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When-issued trading in the Indian IPO market¹

By

Raymond M. Brooks
Oregon State University
raymond.brooks@bus.oregonstate.edu

Prem G. Mathew
Oregon State University
prem.mathew@bus.oregonstate.edu

J. Jimmy Yang²
Oregon State University
jimmy.yang@bus.oregonstate.edu

Abstract

We examine the contribution of when-issued trading to price discovery and underpricing in the Indian IPO market. Besides the when-issued trading, there exists IPO grading, analyst recommendation, group affiliation, and the subscription rates in the bookbuilding process. We examine the impact of these activities and find three sequential factors that explain the IPO underpricing. Higher grades for an IPO lead to higher when-issued premiums, which in turn leads to higher subscription rates. Then, higher subscription rates lead to higher IPO underpricing. Overall, we find that the when-issued trading plays an important role in price discovery in the Indian IPO market.

JEL classification: G15; G24; G32

Keywords: When-issued trading; initial public offering; Indian equity markets; IPO underpricing; information asymmetry

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²Corresponding author. College of Business, Oregon State University, 200 Bexell Hall, Corvallis, OR 97330
Phone: (541)737-6005 Email: jimmy.yang@bus.oregonstate.edu

1. Introduction

Studies have shown that when-issued trading (also known as the grey market) reveals relevant information for setting initial public offering (IPO) offer prices and helps predict first-day aftermarket prices (e.g., Aussenegg, Pichler, and Stomper, 2006; and Cornelli, Goldreich, and Ljungqvist, 2006). Therefore, when-issued trading can play an important role in the price discovery process. However, in India, in addition to when-issued trading, there are a number of other mechanisms and procedures that could potentially reveal relevant information to the market. Furthermore, IPO offer prices are either fixed or bounded by a price range that is determined before the when-issued trading begins. Within this institutional setting, it is not clear whether when-issued trading continues to provide documented benefit on price discovery. We study a sample of Indian IPOs to examine the effect of when-issued trading in this unique setting. Our empirical results provide additional evidence on the informativeness of when-issued trading given the coexistence of other informative mechanisms.

Typically across IPOs there exists a substantial underpricing of shares. The average underpricing is estimated at around 15% in the United States (Ibbotson, Sindelar, and Ritter, 1994) and as high as 250% in China (Datar and Mao, 2006). The Indian IPO market exhibits in the 30% to 40% range (Krishnamurti and Kumar, 1994). Ritter (1998) provides a brief discussion of various explanations that include the bandwagon hypothesis, banker's monopsony power hypothesis, signaling hypothesis, and market feedback hypothesis. Although there appears to be no single dominant model for underpricing, asymmetric information models seem to attract the most attention (Rock, 1986). All asymmetric information theories of underpricing predict that underpricing is positively related to the degree of asymmetric information. Loughran and Ritter (2002) propose the prospect theory to explain why issuers do not get upset about leaving money

on the table. The theory predicts that issuers will sum the wealth loss from underpricing with the larger wealth gain from a price jump, which produces a net wealth increase for pre-issue shareholders. However, empirical evidence in favor of asymmetric information theories is mixed (Ritter and Welch, 2002). We contribute to the literature by studying the Indian IPO market where several options, including when-issued trading, potentially reduce the information asymmetry of an IPO.

Unique to the Indian IPO market is a set of mechanisms that convey information about the quality of the company soon to issue shares. First, companies issuing an IPO receive grades much like the bond market grades for soon to be issued bonds. Prior to May 2007, firms elected to have their company graded prior to the auction. The Securities and Exchange Board of India (SEBI) mandated grading in May 2007. Second, there is information about the subscription rates by institutions, high net worth individuals, and retail investors prior to the auction. This process is known as bookbuilding and allows potential investors to see the subscription rates of others by category prior to the auction. Third, there can be a group affiliation that connects a company to other companies prior to the auction. Fourth, there are analyst recommendations, publicly available prior to the auction. Fifth, there can be a grey market for these shares where information on the share price is posted by traders. The grey market is an unofficial listing of prices quoted by traders at which they are willing to buy or sell shares of the upcoming IPO. This grey market is not part of an organized exchange that regulates the trading mechanism and reporting. Do any of these mechanisms, singularly or in combination, provide a significant reduction in the level of asymmetric information with respect to the underpricing of IPOs? Does the when-issued trading provide information to investors prior to their subscription? Does the when-issued price help set the offer price and predict the aftermarket price? Answers to these

questions will help determine the importance of when-issued trading in the IPO price discovery process.

Several studies have investigated one or more of the special mechanisms in the Indian IPO market. Krishnamurti, Thong, and Vishwanath (2009) show that the IPO grading in India does not affect underpricing. However, they find that stock price informativeness, proxied by idiosyncratic volatility, increases significantly due to the IPO grading process. Deb and Marisetty (2010) test the certification hypothesis by studying the IPO grading in India. They find that grading decreases IPO underpricing and positively influences IPO demand of retail investors. However, grading does not seem to affect the subscription rate of institutional investors. Although grading reduces risk in the secondary market and improves liquidity, it does not affect IPO long-run performance. Khurshed, Pande, and Singh (2009) and Neupane and Poshakwale (2012) study the timing and subscription pattern of different investor groups in India and document the presence of sequential learning among IPO investors. They show that the transparency of the bookbuilding process helps alleviate the winner's curse problem for retail or non-institutional investors. The Neupane and Poshakwale study also finds that demand from retail investors contributes significantly to the determination of the IPO offer price. In a related study, Benveniste and Busaba (1997) compare two commonly used mechanisms for selling IPOs, namely, the fixed price method and bookbuilding. They find that bookbuilding generates higher expected proceeds but exposes the issuer to greater uncertainty. Depending on the characteristics of the issuing firms, both methods can be optimal, suggesting that it might be a good idea to allow both methods to exist in the same market. In fact, both methods are present in India.

The impact of business groups in India has also attracted attention in the IPO market. Khanna and Palepu (2000) study the impact of business groups in India by analyzing the

performance of affiliates of diversified business groups relative to unaffiliated firms. They find that firm performance initially declines with group diversification, but subsequently increases once group diversification exceeds a certain level. However, Marisetty and Subrahmanyam (2010) find that affiliation to large business groups fails to reduce the information asymmetry in the Indian IPO market because underpricing of business group companies is higher than that of stand-alone companies. They also find that investor overreaction, as proxied by oversubscription rates, explains the degree of underpricing.

For IPOs, share allocations and analyst ratings could affect price discovery. Bubna and Prabhala (2011) study underwriter power over allocations in the Indian IPO market before and after the regime change in November 2005 when underwriters no longer controlled allocations. They find that when underwriters control allocations, bookbuilding is associated with lower IPO underpricing relative to the fixed price method. However, this relation disappears when the allocation powers are withdrawn from bookbuilding. However, during our sample period, shares of oversubscribed IPOs are allocated on a strictly pro-rata basis and the process is supervised by the stock exchange so that no power over allocations remains with the underwriter.³ For analyst rating, Rajan and Servaes (1997) find that analysts are overoptimistic about the earnings potential and long-term growth prospects of IPOs. More firms complete IPOs when analysts are optimistic about the growth prospects of recent IPOs.

We find three sequential factors that explain the IPO underpricing. Higher grades for an IPO lead to higher when-issued premiums, which in turn lead to higher subscription rates for institutional investors, as well as high net worth and retail investors. Higher subscription rates lead to higher IPO underpricing and mitigate the winner's curse for retail investors. Overall, we

³ As a result, the informational rents and partial adjustment phenomenon raised by Benveniste and Spindt (1989) and Hanley (1993) would not work in India.

find that when-issued trading plays an important role on the price discovery process in the Indian IPO market, even after controlling for other information revealing mechanisms. Ideally, the strong investor demand conveyed through high when-issued premiums and high subscription rates should lead to a higher offer price, which in turn lowers IPO underpricing, other things being equal. However, in practice, IPOs in India are rarely priced outside the preset range. In other words, the information revealed through the when-issued market cannot be fully reflected until the listing day. Thus, our results generate important policy implications.

The rest of this paper is organized as follows. In Section 2, we provide details of the Indian IPO market. In Section 3, we present our hypotheses and in Section 4 we describe the data and sample statistics. We present the methodology and empirical results in Section 5. Concluding remarks are given in Section 6.

2. The Indian IPO market

The Indian equity market is regulated by the SEBI. Like many Asian markets, India has a high percentage of retail investors. Problems in the IPO market were documented by a joint committee of parliament, which found that over 200 companies issued shares through an IPO in the early 1990s and disappeared leaving many investors with worthless shares. Following this period of duped investors, underpricing of issues averaged 100% (Marisetty and Subrahmanyam, 2010). A number of mechanisms were introduced or mandated in the Indian IPO market to decrease the information disadvantage that retail investors face when investing in an IPO. We examine five of these options.

Figure 1 shows the sequence of events in the Indian IPO market. Issuing firms typically have their issue graded following the announcement of the issue. The company and investment bankers then have road shows to gauge the demand for the issue. Following this, the issuing firm sets an issue price band; a lower and upper price at which they are willing to sell shares of the issue. The issue price band is rarely changed, almost never revised upward, and rarely revised downward. In our sample, only two firms later revised their initial issue price band and they were both reductions. Once the issue price band has been set, analysts may elect to provide their recommendations about the quality of the issue. When-issued trading begins on average five days prior to the book-building period (subscription period) and continues to the day before the listing date. Finally, the subscription period lasts for about 4 days and ends about 20 days prior to the listing of the newly issued shares. Following the subscription period, the issuing firm in consultation with the investment banker will determine an appropriate issue price. By regulation, they may set an issue price that is up to 120% of the lower bound of the issue price band.

