

# Pre-IPO Demand and Underpricing in India-An Empirical Study

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## Abstract

*Purpose* The purpose of this study is to identify the Initial Underpricing/Overpricing in India during the study period and the role of subscription level in explaining this anomaly. Compared to the previous studies which concentrate only on the overall subscription, this study examines the subscription level among various categories of investors and its impact on underpricing. *Design/Methodology*: Using a sample of 236 IPOs listed on the National Stock Exchange of India during the twelve-year period from 2009-2020, applying Ordinary Least Square Regression (Heteroscedasticity Consistent Model), the Market Adjusted Average Return (Initial Underpricing) is regressed across independent variables of Subscription levels in Investor categories. Three categories of investors are Qualified Institutional Buyers, Non-Institutional Investors, and Retail Individual Investors. The firm-specific control variables such as firm age, Firm size, and return on net worth for the last three years prior to the IPO year are taken as control variables. The difference in MAAR among the overall subscription-level quartiles was tested using ANOVA. E views 9 software was used along with MS Excel to consolidate and analyse the data. Tables and diagrams were also used to present the data more clearly and precisely. *Findings* The major finding of this study include initial underpricing in the Indian capital market is 14.44%. The underpriced issues were oversubscribed substantially. The results of the study clearly indicate a strong positive relationship between overall subscription and underpricing of IPOs. The study found a significant association between subscription rates in QIB and RII categories but no significant relationship between the subscription level of NII with the level of underpricing. *Research Implications* The results show a strong positive relation of subscription levels among QIB and RII categories and initial returns which has a predictive power in determining underpricing. This study contributes to the existing IPO literature by examining the components of subscription levels and their relationship with the degree of underpricing.

## Keywords

Underpricing, Heteroscedasticity Consistent Model, QIB, NII and RII, MAAR

## 1. Introduction

Underpricing of shares results when a company offers its shares in an initial public offer at a price less than the market expectation

on the first day of trading (Brau & Fawcett, 2006; Ritter, 1991b). Literature reports underpricing as evident in all markets, both developed and emerging. (Ljungqvist, 2007) reported that

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average underpricing was 21% during 1960's, 12% in 1970s, 16% in the 1980's and 21% in the 1990s and according to Ritter, it was 18.9% during 2000-2021 in the U.S market ([https://site.warrington.ufl.edu/ritter/files/IP Os-Underpricing.pdf](https://site.warrington.ufl.edu/ritter/files/IP%20Os-Underpricing.pdf)). Similar findings were reported by (Jenkinson & Ljungqvist, 2001; Ritter, 1991a; Welch, 1992; Welch & Ritter, 2002); also studies on emerging markets as reported by (Hermin & Murhadi, 2015) in Indonesia (Aissia & Hellara, 2019) in France, (R. Islam, 2014) and (Md. A. Islam et al., 2010) in Bangladesh, (Yu & Tse, 2006; J. Zhou & Lao, 2012; K. Zhou et al., 2020) in China, and (Badru & Ahmad-Zaluki, 2018) in Bursa Malaysia. Literatures which report wide spread underpricing in India include (Bansal & Khanna, 2013; Marisetty & Subrahmanyam, 2010; Mishra, 2012; Pande & Vaidyanathan, 2007; Seth et al., 2019; Singh & Kalra, 2019).

In line with international evidence, researchers found the Pre-IPO demand or the level of subscription as one of the most influencing factor on the degree of underpricing (Paudyal et al., 1998; Sandhu & Guhathakurta, 2020; Sehgal & Sinha, 2013; Singh & Kalra, 2019). Among various theories of underpricing, two theories namely, Winner's curse and Cascade are directly linked to the pre-IPO demand aspects. The level of subscription indicates the confidence of investors in the issuing company's future prospects. When the demand for securities in the new issue market is greater, then, there is a possibility of higher closing price on the listing day (Bansal & Khanna, 2012; Dhamija & Arora, 2017; Ghosh, 2004).

