker. IBREP is set equal to 1 if the book-running investment banker is in the top 10 ranks of Prime Database, else it is set equal to 0. The Prime Database uses the market share of the investment bankers to determine these rankings
AGE	Number of years since incorporation of the firm to the year of the IPO
QIB_sub	The total shares subscribed by Qualified Institutional Buyers (QIBs) as a proportion of the total number of shares available to them for allocation. This is measured after the book has been built.
NII_sub	The total shares subscribed by Non-Institutional Investors (NIIs) as a proportion of the total number of shares available to them for allocation. This is measured after the book has been built.
RET_sub	The total shares subscribed by Retail Investors as a proportion of the total number of shares available to them for allocation. This is measured after the book has been built.
Issuesize	The amount raised in the IPO (in 00,000 INR)
Market return	Return of the S&P CNX, Nifty 500, between the close of bookbuilding to the listing date
Underpricing	This is the traditional measure of market adjusted underpricing used in the literature $[(CP - OP) * 100 / OP] - \text{Market return}$

\*INR refers to the Indian currency, the Indian Rupee

**Table 2: IPO activity and underpricing in India**

Panel A: IPO activity (using the bookbuilding mechanism) in India for the years 1999-2008(1<sup>st</sup> quarter)

<i>Year</i>	<i>&lt; INR 1billion</i>	<i>INR 1 to 5 billion</i>	<i>&gt; INR 5 billion</i>	<i>Bookbuilt IPOs</i>	<i>As a % of all IPOs</i>
1999-00	1	3	1	5	9.8
2000-01	10	1		11	10.09
2001-02			1	1	16.67
2002-03	1	1		2	33.33
2003-04	2	4	1	7	38.89
2004-05	6	5	4	15	65.22
2005-06	25	27	3	55	70.51
2006-07	36	23	10	69	86.25
2007-08	33	27	14	74	86.05
Total	114	91	34	239	

Panel B: Underpricing of Indian book built IPOs during 1999-2008(1<sup>st</sup> quarter)

<i>Year</i>	<i>N</i>	<i>Mean (%)</i>	<i>Median (%)</i>	<i>Minimum (%)</i>	<i>Maximum (%)</i>
1999-00	5	55.34	18.31	-30.62	155.28
2000-01	11	16.04	17.94	-30.54	72.59
2001-02	1	-8.68	-8.68	-8.68	-8.68
2002-03	2	15.03	15.03	-1.88	31.94
2003-04	7	69.74	45.97	3.82	181.94
2004-05	15	45.11	27.83	0.17	207.08
2005-06	55	33.91	29.55	-18.94	336.89
2006-07	69	18.00	1.06	-30.95	235.53
2007-08	74	34.00	20.11	-23.27	241.91
Total	239	30.39	18.65	-30.95	336.89



**Table 3: Descriptive Statistics of the variables used in the study**

The variables are as defined in Table 1.

<i>Variable</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Issue Size (00,000INR)</i>	218	41797.14	116967.03	2175	1026000
<i>MUP (%)</i>	218	24.15	50.75	-43.44	307.41
<i>PUP1 (%)</i>	218	4.37	3.53	0	13.75
<i>PUP2 (%)</i>	218	6.37	5.07	0	16.67
<i>PUP3 (%)</i>	218	2.06	4.46	0	16.67
<i>Underpricing (%)</i>	218	31	50.96	-30.95	336.89
<i>AGE (years)</i>	218	14.77	12.46	< 1 year	100
<i>RET_sub</i>	218	13.75	18.08	0.13	133.52
<i>NII_sub</i>	218	37.48	52.59	0.05	316.46
<i>QIB_sub</i>	218	29.04	37.24	0.18	185
<i>OP</i>	218	218.35	195.51	14	1100
<i>MAXA</i>	218	223.86	200.43	14	1125
<i>MAXP</i>	218	235.45	211.33	14.4	1140

**Table 4: Pearson's Correlations**

Variables are as defined in Table 1.

	<i>MUP</i>	<i>PUP1</i>	<i>PUP2</i>	<i>PUP3</i>	<i>Underpricing</i>	<i>IBREP</i>	<i>RET_sub</i>	<i>NII_sub</i>	<i>QIB_sub</i>	<i>Issue size</i>
<i>MUP</i>	1	-0.05	-0.327(***)	-0.343(***)	0.985(***)	0.076	0.631(***)	0.659(***)	0.399(***)	-0.078
<i>PUP1</i>		1	0.534(***)	-0.176(***)	0.024	-0.213(***)	0.079	0.044	0.062	-0.015
<i>PUP2</i>			1	0.738(***)	-0.210(***)	-0.062	-0.187(***)	-0.208(***)	-0.208(***)	0.051
<i>PUP3</i>				1	-0.266(***)	0.100	-0.284(***)	-0.281(***)	-0.294(***)	0.072
<i>Underpricing</i>					1	0.06	0.645(***)	0.669(***)	0.402(***)	-0.065
<i>IBREP</i>						1	0.032	0.178(***)	0.334(***)	0.201(***)
<i>RET_sub</i>							1	0.778(***)	0.468(***)	-0.111
<i>NII_sub</i>								1	0.665(***)	0.053
<i>QIB_sub</i>									1	0.131
<i>Issue size</i>										1