<Insert Figure 1 here>

For our sample, 68% (177 firms) set the issue price at the upper bound, 10% (26 firms) between the upper bound and lower bound, 13% (35 firms) at the lower bound, and 1% (2 firms) set a price below the initial lower bound. Only 20 firms (8%) chose to use the fixed-price offering instead of the bookbuilding approach. The two firms that set the issue price below the initial lower bound changed their initial issue price band prior to the bookbuilding process. As a percentage of the lower price bound, the average upper price bound is 11.2% higher. This percentage is the highest (12.4%) for issues that are eventually priced between the upper and lower price bounds. Issues priced at the upper (lower) price bound have an upper price bound

that is 11.3% (9.6%) higher than the lower price bound. In our sample, 20 firms set an upper price bound that was 20% higher than the lower price bound.

IPO Grading. The SEBI mandated grading of IPOs started in May of 2007. Each company seeking funds through an IPO must request a rating from a rating agency such as CRISIL Research (a Standard and Poor's Company), ICRA (associated with Moody's), or Credit Analysis & Research Ltd. (CARE). The grades are 1 to 5 with 5 being the top ranking reflecting strong fundamentals and 1 being the lowest with poor fundamentals. The grading is a fundamental assessment of the company and not necessarily the issue itself.

“The IPO rating process is qualitative. A relative assessment of the company is done based on parameters such as business fundamentals and prospects, financial position, management quality, corporate governance practices, project risk, and compliance and litigation history.”⁴

Companies may ask more than one rating agency to grade the company. In our sample, only seven firms (3%) had more than one rating. The cost is minimal as it is usually about 10 basis points for large IPOs. Companies may also request to see a preliminary grading and provide additional information to the rating agency if it wants to secure a better grade. If a company seeks grades from multiple agencies, it must disclose all the grades. Because the grading is about the company and not the IPO per se, it is not particularly useful for determining the price. Companies that filed a draft prospectus with SEBI prior to May 1, 2007 may opt out of the grading requirement. One preliminary study looking at IPO firms before and after the mandatory requirement of grading found that grading implies a reduction in asymmetric

⁴ INDIAN EXPRESS.COM, LOOK BEYOND THE RATING, Niti Kiran Posted: Monday, Jul 06, 2009.

information and is used by retail investors to target higher graded companies (Deb and Marisetty, 2010). We investigate if other mechanisms reduce the marginal impact of grading on information asymmetry, and whether IPO grading should be a factor in the IPO investment selection process.

Analysts' Recommendations. It has become standard practice that, prior to the bidding period of an Indian IPO, financial analysts provide opinions about the upcoming issue. On www.moneycontrol.com, arguably the most influential Indian finance portal, analysts provide recommendations and specific guidance for every issue. It should be noted that analyst recommendations are from independent brokerage firms not related to IPO underwriters. If we assume that these analysts in general are better informed regarding an IPO or at the very least have the skills to evaluate an IPO better than the average retail investor, these recommendations can also serve as an information-revealing mechanism for retail investors. Do investors value the opinions of these experts, i.e., are subscription rates influenced by analyst recommendations?

Grey Market. An IPO grey market is an over-the-counter market for the buying and selling of shares prior to their auction and listing on an organized exchange. It is an informal market. Trading is completed among a small set of traders that trust each other and provide bid-ask quotes at which they are willing to trade the upcoming IPO shares. The pricing of a share, like in any equity market, is determined by supply and demand, although here supply means a willing seller. Sellers will acquire the share at or after the auction for delivery to the buyer at the price agreed upon in the grey market. If an issue is withdrawn, the grey market trade is voided. Therefore these grey market trades are when-issued trades or more appropriately, when and if-

issued trades. No regulatory agencies are involved in the grey market and thus there are no limitations on price movements.

Potential when-issued traders reveal their interest to dealers who then seek a matching trader. Dealers can choose to post a buying or selling price. During our sample period, dealers posting when-issued prices are active in only a few cities (Mumbai, Delhi, Jaipur, etc.) and by design stop posting once the shares are listed on an exchange. The grey market however provides an informal price preview of the coming auction price. If sellers believe they will be issued shares at the initial auction price, they would try to sell in the grey market above this price. Buyers however want to purchase below the post auction trading price. If a buyer believes the post auction price will be above the current when-issued ask, this leaves a window for both sellers and buyers to share in the potential underpricing of an issue prior to the auction and listing. Does an active grey market squeeze the underpricing?

Subscription Rates (or Bookbuilding). A unique feature of the Indian IPO process is that investors can subscribe to the issue based on SEBI-established allocations for different investor categories. Unlike the U.S. where IPO underwriters will approach their best clients to place shares for good IPOs and omit other retail investors, in India, retail investors have the ability to bid for shares in any IPO as the process is primarily done online through brokerage accounts. For most issues, investors are classified into three categories. First are the institutional investors, Qualified Institutional Buyers (QIBs), which includes domestic and foreign financial institutions, mutual funds, venture capital firms, and insurance companies. Second are the small retail investors, Retail Individual Investors (RIIs), for those investors that subscribe to Rs. 1 lakh (INR 100,000 or approximately USD 2,000 given an exchange rate of INR 50 per USD, where INR is

the Indian rupee) or less of the issue. Third are the sophisticated or wealthy individual investors, non-institutional investors (NIIs), also sometimes referred to as high net-worth individuals who invest more than INR 100,000 in an issue. This term, NII, refers to the amount an investor is investing in an IPO but not necessarily the net worth of the individual.

In a book-built issue, 50% of the issue is reserved for QIBs, 35% for RIIs, and 15% for NIIs. In some issues, a portion of the issue is available to employees of the issuing firm. Most Indian IPOs are open for an average of four days for investors to subscribe. During this time, information about subscription rates for each of these categories is available daily. Essentially, everyone can see how the other types of investors are subscribing to an issue while the issue is still open for bids. The Basis of Allotment document, required for each issuing firm at the end of the bidding period, provides final subscription rates across the investor categories. For retail investors, the release of institutional investors' subscription rates can act as an information asymmetry reducing mechanism. Given this structure, we examine whether institutional investors "know better," i.e., are QIB subscription rates higher for better performing issues? Do RIIs mimic the behavior of QIBs? Are subscription rates influenced by grading and the grey market?

Group Affiliation. Companies may be affiliated with other companies prior to their IPO. For example, companies may spin off an operating segment but still maintain some business connection with the new company. Owners of one company may start another company and retain ownership rights in both companies. One concern with affiliated companies is the tunneling option. Funds from a high cash performing firm can be moved to a low cash performing firm within the group. This practice transfers wealth from one set of owners to

another set of owners. In an initial study of group affiliated companies and stand-alone companies, group affiliated companies had higher underpricing (Marisetty and Subrahmanyam, 2010). Does grading reduce or increase the underpricing for the group affiliated companies? Is the bookbuilding process different for affiliated companies?

We examine these five potential asymmetric information reducing options to see their impact given the presence or absence of other options. Our goal is to shed light on the effect of when-issued trading given the existence and timing of other mechanisms.

3. Hypotheses

3.1. IPO grading

IPO grading is considered the first publicly available mechanism that can potentially reduce asymmetric information in the Indian IPO market. Deb and Marisetty (2010) find that IPO grading decreases IPO underpricing and influences the demand of retail investors. More specifically, their empirical results show that retail investors are more interested in higher graded IPOs. In addition, high quality or higher graded IPOs exhibit lower risk in the market. Other things equal, the high demand and low risk associated with higher graded IPOs will likely affect the when-issued trading, so we posit the following hypothesis on IPO grading.

H₁: When-issued premiums are higher for higher graded IPOs.

The when-issued premium is measured as the difference between the posted ask price in the when-issued market and the upper bound of the price band for the IPO. To allow us to compare premiums across IPOs, we state the premium as a percentage of the issue upper bound.

3.2. Bookbuilding and subscription rates

As shown in Figure 1, the bookbuilding or subscription period runs about five days after the when-issued trading started and ends about 20 days before the listing day. In other words, investors who are interested in subscribing to an issue can observe the when-issued premium prior to and during the bookbuilding period. Similarly, traders in the when-issued market can observe the subscription rates from different group of investors during the four days of the subscription period. Existing literature has shown that investors' participation influences IPO offer prices (Cornelli and Goldreich, 2003; Degeorge et al., 2010). Since the offer price band is determined prior to the subscription period in India, we focus on whether when-issued premium reflects the information revealed through the subscription rate. In addition, given Neupane and Poshakwale's (2012) finding that the participation of retail investors is significantly influenced by the participation of institutional investors, we examine not only the total subscription rate but also the subscription rate from each of the three categorized groups in India.

During the subscription period, it is not clear whether the subscription rates influence the when-issued premium or the other way around. However, based on the sequential order of the events, the when-issued premium observed prior to the subscription period could influence the subscription rates. Similarly, the subscription rates observed during the subscription period could influence the when-issued premium after the subscription period. We, therefore, develop the following hypotheses.

H₂: IPOs with higher when-issued premium prior to the subscription period have higher subscription rates.

Subscription rates are measured as the percentage of the issue bid by investors. The total subscription rate is calculated as the total number of shares bid by all investor categories divided by the issue size (number of shares to be issued). Subscription rates within each investor category are calculated the same way based on the allocated number of shares.

H₃: IPOs with higher subscription rates experience an increase in the when-issue premium after the subscription period.

3.3. Analyst recommendation

Analysts' recommendations become available after the offer price band is determined and before the start of the when-issued trading. Analyst recommendations are typically presented as "subscribe," "avoid," "neutral," etc. We quantify these recommendations by assigning a value of 2 for positive recommendations, 1 for recommendations that are neutral, and 0 for recommendations to avoid the issue. Whether or not analysts' recommendations provide additional information is unclear. Rajan and Servaes (1997) find that analysts are overoptimistic about the earnings potential and long-term growth prospects of IPOs. However, if we assume that analysts in general are better informed or at the very least have the skills to evaluate IPOs better than retail investors, their recommendations can serve as an information-revealing event. The information can be reflected in the when-issued trading. As a result, we posit the following hypothesis.