In India, SEBI categorised three classes of investors in IPO as Qualified Institutional Buyers (QIB), Non-Institutional Investors (NII), Retail Individual Investors (RII). Among the total shares offered, 50% reserved for QIBs, 15% for NIIs and not less than 35% are reserved for retail investors. The existing literature in India and abroad, consider the overall subscription level of the IPO for the purpose of study. But, the demand from various investor categories may differ. The

influence of different categories of investors on underpricing are unexplored yet. This paper tries to fill this gap by examining the impact of subscription level among three categories of investors on the level of underpricing in India.

This paper is organised in five sections. The first section introduces the problem, followed by the review of related literature in the second section. The third section provides materials and methods of the study and the fourth section substantiates the impact of Pre-IPO demand on the level of underpricing followed by a concluding section.

## 2. Review of Literatures

Numerous literatures are available on the determinants of underpricing in various economies around the globe. The determinants include firm specific characteristics like age of the firm, size of the firm, profitability, assets and debt-equity ratio (Bansal & Khanna, 2012; Clark, 2002; Sabarinathan, 2010; Singh & Kalra, 2019), and Issue specific characteristics like size of the issue, subscription level, PE ratio, intended uses of IPO proceeds etc. (Badru & Ahmad-Zaluki, 2018; Butler et al., 2014; Kumar & Sahoo, 2021; Sehgal & Sinha, 2013) among the various theories propounded by academicians in explaining the reasons for IPO underpricing. 'Winner's Curse' (Rock, 1986) and 'Informational cascades' (Welch, 1992) signify the role of subscription level and allocation of shares in determining the initial returns in any capital market. Various studies reported a significant positive relationship between level of subscription and underpricing in India also (Jain & Padmavathi, 2012; Sehgal & Sinha, 2013; Singh & Kalra, 2019). They considered the overall subscription level as a proxy for the pre-IPO demand along with other variables and found a significant relationship @1% level. However, studies investigating the variations in initial underpricing and the pre-ipo demand between different investor categories could not be found. So, the impact of subscription level in various categories was explored in detail in this study.

## Objectives

- 1) Analyse the degree of underpricing at various levels of overall subscription.
- 2) Examine the effect of pre-IPO demand among investor categories in explaining the underpricing of IPOs.

## 3. Materials and Methods

### 3.1 Data

The present study focuses on examining the impact of subscription level in three categories of investors on the underpricing of IPOs listed on National Stock Exchange during the twelve-year period from January 2009 through December 2020. The sample includes 236 mainstream IPOs listed on NSE. The closing share prices of companies are elicited from the official website of National Stock Exchange (NSE) <https://www1.nseindia.com> which are also supplemented with information available on the website <https://www.chittorgarh.com>. The data of subscription levels and firm size were collected from <https://www.chittorgarh.com> and other data were sourced from the Red Herring Prospectus filed with SEBI by the issuers.

### Variables and Hypotheses Development

#### 3.2.1 Dependent Variable-Underpricing (MAAR)

In line with previous literatures, (Krishnamurti & Kumar, 2002; Ljungqvist, 2007) Market Adjusted Average Return (MAAR) on the listing day is taken as the measure of underpricing. Firstly, we have computed the raw return of each security by taking the difference between the closing price on the listing day and the issue price. Then, the market return is computed by taking the difference between the NIFTY on the closing day of the offer and the listing day of the security. The difference between the raw return and the market return for each security is taken as the Market Adjusted Average Return (MAAR) which represents the value of underpricing.

#### 3.2.2 Independent Variables

In this study, underpricing (MAAR) is regressed across subscription levels in the three categories of investors, viz., Qualified Institutional Buyers, Non-Institutional Investors and Retail Individual Investors (Mahalakshmi et al., 2021). Subscription level is the ratio of the number of share applications received to the number of shares offered in each investor category (Gupta & Anand, 2020). The existing literature finds a significant positive relationship between overall subscription and the degree of underpricing (Bansal & Khanna, 2013; Singh & Kalra, 2019). Hence, the hypotheses of the present study are stated as:

- H1: There is a significant positive relation between subscription level in QIB category and underpricing.
- H2: There is a significant positive relation between subscription level in NII category and underpricing.
- H3: There is a significant positive relation between subscription level in RII category and underpricing.