\*\*\* Correlation is significant at 1% level

**Table 5: Subscription patterns of investors for different days of the bookbuilding process**

This table presents the subscriptions by the three categories of investors on three different days of the bookbuilding process. Panel A presents the subscription patterns on the first day of bookbuilding. Panel B presents the demands on the penultimate day of bookbuilding. Panel C presents the demands on the last day of bookbuilding while Panel D presents underpricing as measured at the close of the first day of trading.

For Panel B, we do not have information for of the penultimate day NII and QIB subscriptions for two issues.

*Panel A: Investor subscription patterns on the first day of the bookbuilding process*

	<i>Issue size &lt; INR 1 billion</i>			<i>Issue size INR 1 to 5 billion</i>			<i>Issue size &gt; INR 5 billion</i>			<i>Overall</i>		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
<i>QIB</i>	69	0.33	0	50	1.31	0.74	24	3.31	2.04	143	1.17	0.25
<i>NII</i>	69	0.34	0	50	0.17	0	24	1.64	0.02	143	0.5	0
<i>Retail</i>	69	0.05	0.01	50	0.08	0.01	24	0.09	0.03	143	0.07	0.01

*Panel B: Investor subscription patterns on the penultimate day of the bookbuilding process*

	<i>Issue size &lt; INR 1 billion</i>			<i>Issue size INR 1 to 5 billion</i>			<i>Issue size &gt; INR 5 billion</i>			<i>Overall</i>		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
<i>QIB</i>	68	1.94	1.15	50	7.11	4.21	23	13.28	8.59	141	5.62	2.11
<i>NII</i>	68	1.21	0.92	50	1.15	0.41	23	3.46	0.47	141	1.56	0.59
<i>Retail</i>	69	0.71	0.29	50	1.42	0.51	24	1.36	0.65	143	1.06	0.35

*Panel C: Investor subscription patterns on the last day of the bookbuilding process*

	<i>Issue size &lt; INR 1 billion</i>			<i>Issue size INR 1 to 5 billion</i>			<i>Issue size &gt; INR 5 billion</i>			<i>Overall</i>		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
<i>QIB</i>	69	12.1	3.1	50	48.82	33.56	24	60.04	58.81	143	32.99	8.77
<i>NII</i>	69	19.9	3.92	50	48.25	36.1	24	50.28	24.97	143	34.91	7.93
<i>Retail</i>	69	10.88	4.22	50	15.01	11.32	24	7.31	4.73	143	11.73	4.66

*Panel D: First day underpricing*

	<i>Issue size &lt; INR 1 billion</i>			<i>Issue size INR 1 to 5 billion</i>			<i>Issue size &gt; INR 5 billion</i>			<i>Overall</i>		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
	69	25.01	3.57	50	28.65	27.06	24	24.99	16.66	143	26.28	13.54

**Table 6: Determinants of the retail investors' subscriptions in book built IPOs**

The dependent variable is the Retail subscription at the close of bookbuilding exercise. QIB\_penultimate and NII\_penultimate are the subscription levels of the QIBs and NIIs till the penultimate day of bookbuilding. Other variables are as defined in Table 1. Out of a total of 143 issues for which we have the day by day book details, there are 2 issues for which we did not have the penultimate day NII and QIB subscriptions. t statistics are in parentheses.

$$RET\_sub = \beta_0 + \beta_1(QIB\_penultimate) + \beta_2(Log\_AGE) + \beta_3(Log\_issuesize) + \beta_4(IBREP) + \beta_5(NII\_penultimate) + \varepsilon$$

<i>Independent variables</i>	<i>Coefficient</i>	<i>Tolerance</i>	<i>VIF</i>
<i>(Constant)</i>	62.67 (4.67)		
<i>QIB_penultimate</i>	1.32 (6.93)***	0.59	1.7
<i>Log_AGE</i>	-1.38 (-0.69)	0.97	1.03
<i>Log_issuesize</i>	-5.77 (-4.07)***	0.51	1.97
<i>IBREP</i>	2.54 ( 0.74)	0.54	1.85
<i>NII_penultimate</i>	-0.28 ( -0.63)	0.7	1.42
N	141		
Adj R square	28.6%		

\*\*\* denotes significance at 1% level

**Table 7: Determinants of NII Subscriptions in book built IPOs**

This regression analyzes the determinants of the NII subscriptions at the close of the book. The dependent variable is NII\_sub which measures the demand of the NII investors at the close of the book. Panel A is on the full sample, Panel B is after winsorizing bottom 2% of the data. Panel C uses the last day build up of NII demand as the dependent variable. The last day build up is the difference of the cumulative NII subscriptions on the last and the penultimate day.