H₄: When-issued premiums are higher for IPOs with higher analyst ratings.

3.4. Group affiliation

The information about group affiliation should be available even before the IPO grading period. Deb and Marisetty (2010) find that IPO grading captures several firm characteristics such as firm size and group affiliation. If this is the case, we do not expect group affiliation to have additional impact on the when-issued premium. Marisetty and Subrahmanyam (2010) report that group-affiliated companies have a higher probability of survival over the long term. A possible reason is that groups support their affiliates to maintain their reputation. Again, this potential benefit of group affiliation could be reflected in IPO grading. Our H_1 should capture this impact.

3.5. IPO underpricing

The effects of the asymmetric information reducing mechanisms on IPO underpricing cannot be clearly separated as they are interrelated. The focus of this paper is on the sequential impact and as a result we look at the last mechanism that is supposed to capture information revealed through other mechanisms. As shown in Figure 1, the when-issued trading is the last event leading to the listing day. We expect the when-issued premium to reflect the demand of an IPO, which determines the IPO pricing. In India, the offer price band usually does not change, and as a result, a strong demand of an IPO will push up the price on the first trading day, leading to higher IPO underpricing. Therefore, we develop the following hypothesis.

H₅: IPOs with high when-issued premium are subject to higher underpricing.

4. Data and sample statistics

We examine all IPOs that listed between January 1, 2007 and June 30, 2012. Issue-specific data, such as the underwriters, issue size, issue price, and IPO type, etc. are hand-collected from www.chittorgarh.com and www.moneycontrol.com. Data are verified using the documents submitted by the issuing firms to SEBI, including the IPO prospectus. Analyst recommendation summaries and IPO grades for all issues are also collected from these websites. Final subscription rates are collected from the Basis of Allotment document for each IPO. List day stock prices are collected from www.chittorgarh.com and are verified with data from the National Stock Exchange (of India). We use the CNX Nifty as our market index and collect daily index levels from the National Stock Exchange. Accounting data are collected from www.moneycontrol.com. Grey market data prior to 2009 were hand-collected from the discussion boards on www.chittorgarh.com. On each day, bid and ask grey market prices from the last post prior to market close quoted by a grey market trader are collected. Even though a trader's identification is available, the information about his or her affiliation is often unavailable. From 2009 to 2012, the discussion board data were collected and summarized on <http://www.greymarket.co.in/>. Although there is no way to verify that the hand-collected data for the period prior to 2009 represent a complete sample of grey market prices, there are two reasons we believe that our sample accurately reflects prevailing grey market prices. First, although grey market trading takes place in a few cities as described earlier, for traders to have access to a larger market it would make sense for them to disseminate their quotes in a centralized forum, such as the finance portal discussion board. This would allow these traders to interact with a larger group of buyers and sellers. Second, and more importantly, as we will see in a subsequent section, there are no significant differences in our results when we expand our data to include

those published on www.greymarket.co.in. For these reasons, and to ensure the largest possible sample size, we use all data collected from 2007 to 2012.

Table 1 presents the overall sample of IPOs and partitions the sample of 260 Indian IPOs into years (2007-2012) and into those with and without bookbuilding, an IPO grade, venture capital (VC) backing, group affiliation, and a grey market. Nearly all IPOs have book-building (240 out of 260) but very few are group-affiliated (31 out of 260). IPO grading is present in over 68% of the offerings (178 out of 260)⁵ and a VC is associated with about a third of the offers (89 out of 260). Of the 260 issues, 174 have when-issued quotes provided. Note that this is not an indication of trades in the grey market. We do not have information about the volume of trades in this market, only an indication that there are traders willing to trade at the quoted prices. The number of IPOs decreased during 2009, consistent with the global trend during the financial crisis.

<Insert Table 1 here>

We provide summary statistics of the offer price, trading prices on the list day, number of days between key dates, issue size, and the percentage of shares sold in Panel A of Table 2. The mean offer price, open price, and close price are Rs.185, 213, and 217 (USD 3.70, 4.26, and 4.34), respectively. On average, it takes 4 days from the issue open day to the issue close day and another 20 days from the issue close day to the list day. The mean issue size is Rs. 396 Crore, or Rs. 3.96 billion (USD 79.2 million), with the largest being about Rs. 152 billion or USD 3.04 billion (Coal India Ltd.) and the smallest being about Rs. 0.2 billion or USD 4 million (KPR Mill

⁵ For the two IPOs in 2010 and 2012 that did not have a grade although they were mandated to, we were not able to obtain grading information. We exclude these IPOs when partitioning by whether the IPO was graded and in our regressions when IPO grade is an explanatory variable.

Ltd.). The mean (median) percentage of shares sold is 28% (25%) with the maximum being 70% and the minimum being 7%.

<Insert Table 2 here>

Panel B of Table 2 presents the statistics on the returns that an investor could generate if he were to buy shares of the IPO in the grey market, or at the offer price. The first when-issued quote becomes available about five days prior to the subscription period, on average. We find that investors that choose to purchase shares in the when-issued market at this first when-issued quote will tend to lose about 6% (4%) on average if they were to sell their shares at the opening (closing) price on the list date. The median return is considerably lower at about -7% (-12%) at the opening (closing) price. Thus, it appears that when-issued prices reflect the demand of the most optimistic investors.

For our sample, the median number of days between the last when-issued quote and the list day is one. Investors that choose to buy shares at this time also experience negative returns based on list day open and close prices. This evidence suggests that traders that are selling or quoting when-issued prices tend to set premiums that are considerably higher than the prices at which the newly issued shares trade on the list date. This is consistent with Dorn (2009), who finds that retail investors consistently overpay for IPOs in the grey market relative to the immediate aftermarket. However, it should be noted that there is huge variation, with the maximum return being 158% and the minimum being negative 73%. The mean and median returns based on the opening price are -5% and -3%, respectively, with the maximum being 20% and the minimum being negative 60%.

We also report statistics on underpricing of the 260 Indian IPOs in Panel B of Table 2. We calculate underpricing as the offer to close return adjusted for market returns from the issue close day to the listing day.⁶ For reference and comparison to previous studies, we also provide the return from offer price to the listing day opening price (offer-open return) and return from offer price to the listing day closing price (offer-close return). We find that IPOs in our sample are underpriced by 16.58%, on average, with a median underpricing of 4.64%. The mean offer-open return is 13.13% and the median is 5.23%. The mean offer-close return is 16.23% and the median is 5.55%. Therefore, our sample underpricing is well below the results from earlier samples of Indian IPOs that estimated underpricing at 30% to 40% (Krishnamurti and Kumar, 1994).

We cannot assess the informativeness of the when-issued quotes using these summary statistics. However, it should be noted that investors have a choice of bidding for shares in the bookbuilding process (even though they may not be allocated all the shares for which they bid) or acquiring shares in the when-issued market. The former route is preferable as it provides investors with a positive return on the list date whereas the latter does not. Traders providing when-issued quotes appear to overprice the issue, possibly to compensate for the risk taken for offering shares prior to the bookbuilding process, where demand for the issue will be determined, or to take advantage of investors that overestimate the value of the issue. It is also possible that investors are willing to pay a premium at the when-issued market if they really want the shares

⁶ Ideally we would want to adjust offer to close returns using market returns from the date that the issue price is set until the list day. However, we cannot ascertain the exact date on which the offer price is set. We therefore use market returns from the end of the subscription period to the list day to calculate underpricing. As a comparison, when calculating underpricing, Bubna and Prabhala (2011) use market returns from the start of the subscription period to the list day to adjust offer to close returns for market returns, and Neupane and Poshakwale (2012) do not adjust for market returns.

given that they may not be allocated the desired number of shares in the book-building process, especially for oversubscribed IPOs.

To examine the univariate relationships between some of our key variables, we present a correlation matrix in Table 3. The correlations between underpricing and subscription rates across all investor groups, except employees, are significant at the 1% level. In addition, all subscription groups, except employees, are significantly correlated at the 1% level. We also find that the first when-issued premium (F_WIP) and last when-issued premium (L_WIP) are significantly correlated with all subscription groups and the IPO grade at the 1% level. However, group affiliation is not correlated with the underpricing of the issue, or the total subscription rate. Finally, analysts' recommendations are significantly correlated with the IPO grade, when-issued premium, and the subscription rate of all investor groups except retail individual investors. This evidence is in line with our H_4 . It appears that many of the information revealing mechanisms are interrelated. Our multivariate analyses in the next section provide a better picture of their impact.

<Insert Table 3 here>

5. Methodology and empirical results

We examine the impact of the potentially information asymmetry reducing events on underpricing of Indian IPOs in four ways. First, we examine underpricing and when-issued returns using our data partitioned by the presence or absence of bookbuilding, IPO grading, VC backing, group affiliation, and when-issued trading, as well as by whether the IPO received positive or negative analyst recommendations. An issue that has an average analyst

recommendation greater (less) than 1 is considered to have received a positive (negative) recommendation. Second, we employ standard OLS regression models to assess the significance of our independent variables on IPO underpricing. Third, given that the grey market trading period starts prior to the subscription period and ends following the subscription period, it is likely that subscription rates could impact subsequent grey market prices. We examine this issue by employing an OLS regression model in which the change in grey market premium is the dependent variable. Fourth, to account for the temporal sequence of events, we employ two-stage least squares (2SLS) regression models to determine the mechanisms through which information is conveyed to investors and their impact on underpricing.