#### 3.2.3 Control Variables

Based on the existing literature, firm specific factors including the firm's age (*age*), size (*size*) and return on net worth (*ronw*) were considered as control variables. To make standardisation and to avoid heteroskedasticity, the variable *size* was converted into their natural log.

##### 3.2.3.1 Firm's Age (*age*)

Following the previous literatures (Bansal & Khanna, 2012; Boehmer & Ljungqvist, 2004; Clark, 2002; Vetsuypens & Muscarella, 1989) firm's age is taken as the time gap (in years) between the year of founding of the company and the year of IPO issue.

##### 3.2.3.2 Firm size (*size*)

Many empirical studies (Butler et al., 2014; Chhabra et al., 2017; Kiyamaz, 2000; Loughran & Ritter, 2004) measure the size of the firm as the total assets reported in the last

balance sheet date just prior to the issue opening date.

### 3.2.3.3 Return on Net Worth (ronw)

The weighted average Return on Net Worth (in %) of the last three years of the IPO year for each firm is taken as a firm specific factor (Bansal & Khanna, 2013).

The data were compiled and arranged using M S Excel in proper form. For data analysis, EViews 9.0 software was used. The Ordinary Least Square (OLS) regression model is used to examine the impact of subscription levels on the degree of underpricing. The OLS model can be stated as:

$$MAAR = \alpha + \beta_1 subqib + \beta_2 subnii + \beta_3 subrii + \beta_4 age + \beta_5 lnsize + \beta_6 ronw + \epsilon_i$$

Where, MAAR = Market Adjusted Average Return, subqib = Subscription level in QIB category, subnii = Subscription level in NII category, subrii = Subscription level in RII category, age = firm's age, lnsize = Log of size of firm (Total Assets), ronw = Return on Net worth,  $\epsilon_i$  = Error term.

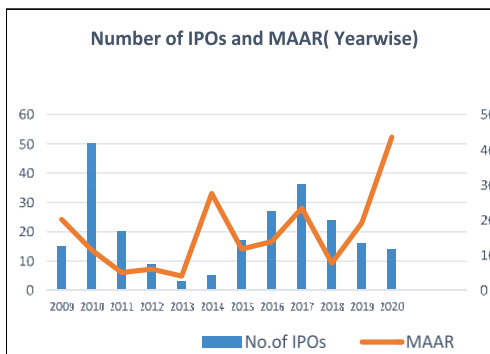
## 4. Data Analysis and Results

### 4.1 Level of underpricing

Previous studies reported a high level of underpricing in India during the 1990s (Shah, 1995) at 105.6% and 75.21% raw return reported by (Madhusoodanan & Thiripalraju, 1997). In this study, we found that the extent of underpricing is 14.44% in the Indian stock market and the difference between Raw return and Market Adjusted Average Returns on the listing day is 0.42%. Interestingly, this finding is in line with the average level of underpricing in different stock markets around the world as reported in Bhattacharya et al., 2020.

The year wise number of IPOs listed on NSE and the level of underpricing are shown in figure 1. The maximum number of IPOs listed was 50 during the year 2010 followed by the years 2017 and 2016. Similarly, the highest level of underpricing

was reported in the year 2020 with more than 43% MAAR.