$$NII\_sub = \beta_0 + \beta_1(QIB\_penultimate) + \beta_2(IBREP) + \beta_3(Log\_AGE) + \beta_4(Log\_issuesize) + \varepsilon$$

$$NII\_lastday = \beta_0 + \beta_1(QIB\_penultimate) + \beta_2(IBREP) + \beta_3(Log\_AGE) + \beta_4(Log\_issuesize) + \varepsilon$$

<i>Panel A</i>	
Independent Variables	Coefficient
(Constant)	107.54(2.68)
QIB_penultimate	4.62(8.94)***
IBREP	10.23(1.02)
Log_AGE	-4.49(-0.75)
Log_issuesize	-9.31(-2.23)**
N	141
Adj. R square	39.8%
<i>Panel B</i>	
Independent Variables	Coefficient
(Constant)	85.7(2.55)
QIB_penultimate	4.49(10.39)***
Log_AGE	-2.69(-0.54)
Log_issuesize	-7.47(-2.13)**
IBREP	7.07(0.84)
N	138
Adj. R square	47.4%
<i>Panel C</i>	
Independent Variables	Coefficient
(Constant)	88.86(2.66)
QIB_penultimate	4.30(10.01)***
IBREP	8.88(1.06)
Log_AGE	-1.98(-0.4)
Log_issuesize	-8.12(-2.33)**
N	141
Adj. R square	45.5%

\*\*\* indicates significance at 1% level

\*\* indicates significance at 5% level

**Table 8: Determinants of setting the offer price below MAXA**

This regression shows the determinants of the setting of Offer Price (OP) below the maximum end of the book building range actually used (MAXA). The dependent variable is  $PUP3 = (MAXA - OP) * 100 / MAXA$ . Other variables are as defined in Table 1. t statistics are reported in parentheses.

$$PUP3 = \beta_0 + \beta_1(Log\_AGE) + \beta_2(Log\_issuesize) + \beta_3(IBREP) + \beta_4(RET\_sub) + \beta_5(NII\_sub) + \beta_6(QIB\_sub) + \varepsilon$$

<i>Independent variables</i>	<i>Coefficient</i>
(Constant)	2.12(0.71)
Log_AGE	-1.29(-3.12)***
Log_issuesize	0.42(1.38)
IBREP	1.37(2.12)**
RET_sub	-0.02(-0.84)
NII_sub	0.00(-0.39)
QIB_sub	-0.04(-3.28)***
N	218
Adj R square	17.00%

\*\*\* indicates significance at 1% level

\*\* indicates significance at 5% level

**Table 9: The determinants of Market Underpricing**

The dependent variable in both panels is Market Underpricing (MUP). Model 1 uses PUP 1 as the explanatory variable with other control variables whereas Model 2 uses PUP2 as the explanatory variable. Model 3 includes both PUP1 and PUP2. Variables are as defined in Table 1. t statistics are reported in parentheses.

$$MUP = \beta_0 + \beta_1(NII\_sub) + \beta_2(RET\_sub) + \beta_3(Log\_AGE) + \beta_4(Log\_issuesize) + \beta_5(Market\_return) + \beta_6(PUP1) + \epsilon \quad (1)$$

$$MUP = \beta_0 + \beta_1(NII\_sub) + \beta_2(RET\_sub) + \beta_3(Log\_AGE) + \beta_4(Log\_issuesize) + \beta_5(Market\_return) + \beta_6(PUP2) + \epsilon \quad (2)$$

$$MUP = \beta_0 + \beta_1(NII\_sub) + \beta_2(RET\_sub) + \beta_3(Log\_AGE) + \beta_4(Log\_issuesize) + \beta_5(Market\_return) + \beta_6(PUP1) + \beta_7(PUP2) + \epsilon \quad (3)$$

<i>Independent Variables</i>	<i>Model 1 Coefficient</i>	<i>Model 2 Coefficient</i>	<i>Model 3 Coefficient</i>
<i>(Constant)</i>	21.42(0.93)	29.14(1.27)	29.53(1.28)
<i>NII_sub</i>	0.45(5.88)***	0.42(5.61)***	0.42(5.60)***
<i>RET_sub</i>	0.75(3.34)***	0.71(3.20)***	0.71(3.20)***
<i>Log_AGE</i>	4.88(1.38)	2.76(0.78)	2.88(0.81)
<i>Log_issuesize</i>	-3.41(-1.57)	-3.06(-1.44)	-3.11(-1.45)
<i>Market_return</i>	1.95(5.03)***	1.82(4.74)***	1.82(4.73)***
<i>PUP1</i>	-1.37(-2.03)**		-0.17(-0.21)
<i>PUP2</i>		-1.57(-3.28)***	-1.49(-2.55)**
N	218	218	218
Adj R square	53.30%	54.70%	54.50%

\*\*\* indicates significance at 1% level

\*\* indicates significance at 5% level