The results of our partitioned data analyses are presented in Table 4. The VC-backed IPOs have significantly higher underpricing and offer-open and offer-close returns than those without a VC backing. This is inconsistent with the argument that VC investment certifies the quality of the issue (e.g., Megginson and Weiss, 1991; and Lin and Smith, 1998). However, this result is consistent with Francis and Hasan (2001) and Lee and Wahal (2004), who also find that VC-backed IPOs experience larger underpricing than comparable non-VC-backed IPOs.

<Insert Table 4 here>

The presence of grading has a significant impact on reducing the mean underpricing, as well as the offer-open and offer-close returns. We should note that all the IPOs in our sample from 2010 to 2012 were required to be graded; therefore this result could be a reflection of differences in underpricing across time. In results not presented, in a sub-sample of IPOs from 2007 to 2009 when grading was optional, those firms that chose to be graded had a marginally lower level of underpricing.

IPO book-building activity only marginally impacts underpricing and offer-open return. Group affiliation only reduces median offer-close return marginally and has no impact on underpricing. These results may be due to the fact that we have only a few firms with firm affiliation and non-bookbuilt IPOs.

Underpricing for firms that have when-issued trading is not significantly different from underpricing for firms without when-issued trading. The median offer-open and offer-close returns are marginally higher for firms with when-issued trading. This suggests that the presence of when-issued quotes could signal to investors that the issue will generate significant demand for the shares during the subscription period, driving first day returns higher than those issues for which no when-issued quotes are available. The subscription rates are marginally (significant at the 10% level) higher for firms with when-issued quotes (19.96 times the number of shares offered for firms with when-issued quotes vs. 13.94 times for firms without when-issued quotes), therefore when-issued quotes may contribute to higher demand.

Although IPOs do not generate significantly different levels of underpricing for issues with positive recommendations versus negative recommendations, offer-open return is significantly higher for those issues that receive positive recommendations. For the offer-close return, the mean difference is only marginally significant.

We use the first and last when-issued ask prices to determine when-issued returns based on the list date opening and closing prices and report the results in Panel B of Table 4. The first (last) when-issued price is the first (last) ask price listed by a dealer in the grey market. We examine these when-issued returns based on our data partitioned by the presence or absence of bookbuilding, IPO grading, VC association, group affiliation, and by whether the IPO received positive or negative analyst recommendations. We find that when-issued median returns are

significantly less negative for those IPOs that have VC-backing, consistent with the result that VC-backed IPOs are associated with higher first-day return, which leads to less negative when-issued returns. However, there are no significant differences in when-issued returns based on first when-issued prices between issues that are graded and not graded, between those that receive positive and negative recommendations, between those that are fixed versus those that use bookbuilding, and between those that are group affiliated and those that are not. Small sample sizes, especially for the last two comparisons, preclude us from drawing any strong conclusions. We find that when-issued returns based on the last available when-issued prices are significantly less negative for those IPOs that are not graded and for those firms without group affiliation based on median returns. Our results suggest that the grey market drives up IPO prices beyond a level that is justified by underpricing as buying in this market results in negative first-day returns to the investor. Overall, these results provide us with a cursory understanding of the effect of the various information asymmetry-reducing mechanisms.

We next run a series of OLS regressions to examine possible determinants of IPO underpricing during our sample period. We assess the significance of our independent variables based on White's heteroscedasticity-consistent chi-square test. The dependent variable is the IPO underpricing and is calculated as the offer to close return adjusted for the market return from the subscription close day to the listing day. We run the following five initial regressions:

$$\begin{aligned}
 \text{IPO underpricing} = & \alpha + \beta_1 L_WIP + \beta_2 \text{Fixed} + \beta_3 \text{VC} + \beta_4 \text{Midpoint} + \beta_5 \text{Size} \\
 & + \beta_6 \left(\frac{D}{E} \right) + \beta_7 \text{Group} + \beta_8 \text{UndRep} + \beta_9 \text{Percent_sold}.
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 \text{IPO underpricing} = & \alpha + \beta_1 \text{Analyst} + \beta_2 \text{Fixed} + \beta_3 \text{VC} + \beta_4 \text{Midpoint} + \beta_5 \text{Size} \\
 & + \beta_6 \left(\frac{D}{E} \right) + \beta_7 \text{Group} + \beta_8 \text{UndRep} + \beta_9 \text{Percent_sold}.
 \end{aligned} \tag{2}$$

$$\begin{aligned}
\text{IPO underpricing} = & \alpha + \beta_1 \text{IPO grade} + \beta_2 \text{Fixed} + \beta_3 \text{VC} + \beta_4 \text{Midpoint} + \beta_5 \text{Size} \\
& + \beta_6 \left(\frac{D}{E}\right) + \beta_7 \text{Group} + \beta_8 \text{UndRep} + \beta_9 \text{Percent_sold}.
\end{aligned} \tag{3}$$

$$\begin{aligned}
\text{IPO underpricing} = & \alpha + \beta_1 \text{TOT} + \beta_2 \text{Fixed} + \beta_3 \text{VC} + \beta_4 \text{Midpoint} + \beta_5 \text{Size} \\
& + \beta_6 \left(\frac{D}{E}\right) + \beta_7 \text{Group} + \beta_8 \text{UndRep} + \beta_9 \text{Percent_sold}.
\end{aligned} \tag{4}$$

$$\begin{aligned}
\text{IPO underpricing} = & \alpha + \beta_1 L_{WIP} + \beta_2 \text{Analyst} + \beta_3 \text{IPO grade} + \beta_4 \text{TOT} + \beta_5 \text{Fixed} \\
& + \beta_6 \text{VC} + \beta_7 \text{Midpoint} + \beta_8 \text{Size} + \beta_9 \left(\frac{D}{E}\right) + \beta_{10} \text{Group} \\
& + \beta_{11} \text{Undrep} + \beta_{12} \text{Percent_sold}.
\end{aligned} \tag{5}$$

In each of our first four models, we isolate one variable that has the potential to reduce information asymmetry associated with the issue. We define each of these variables as follows: *L_WIP* is the difference between the last posted ask price in the when-issued market and the upper bound of the price band for the IPO divided by the upper bound. *Analyst* is the average analyst recommendation for all analysts providing recommendations for the issue. *IPO grade* is the IPO grade assigned by rating agencies from 5 to 1 with 5 being the best rating. *TOT* is the total subscription rate for the issue. In Model 5, we include all of our variables of interest.

In each of our models, we include the following control variables. *Fixed* is a dummy variable that equals one if the firm adopted a fixed price offer and zero otherwise. *Midpoint* is the average of the lower and upper prices of the issue price band. We include the midpoint as a control variable as Fernando, Krishnamurthy, and Spindt (2004) have shown that there is a systematic relationship between the issue price set for an IPO and underpricing. *Size* is the log of total assets. *D/E* is the ratio of debt to equity. *Group* is a dummy variable that is equal to one if the issuing company is group affiliated, and zero otherwise. *UndRep* is a dummy variable that is equal to one if the lead underwriter in the IPO has underwritten at least INR 10,000 million

(USD 200 million) during our sample period, and zero otherwise.⁷ *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in an IPO.

The results are presented in Table 5. Column (1) results indicate that there is a significant and positive relationship between *L_WIP* and IPO underpricing. This result indicates that for issues in which the WI premium is higher as a percentage of the issue price, their shares are likely to experience higher underpricing. The grey market exists only if buyers believe that there is an opportunity to sell the issue at a higher price when the issue is listed. Since the buyer is paying a price higher than the offer price, the buyer must be confident that the issue will be underpriced and that the issue will be oversubscribed such that they will not be able to purchase their desired number of shares during the subscription period. Our results are consistent with this explanation. Those issues with the highest WI premiums generate the greatest first-day returns, in line with the correlation results in Table 3. These results support our H₅.

<Insert Table 5 here>

In Column (2) of Table 3, we examine the relationship between analyst recommendation and underpricing. We find that the recommendation variable is insignificant. Similarly, in column (3) we find that *IPO grade* variable is insignificant. The coefficients of control variables such as *Size*, *UndRep*, and *Percent_sold* are all significantly negative for both models.

In Column (4) of Table 3, the results indicate that total subscription rates (*TOT*) are highest for those issues that have the greatest underpricing. In unreported results, when substituting subscription rates of institutional investors, retail investors, and high net worth investors for total subscription rates, each of the investor subscription rate categories is also

⁷ Our measure of underwriter reputation is the same as that used by Neupane and Poshakwale (2012). We also define the underwriter reputation variable as taking a value of one if the underwriter is in the top five based on issue size of all underwriters during a given year, and zero otherwise. Our results are robust to this second measure.

significantly related to underpricing. This result is in line with the correlation results in Table 3. It appears from these results that the structure of the Indian IPO market successfully reduces the informational disadvantage of retail investors.

When all of our variables of interest are included in Model 5, we find that total subscription rates (*TOT*) do not affect underpricing. However, in this regression we include *L_WIP* as an explanatory variable. Since the last data collected in the when-issued market occurs after the subscription period, we posit that *TOT* is insignificant in this regression because the information obtained about the IPO during the subscription period is incorporated into the subsequent when-issued price.⁸ We examine this issue shortly.

Across all of our models, we find that companies that adopt a fixed-price offer, instead of the bookbuilding approach, experience higher underpricing. This result is consistent with the findings from Khurshed, Pande, and Singh (2009) and Neupane and Poshakwale (2012) that the transparency of the bookbuilding process helps alleviate the winner's curse problem for retail or non-institutional investors. Since firms that adopt a fixed-price offer suffer from the winner's curse problem, the higher underpricing is understandable. We also find that there is a significant negative relationship between *UndRep* and *underpricing*. This suggests that underwriters of higher quality are associated with lower underpricing, which is consistent with the certification role that underwriters play in the IPO process.