Source: Authors computation

**Figure 1.** Year wise classification of Number of IPOs and Underpricing (MAAR)

### 4.2 Overall Subscription level and Underpricing

Overall subscription is the measure of the number of times the issue was subscribed in terms of the offer size. When the demand for securities in the new issue market is greater, then there is a possibility of higher closing price on the listing day (Dhamija & Arora, 2017; Sehgal et al., 2014; Sehgal & Singh, 2008). Therefore, this study enquired how the degree of underpricing is impacted by the change in the level of subscription. To know the pattern of subscription rate and the level of underpricing, the entire IPOs are partitioned based on the rate of subscription into four quartiles as under and the degree of underpricing is analysed across each quartile.

- Q1- Subscription rate less than 1.84 times (Least Subscription)
- Q2- Subscription rate between 1.84 to 6.14 times (Moderate Subscription)
- Q3- Subscription rate between 6.14 to 38.11 times (Higher Subscription)
- Q4- Subscription rate greater than 38.11 times (Highest Subscription)

**Table 1. Descriptive Statistics - Underpricing among Subscription level quartiles**

MAAR	SUBC-Q1	SUBC- Q2	SUBC-Q3	SUBC-Q4 (%)
Mean(%)	-3.95584	1.316144	13.9709	46.13661
Median (%)	-4.73158	1.298869	9.95295	33.12555
Maximum (%)	100.0139	75.69582	87.9514	142.5654
Minimum (%)	-79.3901	-65.9627	-20.5871	-0.42823
Std. Dev.	23.09095	26.68824	20.5618	35.73748
No. of IPOs	58	59	60	59

Source: Authors' calculation using secondary data

Table 1 shows 58 IPOs in Q1 category, 59 in Q2, 60 in Q3 and 59 IPOs in the Q4 category. The subscription was the highest in Q4. The average underpricing is increasing in each category of subscription from - 3.96% in the least subscribed category (Q1) to 46.14% in the highest subscribed category (Q4). This points out that the rate of subscription is likely to have a direct relationship with the level of underpricing. Therefore, the difference in the average level of underpricing at different levels of subscription was analysed using ANOVA.

Table 2 shows that the average level of underpricing is significantly different among four quartiles and within the quartiles. It can be inferred that there is a positive relation between underpricing and overall subscription level in India. Moreover, this result is also consistent with the earlier studies in India and abroad (Bhattacharya et al., 2020; Chong & Liu, 2020; Marisetty & Subrahmanyam, 2010; Perera & Com, 2014; Ritter, 1991b; Singh & Kalra, 2019).

**Table 2. Test for Equality of Means Between Series**

Method	df	Value	Prob.
Anova F-test	(3, 232)	40.3503	0.000***
Welch F-test*	(3,126.836)	29.6865	0.000***

\*Test allows for unequal cell variances  
Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	3	89078.52	29692.84
Within	232	170723.3	735.8765
<b>Total</b>	<b>235</b>	<b>259801.9</b>	<b>1105.54</b>

Source: Authors' calculation. \*\*\* indicates significant at 1% level

#### 4.2 Impact of level of Subscription among Investor categories on the Degree of Underpricing

The analysis of overall subscription level and underpricing gives an insight into the strong relationship, but the demand from different classes of investors could not be revealed. Academicians find a significant relationship between underpricing and level of subscription (Bansal & Khanna, 2012; Hawaldar et al.,

2018; Jain & Padmavathi, 2012; Loughran & Ritter, 2002; Sehgal & Sinha, 2013; Singh & Kalra, 2019). All of these studies consider the overall subscription level as a proxy for the pre-IPO demand. As mentioned earlier, Indian Investors are classified into three categories - QIB, NII and RII based on the amount of investment made in an IPO issue. The present study collected the subscription level data separately to investigate the impact of

subscription among three categories of investors on the level of underpricing.

For the purpose of testing the hypotheses, an OLS regression model has been used. Underpricing level was regressed with all the three explanatory variables along with firm specific control variables. Since the data are cross sectional, the residuals are tested for homoscedasticity and multicollinearity. The

result using Breusch-Pagan-Godfrey Test shows heteroscedasticity among residuals. Therefore, White's Heteroscedasticity Consistent standard errors for Estimation, which is BLUE has been used. For collinearity checking, uncentered VIF values have been found and all values are within the limit of 10 except in the case of *Firm Size*. The result of regression is presented in Table 3.