Remember that the first when-issued price is quoted prior to the subscription period and therefore cannot be influenced by subscription rates. The last when-issued price is quoted well after the subscription period is over. Pricing by participants in this market at this time may be affected by the demand for shares during the subscription period. To determine whether grey market prices that are quoted after the subscription period is over are dependent on subscription

⁸ Replacing *TOT* with investor subscription categories (*QIB*, *RII*, *NII*) generates similar results.

rates, we run an OLS regression in which the dependent variable is the change in the when-issued premium. This variable is calculated as the first quoted when-issued ask price immediately subsequent to the subscription period minus the last quoted when-issued ask price immediately before the subscription period divided by the last quoted when-issued ask price immediately before the subscription period. Note that we only include in our sample those IPOs that have a when-issued price quoted prior to the start of the subscription period. The independent control variables we use are the same as those in the previous regressions. The primary independent variable of interest is the subscription rates of the various investor types.

Table 6 provides the results of this analysis. In Column (1), the total subscription rate, *TOT*, is included as an independent variable. As expected, we find that the total subscription rate is a positive and significant determinant of the change in the when-issued premium, supporting our H₃. As investors demand a greater number of shares in the IPO during the subscription period, grey market prices are also driven up in anticipation of greater underpricing when the IPO is listed. We also find that grey market prices tend to change more for larger issues and that there is a negative relationship between the change in when-issued prices and the IPO grade. The last result could be because investors initially view IPOs with low grades as undesirable, but after information about the IPO regarding subscriptions emerges during the subscription period, investors may bid up the price for these issues in the grey market. Subsequent analyses confirm this reasoning. In Columns 2 – 4 in Table 6, we use institutional subscription rates, *QIB*, high net worth individual investor subscription rates, *NII*, and retail individual investor subscription rates, *RII*, respectively, as an independent variable instead of *TOT*. Our results are qualitatively similar when examining investor categories individually as the coefficients of all subscription rates are significantly positive.

<Insert Table 6 here>

Although these results provide some evidence that investors are able to invest in those issues in which first-day returns are greatest, the question as to whether the mechanisms discussed are necessarily information asymmetry reducing remains unclear. In order to address this issue, we must first understand the temporal sequence of events. Of the mechanisms discussed, the IPO grading takes place well before any of the others and before the issue price band is fixed. Therefore, IPO grading has the potential to reduce information asymmetry, as well as to influence the offer price band set by the firm. Therefore, of the five mechanisms, this is the only one that can influence underpricing through its effect on the offer price band. All other mechanisms occur nearer the IPO list date when the offer price band has already been set. These mechanisms can reduce information asymmetry but the effect can only be evidenced by differences in subscription rates and first day trading activity. We have already reported a significantly positive relation between subscription rates and underpricing.

Analyst recommendations are typically provided 6 to 8 days prior to the subscription period. Using medians, the grey market activity starts four days prior to the beginning of the subscription period and ends one day prior to the list date. Therefore, an early (pre-subscription) WI premium can influence subscription rates and may serve as an information asymmetry-reducing mechanism between retail and institutional investors. The subscription period lasts for an average of 4 days and is usually about 20 days prior to the list date. Grey market activity continues well after the subscription period is over, at least during our sample period.

To examine the temporal sequence of events and its effects on information asymmetry and on underpricing, we conduct tests that examine our data more closely using the following rationale. Since we assume that retail investors have the greatest information disadvantage,

information about upcoming issues can affect their decision to subscribe if this information enters the market prior to the subscription decision. Therefore, we expect that there will be a positive relationship between high analyst recommendations and retail investor subscription rates, between IPO grades and retail subscription rates, and between WI premiums that occur prior to the subscription period and retail investor subscription rates. To examine the last of these issues, we partition our WI premium data based on whether the premiums are quoted prior to or during/after the subscription period.

We examine these same issues with institutional investor subscription rates. Here we assume that these investors are informed and therefore should be less influenced by these mechanisms. Aussenegg, Pichler, and Stomper (2006) find that retail investors and smaller institutions are the major participants in the when-issued market. Dorn (2009) finds that retail investors consistently overpay for IPOs in the grey market relative to the immediate aftermarket. Both studies examine the German IPO market, while we provide additional evidence from the Indian IPO market.

From our previous results, we know that the total subscription rate is a significant explanatory variable in the underpricing of the issue. Since subscription rates provide an indication of the demand for the issue, this finding is expected since issuing firms rarely set an offer price that is higher than the upper price of the issue price band. Therefore, they may not be able to increase the price enough to alleviate the demand pressure that surfaces as higher underpricing on the list date. Of the 260 IPOs in our sample, 177 (68%) firms set an issue price that is equal to the upper price.

During the subscription period, retail investors, who are expected to be at an informational disadvantage, can mimic the actions of the institutional investors as daily

subscription rates of each investor type are made public. Khurshed, Pande, and Singh (2009) confirm this conjecture by showing that retail investors do follow the subscription patterns of institutional investors.

However, analyst recommendations, IPO grading, and the when-issued quotes appear prior to the subscription period. Therefore, we contend that these mechanisms may be determinants of subscription rates, which would suggest that these mechanisms influence underpricing through their impact on subscription rates. We posit that those issues that are highly regarded by analysts, that have high IPO grades, and that have large when-issued premiums will be highly regarded by investors, driving up demand for these issues and thus driving up subscription rates. Demand pressure then results in higher underpricing for these issues. In other words, we posit that the subscription rate is an endogenously-determined explanatory variable for *underpricing* and can be instrumented by analyst recommendations, IPO grading, and when-issued premiums.

To examine this issue, we run a set of 2SLS regressions based on the temporal sequence of events. The Hausman test suggests that the 2SLS specification is more appropriate than the OLS specification for our models. Table 7 presents the 2SLS regression results. In Panel A we present the first-stage results. In these models, based on our discussion earlier, we include the first WI premium, analyst recommendation, and IPO grade as instrumental variables. Since they are available to investors prior to the subscription period, these variables could inform investors of the quality and demand of the IPO and thus drive subscription rates. We posit that the impact of these variables on IPO underpricing occurs indirectly through their effect on subscription rates and thus serve as appropriate instruments in our model. The remaining variables in our first and

second stages of the 2SLS specification are the same control variables as used previously and consistent with those used in the literature.

<Insert Table 7 here>

We find that the WI premium prior to the subscription period is significant and positively related to the subscription rates of every investor category. This provides strong support for our H₂ and the contention that the grey market is informative to investors about the demand for the issue, regardless of the type of investors. Since this appears prior to the subscription period, it levels the playing field across investor types. IPO grades have no influence on subscription rates; there is a marginal positive relationship between analyst recommendations and high net worth investors' subscription rates. For this subset of investors, they subscribe more to those issues that have a higher analyst recommendation. We also find that there is a strong positive relationship between VC backing and subscription rates, as well as a strong negative relationship between the percentage of equity that the owners relinquish in the IPO and subscription rates for all investor categories, which is understandable because the high percentage of insider selling sends out a negative signal to the market. Interestingly, high net worth investors are only marginally influenced by insider selling. Retail individual investors' subscription rates are also significantly higher for fixed price issues. We find that issue size, the size of the company or group affiliation do not significantly influence subscription rates for any of the investor categories.

In the second stage of the 2SLS regressions with the predicted subscription rate as an independent variable, we find again that the subscription rates for all investor categories are higher with higher underpricing. We find that *UndRep* and *Percent_sold* are negative and significant at the 5% level for all investor categories, suggesting that those issues in which a

more reputable lead underwriter is involved result in lower underpricing and that those issues in which insiders relinquish a greater percentage of ownership also result in lower *underpricing*. The latter finding is consistent with the findings and theoretical arguments in Habib and Ljungqvist (2001). They argue and find that insiders that stand to lose more wealth during an IPO, i.e., one in which they sell a greater percentage of their ownership, will take actions to promote the issue to reduce underpricing. Our findings are also consistent with our OLS results.⁹

We know from the first set of OLS regressions that the higher the subscription rates, the higher the *underpricing*. The first stage of the 2SLS confirms that the first when-issued premium provides information to all potential investors such that higher premiums are associated with higher subscription rates. What is surprising is that the *IPO grade* is not a significant predictor of the subscription rates. Perhaps this information is being captured in the when-issued premium, which is after the offer price has been set. We examine this issue by running an OLS regression where the dependent variable is the when-issued premium. The results are presented in Table 8. In Column (1), the dependent variable is the first when-issued premium available as a percentage of the upper issue price bound. In Column (2), the dependent variable is the last when-issued premium available as a percentage of the upper issue price bound. We find that the higher the *IPO grade*, the higher the initial when-issued premium, supporting our H₁. However, by the end of the grey market the *IPO grade* is no longer significant with respect to the when-issued premium. This suggests that information in the *IPO grade* is impounded in the first when-issued premium and therefore is not a separate determinant of subscription rates.¹⁰

⁹ In unreported results, we find that during the period in which firms had the option of being graded, an indicator variable that reflects this option was negative and marginally significant. This suggests that firms that chose to be graded had marginally lower underpricing.

¹⁰ Because of data availability, sample sizes vary across our OLS regression models. We re-run our tests using constant sample sizes and find that the results continue to hold.

<Insert Table 8 here>

The coefficient of the variable *Analyst* is not significant. Although we report positive and significant correlation between analysts' recommendations and the first when-issued premium in Table 3, the significant relation goes away after controlling for other factors such as *IPO grade* and VC backing in the OLS regression model. Since analyst recommendation is also significantly correlated with IPO grade, as reported in Table 3, it appears that the impact on the first when-issued premium is coming from the *IPO grade*, not analyst recommendation. This evidence does not support our H₄.

6. Conclusions

The Indian IPO market has a series of potential asymmetric information reduction activities that can influence investors that may have an informational disadvantage. These activities are not mutually exclusive and appear in set sequential order. One activity is highly regulated (the bookbuilding process), one was originally encouraged but is now mandated (grading), one is unregulated (the grey market), and one is at the discretion of brokers (analysts' recommendation). In addition, a firm may be affiliated with other firms or the IPO may be backed by VCs.

Our investigation finds that the information in the sequence of events has a significant impact on reducing the asymmetric information between potential investors. The mandated IPO grading has reduced the level of underpricing in the Indian IPO market, and also has signaled the potential for retail investors to subscribe to higher underpriced issues. This signal is then transmitted through the grey market with the initial when-issued price premium. Retail investors

see that high grades and high when-issued premiums signal higher underpricing and increase their subscription rates for these issues. In addition, both institutional investors and high net worth individuals increase their subscription rates for these issues as well.

These mechanisms make the Indian IPO market quite distinct. The mechanisms have lowered the overall underpricing in the Indian markets. They have also allowed the reduction of asymmetric information across all potential investors so that retail traders can and apparently do enjoy the same level of underpricing as large institutional investors, alleviating the winner's curse. The question remains though, will employment of some of these mechanisms in other markets help to reduce information asymmetry and ultimately underpricing as it has in India? This would be beneficial from the issuer's and buyer's perspectives in many markets, including the U.S, which currently does not allow a grey market for IPOs or the use of IPO grading.

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Table 1. Number of IPOs

This table reports the number of IPOs by issue years. We also classify IPOs by categories such as *Bookbuilding*, *Grading*, *VC-backed*, *Group affiliation*, and *WI trading*.

Year	# of IPOs	<i>Bookbuilding</i>		<i>Grading</i>		<i>VC-backed</i>		<i>Group affiliation</i>		<i>WI trading</i>	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
2007	91	79	12	16	75	48	43	11	80	42	49
2008	41	37	4	37	4	14	27	4	37	35	6
2009	17	17	0	16	1	4	13	3	14	14	3
2010	66	65	1	65	1	20	46	7	59	57	9
2011	39	37	2	39	0	2	37	6	33	23	16
2012	6	5	1	5	1	1	5	0	6	3	3
Total	260	240	20	178	82	89	171	31	229	174	86

Table 2. Summary statistics

This table reports summary statistics of our IPO sample. *Open (close) price* is the first (last) price on the listing day. *O_C days* is the number of days from the issue open day to the issue close day where issue open (close) day is the first (last) day of the subscription period. *C_L days* is the number of days from the issue close day to the listing day. *F_O days* is the number of days from the first available when-issued quote to the issue open day. *L_L days* is the number of days from the last available when-issued quote to the listing day. *Issue size* is in units of INR 10,000,000s where INR 10,000,000 is equivalent to USD 200,000. *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in the IPO. *First WI price to open (close) return* is the return calculated from the first available when-issued ask price to the listing day open (close) price. *Last WI price to open (close) return* is the return calculated from the last available when-issued ask price to the listing day open (close) price. *Offer-open return* is the return calculated from the offer price to the first opening price. *Offer-close return* is the return calculated from the offer price to the first closing price. *Underpricing* is the offer-close return adjusted for market returns from the issue close day to the listing day. *T*-test and Wilcoxon signed rank test are used to determine the level of significance for means and medians, respectively. ***, **, and * indicate that the return is significantly different from zero at the 1%, 5%, and 10% levels, respectively.

Panel A: Basic characteristics

	<i>Offer price</i>	<i>Open price</i>	<i>Close price</i>	<i>O_C days</i>	<i>C_L days</i>	<i>F_O days</i>	<i>L_L days</i>	<i>Issue size</i>	<i>Percent_sold</i>
<i>N</i>	260	260	260	260	260	95	111	260	260
Min	10	9.5	5.2	2	11	1	1	21	0.0699
Max	1310	1655	1709.4	11	174	101	32	15199.44	0.6996
Mean	184.58	212.83	217.36	3.92	19.72	5.45	2.82	396.25	0.2762
Median	119	128.85	131.72	3	20	4	1	82.5	0.2536
St. Dev.	186.81	232.78	244.97	1.85	10.7	8.83	4.52	1328.79	0.1269

Panel B: Returns

	<i>First WI price to open return</i>	<i>First WI price to close return</i>	<i>Last WI price to open return</i>	<i>Last WI price to close return</i>	<i>Offer-open return</i>	<i>Offer-close return</i>	<i>Underpricing</i>
<i>N</i>	158	158	170	170	260	260	260
Min	-0.6135	-0.7833	-0.6011	-0.7317	-0.5392	-0.8551	-0.8237
Max	0.5625	1.7265	0.2037	1.5775	1.575	2.8625	2.809
Mean	-5.95%***	-0.0395	-5.02%***	-0.0266	13.13%***	16.23%***	16.58%***
Median	-6.97%***	-11.94%***	-3.49%***	-8.03%***	5.23%***	5.55%**	4.64%**
St. Dev.	0.1812	0.3744	0.1026	0.3241	0.2429	0.5042	0.4972

Table 3. Correlation matrix

This table reports the correlation matrix for our key variables. The following are variable definitions. *Offer-open return* is the return calculated from the offer price to the first opening price; *Offer-close return* is the return calculated from the offer price to the first closing price; *Underpricing* is the offer-close return adjusted for market returns from the issue close day to the listing day; *VC*: Dummy variable, 1 if the firm is VC-backed and 0 otherwise; *Issue size* is in units of INR 10,000,000s where INR 10,000,000 is equivalent to USD 200,000; *IPO grade* is the grade of the IPO firm in a scale from 1 to 5, with 5 being the best; *Group*: Dummy variable, 1 if the firm is affiliated with a group of Indian firms and 0 otherwise; *QIB*: Subscription rate for qualified institutional investors; *NII*: Subscription rate for high net worth individuals; *RII*: Subscription rate for retail individual investors; *EMP*: Subscription rate for employees of the IPO firm; *TOT*: Subscription rate for all investors; *Analyst*: Average analyst recommendation, 2 if subscribe recommendation, 0 if do not subscribe, and 1 otherwise; *F_WIP*: The first WI premium, which is equal to the first WI ask price in the grey market minus the upper price bound scaled by the upper price bound; *L_WIP*: The last WI premium, which is equal to the last WI ask price in the grey market minus the upper price bound scaled by the upper price bound; *Percent_sold*: Percentage of the total equity of the firm that the insiders sell in the IPO. ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

	<i>Offer-open return</i>	<i>Offer-close return</i>	<i>Underpricing</i>	<i>VC</i>	<i>Issue size</i>	<i>IPO grade</i>	<i>Group</i>	<i>QIB</i>	<i>NII</i>	<i>RII</i>	<i>EMP</i>	<i>TOT</i>	<i>Analyst</i>	<i>F_WIP</i>	<i>L_WIP</i>	<i>Percent_sold</i>
<i>Offer-open return</i>	1	0.566***	0.546***	-0.034	-0.005	0.030	0.008	0.651***	0.741***	0.736***	0.111	0.754***	0.152**	0.465***	0.805***	-0.120*
<i>Offer-close return</i>		1	0.992***	-0.030	-0.026	-0.041	-0.033	0.387***	0.495***	0.550***	0.058	0.483***	0.016	0.266***	0.621***	-0.033
<i>Underpricing</i>			1	-0.050	-0.032	-0.056	-0.019	0.385***	0.494***	0.553***	0.051	0.483***	0.007	0.276***	0.626***	-0.028
<i>VC</i>				1	0.213***	0.041	-0.078	-0.043	-0.018	-0.079	-0.029	-0.050	0.129	-0.110	-0.090	-0.040
<i>Issue size</i>					1	0.283***	0.166***	0.073	-0.010	-0.088	-0.030	0.028	0.208***	-0.067	-0.020	-0.114*
<i>IPO grade</i>						1	0.226***	0.323***	0.249***	0.111	0.154	0.265***	0.567***	0.147**	-0.046	-0.481***
<i>Group</i>							1	0.099	0.079	0.048	-0.026	0.104	0.180***	0.030	0.055	-0.110
<i>QIB</i>								1	0.696***	0.595***	0.330***	0.926***	0.312***	0.408***	0.617***	-0.463***
<i>NII</i>									1	0.785***	0.191**	0.829***	0.334***	0.365***	0.735***	-0.278***
<i>RII</i>										1	0.130	0.780***	0.164**	0.504***	0.866***	-0.136**
<i>EMP</i>											1	0.595***	0.361***	-0.043	0.087	-0.328***
<i>TOT</i>												1	0.321***	0.482***	0.781***	-0.387***
<i>Analyst</i>													1	0.084	0.144*	-0.441***
<i>F_WIP</i>														1	0.506***	-0.114
<i>L_WIP</i>															1	-0.072
<i>Percent_sold</i>																1

Table 4. Underpricing and returns

This table reports the means and medians of returns and underpricing by categories. *Offer-open return* is the return calculated from the offer price to the listing day opening price. *Offer-close return* is the return calculated from the offer price to the listing day closing price. *Underpricing* is the offer-close return adjusted for market returns from the issue close day to the listing day. Panel B reports returns from the first and last WI prices to the listing day opening and closing prices by categories. *T*-test and Wilcoxon rank sum test are used to determine the level of significance of the difference for means and medians, respectively. ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