**Table 3. Regression Result**

Dependent Variable: Underpricing				
White heteroskedasticity-consistent standard errors & covariance				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	5.006	10.024	0.499	0.618
SUBQIB	0.270	0.082	3.312	<b>0.001***</b>
SUBNII	0.017	0.027	0.636	0.525
SUBRII	1.185	0.202	5.878	<b>0.000***</b>
AGE	-0.144	0.096	-1.512	0.132
LNSIZE	-0.652	1.033	-0.631	0.528
RONW	0.051	0.040	1.273	0.204
Observations	236	236	236	236
R-squared	0.487	Mean dependent var		14.443
Adjusted R-squared	0.474	S.D. dependent var		33.250
F-statistic	36.286	Durbin-Watson stat		2.030
Prob(F-statistic)	0.000	Wald F-statistic		33.219
Prob (Wald F-statistic)	0.000			

Source: Authors' calculation. \*\*\*indicates significant at 1% level

Subscription rate in QIB and RII categories are the most significant factors explaining underpricing (p value 0.001 and 0.000). Whereas, the coefficient of NII shows that subscription rate has no influence on underpricing. All other control variables, firm's age, size and return on net worth show results as expected. The model is significant at 5 % (Since F test-P value is 0.00) and the adjusted R<sup>2</sup> is 0.474 indicates that 47.4 % of the variability in MAAR is explained by this model.

The analysis of regression clearly indicates the strong positive influence of demand for IPO shares from Qualified Institutional Buyers and Retail Individual Buyers in determining initial returns. This is due to the fact that

almost 85% (minimum 50% for QIB + 35% for RII) of the issue is reserved for this category. In explaining Winner's curse theory, (Rock, 1986) classified investors into two groups, Informed and Uninformed. Here, QIBs are generally considered as *informed investors* and retail individual investors are considered as '*uninformed*' (Rock, 1986). The informed investors buy the issue if the issue is underpriced. So, a strong demand from this category indicates the undervaluation of IPO by the issuers and the quality of the issue. The demand from uninformed categories also influences the level of underpricing positively. So, if demand from the QIB and RII is increasing, the underpricing will also be

higher and vice versa. This finding underlined that the participation of both categories of investors will determine the success of the issue, so in order to attract both types of investors, the issue is underpriced.

But the demand from NII category does not influence the initial return. It can be assumed that the role of NII is very limited as their portion in an issue is only up to 10%. This result of positive significant relationship of subscription level is consistent with earlier studies in India and abroad (Bansal & Khanna, 2012; Jain & Padmavathi, 2012; Rock, 1986; Samarakoon, 2010; Samontaray & Al Zuwidi, 2023; Singh & Kalra, 2019), provided the earlier studies consider the overall demand. So, the present study contributes to the breaking of the significance of overall demand and identifies the degree of influence among three categories of investors on the level of underpricing in India.

## 5. Conclusion

This study focused on identifying the degree of underpricing in India and examining the impact of pre-IPO demand on underpricing. Based on the analysis of 236 IPOs listed on National Stock Exchange from 2009 to 2020, the initial underpricing is 14.44 %. The observed level of underpricing in this study is lesser than the findings of most of previous studies which were done in pre- book building era (Madhusoodanan & Thiripalraju, 1997; Shah, 1995) and this could be attributable to the stringent measures by SEBI to reduce information asymmetry. The underpriced issues were oversubscribed substantially. Overall subscription is higher for highly underpriced IPOs and vice versa. The demand from QIB and RII determine the level of underpricing but NII demand has no significant role. This study contributed in segregating the effect of oversubscription level on the degree of underpricing in India. Further research on the Indian capital market needs to be made by including more firm specific, issue specific and emerging market factors to shed more light on the capital market anomalies.

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