Panel A: Returns and underpricing

		<i>Offer-open return</i>		<i>Offer-close return</i>		<i>Underpricing</i>		
		<i>N</i>	Mean	Median	Mean	Median	Mean	Median
<i>Bookbuilding</i>	Yes	240	12.33%	5.05%	14.80%	5.55%	15.05%	4.64%
	No	20	22.71%	7.95%	33.47%	1.43%	34.80%	6.62%
	Difference		-10.38%*	-2.90%	-18.67%	4.12%	-19.75%*	-1.98%
<i>Grading</i>	Yes	178	8.57%	3.95%	10.65%	4.55%	11.11%	3.70%
	No	82	23.03%	15.38%	28.35%	8.91%	28.39%	5.83%
	Difference		-14.47%***	-11.43%***	-17.70%**	-4.36%	-17.28%***	-2.13%
<i>VC-backed</i>	Yes	89	25.09%	20.00%	28.83%	16.12%	27.84%	18.24%
	No	171	6.90%	2.44%	9.68%	-2.07%	10.68%	0.35%
	Difference		18.19%***	17.56%***	19.15%***	18.19%***	17.16%***	17.89%***
<i>Group affiliation</i>	Yes	31	13.44%	5.00%	11.68%	-3.94%	14.02%	3.52%
	No	229	13.09%	5.56%	16.85%	6.10%	16.93%	5.32%
	Difference		0.36%	-0.56%	-5.18%	-10.14%*	-2.91%	-1.80%
<i>WI trading</i>	Yes	174	13.92%	5.88%	17.27%	7.95%	15.99%	6.15%
	No	86	11.50%	4.74%	14.11%	-2.88%	17.50%	0.86%
	Difference		2.42%	1.14%*	3.16%	10.83%*	-1.51%	5.29%
<i>Analyst recommendation</i>	Positive	78	17.88%	7.79%	19.70%	5.96%	19.48%	4.32%
	Negative	155	10.66%	4.32%	15.47%	2.89%	16.21%	4.10%
	Difference		7.23%***	3.47%**	*4.23%	3.07%	3.28%	0.22%

Panel B: WI returns

		First WI price					Last WI price				
		<i>First WI price to open return</i>			<i>First WI price to close return</i>		<i>Last WI price to open return</i>			<i>Last WI price to close return</i>	
		<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>
<i>Bookbuilding</i>	Yes	146	-6.35%	-6.97%	-4.72%	-11.94%	160	-4.86%	-3.49%	-3.31%	-7.82%
	No	12	-1.00%	-6.07%	5.35%	-5.52%	10	-7.58%	-2.41%	7.74%	-14.25%
	Difference		-5.35%	-0.90%	-10.07%	-6.42%		2.71%	-1.08%	-11.04%	6.43%
<i>Grading</i>	Yes	129	-5.87%	-7.60%	-5.97%	-12.81%	141	-5.35%	-3.69%	-4.70%	-8.23%
	No	29	-6.28%	-4.95%	5.01%	1.93%	29	-3.40%	0.00%	7.26%	-5.20%
	Difference		0.41%	-2.74%	-10.98%	-14.74%		-1.95%	-3.69%**	-11.96%*	-3.03%*
<i>VC-backed</i>	Yes	56	-0.40%	-1.40%	2.10%	-0.98%	62	-5.38%	-3.79%	-3.35%	-6.42%
	No	102	-8.99%	-8.92%	-7.28%	-14.95%	108	-4.81%	-3.44%	-3.99%	-8.62%
	Difference		8.59%	7.52%***	9.38%	13.97%**		-0.57%	-0.35%	0.66%	2.20%
<i>Group affiliation</i>	Yes	18	-7.13%	-13.56%	-11.78%	-16.53%	19	-8.44%	-8.43%	-9.77%	-14.60%
	No	140	-5.80%	-6.56%	-2.95%	-8.96%	151	-4.59%	-3.10%	-1.76%	-5.17%
	Difference		-1.33%	-7.00%	-8.83%	-7.57%		-3.85%	-5.33%**	-8.01%	-9.43%*
<i>Analyst recommendation</i>	Positive	68	-4.48%	-6.74%	-5.43%	-13.57%	65	-5.75%	-4.66%	-6.31%	-9.03%
	Negative	74	-6.11%	-6.97%	-1.26%	-4.08%	86	-4.71%	-3.16%	0.75%	-3.76%
	Difference		1.63%	0.23%	-4.17%	-9.49%		-1.04%	-1.50%*	-7.06%	-5.27%

Table 5. Determinants of IPO underpricing

This table reports the OLS regressions of the IPO underpricing. *Underpricing* is the offer-close return adjusted for market returns from the issue close date to the listing date. *TOT* is the total subscription rate. *L_WIP* is the last WI premium which is equal to the difference between the last posted ask price in the when-issued market and the upper bound of the price band for the IPO divided by the upper bound. *IPO grade* is the grade of the IPO firm in a scale from 1 to 5, with 5 being the best. *VC* is equal to one if the firm is backed by VCs and 0 otherwise. *Fixed* is a dummy variable that takes on a value of one in the event that the firm adopted a fixed-price offer, and 0 otherwise. *Midpoint* is the average of the lower and upper prices of the issue price band. *Size* is the log of total asset. *D/E* is the ratio of debt to equity. *UndRep* is equal to one if the lead underwriter in the IPO has underwritten at least INR 10,000 million (USD 200 million) during our sample period, and 0 otherwise. *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in the IPO. The significance levels are based on White's heteroscedasticity-consistent chi-square test. ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

Variables	<i>Underpricing</i>				
	(1)	(2)	(3)	(4)	(5)
<i>L_WIP</i>	0.824***				0.807***
<i>Analyst</i>		0.056			0.003
<i>IPO grade</i>			-0.029		0.015
<i>TOT</i>				0.009***	0.001
<i>Fixed</i>	0.287**	0.640*	0.166*	0.252**	0.605**
<i>VC</i>	-0.028	0.174*	0.063	-0.017	-0.051
<i>Midpoint</i>	0.000*	-0.000	0.000**	-0.000	0.000
<i>Size</i>	-0.005	-0.071**	-0.064**	-0.021	-0.030
<i>D/E</i>	0.011	0.039	0.055	0.004	0.002
<i>Group</i>	0.021	0.140	0.060	-0.014	0.013
<i>UndRep</i>	-0.099*	-0.268***	-0.112*	-0.148**	-0.176**
<i>Percent_sold</i>	0.001	-0.008**	-0.009**	0.001	-0.003
<i>Intercept</i>	-0.019	0.960***	0.701**	0.103	0.196
<i>Industry dummy</i>	Yes	Yes	Yes	Yes	Yes
F value	5.89***	1.94**	1.15	4.76***	3.73***
Adj. R ²	0.3509	0.0906	0.018	0.2447	0.3450
<i>N</i>	164	170	149	210	110

Table 6. Determinants of change in when-issued premium

This table reports the OLS regression where the dependent variable is the change in the when-issued premium, calculated as the first WI ask price immediately following the subscription period minus the last WI ask price immediately prior to the subscription period, divided by the last WI ask price immediately prior to the subscription period. *TOT* is the total subscription rate. *QIB*, *NII* and *RII* are the subscription rates by qualified institutional buyers, high net worth investors and retail investors, respectively. *IPO grade* is the grade of the IPO firm in a scale from 1 to 5, with 5 being the best. *Analyst* is the average rating provided by the analysts for the issue where ratings range from 2, for positive recommendations, to 0 for negative recommendations. *Issue size* is in units of INR 10,000,000s where INR 10,000,000 is equivalent to USD 200,000. *VC* is equal to one if the firm is backed by VCs and 0 otherwise. *Fixed* is a dummy variable that takes on a value of one in the event that the firm adopted a fixed-price offer, and 0 otherwise. *Midpoint* is the average of the lower and upper prices of the issue price band. *Size* is the log of total asset. *D/E* is the ratio of debt to equity. *UndRep* is equal to one if the lead underwriter in the IPO has underwritten at least INR 10,000 million (USD 200 million) during our sample period, and 0 otherwise. *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in the IPO. Model (1) uses total subscription rates as an independent variable, model (2) uses subscription rates of qualified institutional buyers (*QIB*), model (3) uses subscription rates of high net worth investors (*NII*), and model (4) uses subscription rates of retail investors (*RII*). ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)
<i>Intercept</i>	-0.0117	0.0046	0.0013	0.0105
<i>TOT</i>	0.0010***			
<i>QIB</i>		0.0006**		
<i>NII</i>			0.0008***	
<i>RII</i>				0.0015***
<i>Analyst</i>	0.0137	0.0161	0.0033	0.0128
<i>Issue size</i>	0.0000	0.0000	0.0000	0.0000
<i>VC</i>	-0.0017	0.0044	-0.0117	0.0100
<i>Size</i>	0.0108**	0.0094*	0.0129***	0.0079*
<i>D/E</i>	-0.0070	0.0004	-0.0021	0.0012*
<i>IPO grade</i>	-0.0275**	-0.0268**	-0.0309**	-0.0278**
<i>Fixed</i>	0.0498	0.0633**	0.0558*	0.0325
<i>Midpoint</i>	-0.0000	-0.0000	-0.0000	0.0000
<i>Group</i>	0.0027	0.0052	0.0038	-0.0009
<i>Percent_sold</i>	0.0000	-0.0002	-0.0000	-0.0003
<i>UndRep</i>	-0.0506	-0.0533	-0.0441	-0.0441
<i>Industry dummy</i>	Yes	Yes	Yes	Yes
F value	4.12***	3.00***	4.72***	5.39***
Adj. R ²	0.2323	0.2211	0.2806	0.2196
<i>N</i>	84	84	84	84

Table 7. 2SLS regressions

This table reports the 2SLS regressions. Subscription rates are used as the endogenous variable and IPO underpricing is the offer price to listing date closing price return adjusted for market returns from the issue close date to the listing date. *Analyst* is the average rating provided by the analysts for the issue where ratings range from 2, for positive recommendations, to 0 for negative recommendations. *F_WIP* is the first WI premium which is equal to the difference between the first posted ask price in the when-issued market and the upper bound of the price band for the IPO divided by the upper bound. *IPO grade* is the grade of the IPO firm in a scale from 1 to 5, with 5 being the best. *VC* is equal to one if the firm is backed by VCs and 0 otherwise. *Issue size* is in units of INR 10,000,000s where INR 10,000,000 is equivalent to USD 200,000. *Fixed* is a dummy variable that takes on a value of one in the event that the firm adopted a fixed-price offer, and 0 otherwise. *Size* is the log of total asset. *D/E* is the ratio of debt to equity. *Midpoint* is the average of the lower and upper prices of the issue price band. *UndRep* is equal to one if the lead underwriter in the IPO has underwritten at least INR 10,000 million (USD 200 million) during our sample period, and 0 otherwise. *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in the IPO. Panel A provides the first stage regression results. Panel B provides the second stage regression results where the predicted subscription rate (*Pred subscript*) is included as one of the independent variables. Model (1) uses total subscription rates, model (2) uses subscription rates of qualified institutional buyers (QIBs), model (3) uses subscription rates of high net worth investors (NII), and model (4) uses subscription rates of retail investors (RII). ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

Panel A: First stage

Variables	(1)	(2)	(3)	(4)
Instruments				
<i>F_WIP</i>	43.047***	49.525**	51.032*	23.834**
<i>Analyst</i>	0.183	-2.691	11.173*	0.525
<i>IPO grade</i>	-0.573	-1.759	4.992	0.118
Control variables				
<i>VC</i>	24.166***	30.621***	40.512***	8.618***
<i>Issue size</i>	-0.001	-0.001	-0.002	-0.001
<i>Size</i>	-1.111	-1.122	-3.788	0.017
<i>D/E</i>	3.731*	4.430*	6.554**	1.822
<i>Fixed</i>	16.549**	14.684	6.621	22.676***
<i>Midpoint</i>	0.021**	0.034**	0.012	-0.001
<i>Group</i>	12.138	14.003	15.365	7.162
<i>Percent_sold</i>	-0.545***	-0.727***	-0.562*	-0.240**
<i>UndRep</i>	-3.960	1.161	-14.039	-7.393**
<i>Intercept</i>	18.175	22.874	16.221	8.954
F value	7.72***	7.59***	4.85***	4.81***
Adj. R ²	0.4645	0.4596	0.3316	0.3298
<i>N</i>	94	94	94	94

Panel B: Second stage

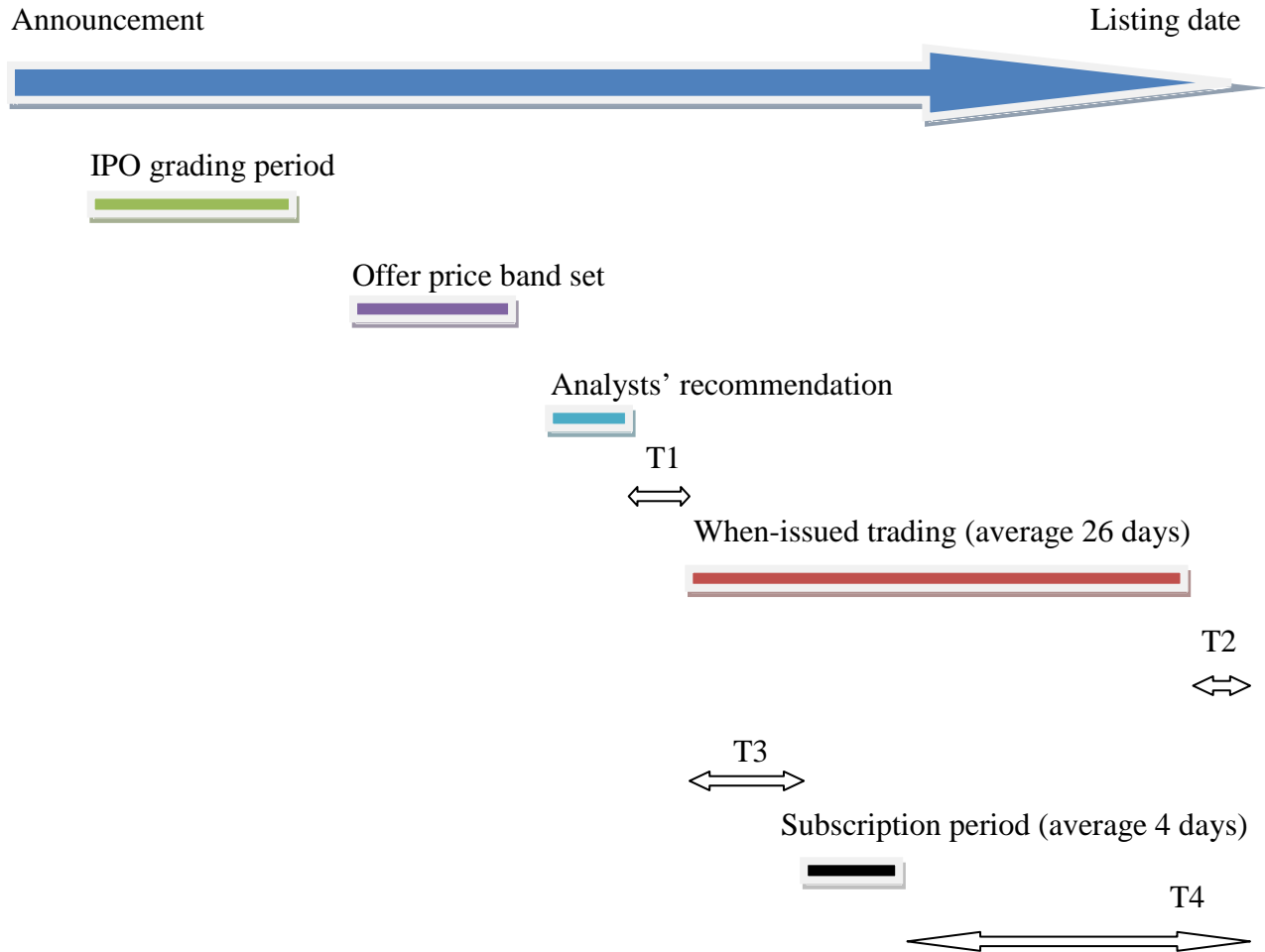
Variables	(1)	(2)	(3)	(4)
<i>Pred subscript</i>	0.006**	0.004***	0.004**	0.013**
Control variables				
<i>VC</i>	0.056	0.011	0.047	0.052
<i>Issue size</i>	0.000	0.000	0.000	0.000
<i>Size</i>	-0.048*	-0.036	-0.053**	-0.044*
<i>D/E</i>	0.044*	0.038	0.046*	0.044*
<i>Fixed</i>	0.512	0.472	0.548	0.482
<i>Midpoint</i>	0.000	0.000	0.000	0.000
<i>Group</i>	-0.007	-0.036	-0.011	0.001
<i>Percent_sold</i>	-0.011***	-0.010**	-0.011***	-0.011***
<i>UndRep</i>	-0.224**	-0.211**	-0.222**	-0.201**
<i>Intercept</i>	0.582***	0.547**	0.597**	0.553**
<i>Industry dummy</i>	Yes	Yes	Yes	Yes
F value	2.61***	3.63***	2.62***	2.67***
Adj. R ²	0.1477	0.2114	0.1480	0.1525
<i>N</i>	94	94	94	99

Table 8. OLS regression: WI premium

This table reports the results of OLS regressions where the dependent variable is the WI premium. In model (1), the WI premium used is F_WIP which is equal to the difference between the first posted ask price in the when-issued market and the upper bound of the price band for the IPO divided by the upper bound. In model (2), the WI premium used is L_WIP which is equal to the difference between the last posted ask price in the when-issued market and the upper bound of the price band for the IPO divided by the upper bound. *Analyst* is the average rating provided by the analysts for the issue where ratings range from 2, for positive recommendations, to 0 for negative recommendations. *Issue size* is in units of INR 10,000,000s where INR 10,000,000 is equivalent to USD 200,000. *IPO grade* is the grade of the IPO firm in a scale from 1 to 5, with 5 being the best. *VC* is equal to one if the firm is backed by VCs and 0 otherwise. *Size* is the log of total asset. *D/E* is the ratio of debt to equity. *UndRep* is equal to one if the lead underwriter in the IPO has underwritten at least INR 10,000 million (USD 200 million) during our sample period, and 0 otherwise. *Percent_sold* is the percentage of the total equity of the firm that the insiders sell in the IPO. ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)
<i>Intercept</i>	0.445**	0.597***
<i>Analyst</i>	-0.005	0.005
<i>Issue size</i>	0.000	0.000
<i>VC</i>	0.156**	0.182***
<i>Size</i>	-0.064***	-0.063***
<i>D/E</i>	0.029	0.042
<i>IPO grade</i>	0.068**	0.023
<i>UndRep</i>	0.074	-0.002
<i>Percent_sold</i>	-0.006*	-0.008**
<i>Industry dummy</i>	Yes	Yes
F value	2.11**	3.34***
Adj. R ²	0.1754	0.2771
<i>N</i>	95	111

Figure 1. Indian IPO sequence of events



Note: T1 represents the days between the Analysts' recommendation and the start of When-issued trading and ranges from 1 to 3 days. T2 covers the days between the end of When-issued trading and the Listing date and has an average (median) length of 3 (1) days. T3 represents the days between the start of When-issued trading and the Subscription period and has an average (median) length of 5 (4) days. T4 is the time from the end of the Subscription period to the Listing date and has an average (median) length of 20 (20) days.