

What drives the oversubscription of IPO's: evidence from Indian Stock Market

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Abstract. *The paper's objective is to measure the drivers of oversubscription of Initial Public Offerings (IPOs) in India. Data from cross-sections are used in the investigation to analyse 179 IPOs issued from Jan 2009 to Dec 2020 and listed on Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) to examine the essential causes of IPO oversubscription. The study uses least square regression, robust regression and quantile regression approach to study the imperative factors of oversubscription of IPOs in India. The findings of the study suggest that issue price, underwriter's reputation showed positive and significant association with oversubscription and listing delays and pricing mechanism showed negative and significant association with oversubscription. For the purpose of understanding the causes of oversubscription, the current study is restricted to a small number of variables. Future studies should include more variables like macro-economic variables which effects the oversubscription of IPOs. The study's conclusions have repercussions for academics, financial advisors, and regulators. It provides useful insights to researchers by listing the factors effecting the oversubscription of IPOs in emerging markets like India. By investigating the connection, this study adds something new to the body of literature on initial public offerings by examining the relationship between pre-IPO firm action like issue price, issue size, price mechanism, listing delay, underwriter's reputation, boom market, oversubscription and undersubscription from the context of emerging markets like Indian and during post global financial crisis.*

Keywords: Oversubscription, IPO's determinants, Indian stock market.

JEL Classification: G00, G12, G23.

1. Introduction

An organisation making fresh issue of securities to the public is known as the Initial Public Offering. Thereby, a company is opening up the investment opportunity for the first time to the public at large. Companies willing to diversify their operations, investment for future expansions, liquidity for the existing shareholders, realize the potential of the business, etc. usually prefer the route of IPO for raising finance. The advantage of going public will not only benefit the firm in diversifying its operations in turn also reduces the risk exposure of the organisation Shah and Thakor (1988). Mikkelsen, Partch, and Shah (1997) also stated that companies willing to raise funds for investment prefer listing of companies in the stock market.

Indian capital Market comprises of Primary market and secondary market. IPO market has shown a phenomenal growth, since the country is receiving global attention from investors all over the world. Indian Primary Market is the market where exists various class of investors who can subscribe to the IPO. These investors are further categorised as per the norms laid down by the regulator of the Indian securities market that is SEBI (Securities Exchange Board of India). These investors are categorised on the basis of the subscription allocated for each categories, namely Qualified Institutional Buyers (QIBs), non-institutional investors (NIIs), and retail individual investors (RIIs). The categorisation has been done with the objective of active participation from all the sector of investors. Raising of funds is one of the crucial task for the organisation, therefore, companies prior to listing examine factors that attracts the investors, so that the issues are fully subscribed. The interests from the investors in regard to the acceptance of the offer for subscription of shares from each category gets reflected by way of under subscription or oversubscription after the bidding process. Thus, if the no. of shares offered for each category is less than the no of bids received from the investors, than it leads to oversubscription and vice versa. Consequently, prior to listing, subscription rate provides a good indication of investor demand for shares.

After the bidding process is over as per book building process the shares are allotted to those who have bided above the cut off price and thereafter shares are listed in the Indian exchanges, including the Bombay and National stock exchanges. Under this process, bidding amount will be refunded to the applicants who have applied for shared below the cut-off rate or due to oversubscription. It has been witnessed that the increased demand from investors caused by the oversubscription results in better initial returns as stated by Chowdhury & Sherman (1996). Low & Yong (2011) further proposed that there are various other factors to be considered to understand the phenomenon of oversubscription which is negatively correlated with offer price. In this backdrop, the intent of this study is to examine the effects of five variables which might lead to oversubscription in the Indian Primary Market during IPO. The determinants which have been examined are Issue price, Issue Size, listing delay, Firm Size and Underwriter's reputation against oversubscription. This

paper will help the investor and the organisation going for IPO to understand the different determinants which are weighty in affecting the oversubscription.

The paper has been organised as per the following: Section I introduces the topic, Section II of the paper assesses the literature in the concerned area of the study and formulation of Hypothesis, Section III of the manuscript explains the methodology or the tactics of the study, Section IV includes the analytical work and shows the result, followed by the conclusion in Section V.

2. Review of Literature and Hypothesis Development

2.1. Review of Literature

Different academic scholars mostly in Asian countries have made an effort to understand different factors which have an influence on the oversubscription where, Marangu and Moronge (2013) in their study at Kenya divulged that offer price, firm size, age of the firm and investor sentiments are important factors driving the oversubscription. Kaustia and Knüpfer (2008) in their study in Finland found that there may be a connection between previous IPO performance and upcoming subscriptions. The study further disclosed that investors overweight an IPO anticipating favourable returns and that leads to oversubscription whereas, Sahoo and Rajib (2012) indicated that oversubscription is an indication of an investor's wish for an IPO and indeed it is an indication of the positive performance of the IPO. Jain and Singh (2012) in their study to understand the importance of the subscription rate, realized it was necessary to find out the determinants of the subscription rate in the Indian context. They found that the small investors follow the big investor's subscription trend.

The three major pricing mechanism functional globally are auction, book building and fixed pricing which differs in price discovery and share allocation process Loughran and Ritter (2002). Mehmood et al. (2020) in their study using cross sectional data assessed the influence of pricing mechanism on 85 oversubscribed IPO's listed in Pakistan stock exchange during 2000-2017 demonstrated that the oversubscription of IPOs is significantly negatively impacted by pricing method. They revealed that under fixed pricing mechanism due to the presence of information symmetry demand will be higher which in turn will lead to oversubscription. Bajo and Raimondo (2017) stated that the investor's demand for equity listing on the Indian market relies heavily on media coverage, hence there is a strong link between underpricing and oversubscription. The oversubscription of the IPO's has been mostly noticed in the developing nations.

In a study by Krishnamurthy (2002) on 386 Indian IPO's, it has been observed that time delay, offer price and size of the firm are important factors that affect the IPO's performance.

Bansal and Khanna (2012) also discovered a strong, positive correlation between firm size and the undervaluation of the IPO price. In order to understand the importance of underwriter's reputation Logue (1973) and Beatty & Ritter (1986) were among the first to identify the importance of the underwriters performance in the IPO performance. Carter & Manaster (1990) on the basis of 'tombstone announcements' asserted that underwriters are rated according to the volume of initial public offerings. Jeribi and Jarboui (2014) created a metric for the reputation of the underwriters based on the proportion of IPO shares each underwriter requested to the total shares requested during the subscription period. On the other hand Gana and El ammari (2008) specified that size of the issue decides underwriter's reputation. If the size of the issue underwritten by underwriter is superior to the average than the underwriter is supposed to be reputed. Dambra, Field, & Gustafson (2015) is also of the view that presence of reputed underwriters and auditors in the IPO process leads to oversubscription.

On the basis of a survey on 336 CFO's in USA conducted by Brau and Fawcett (2006), ascertained that EPS and underwriters reputation is one the prime encouraging factor for investment. Alvarez and Gonzalez (2001) examined the Spanish IPO market with a sample size of 56 companies found that size of the IPO and underwriters reputation have no significant influence on the stock return. Pande and Vaidyanathan (2007) considered IPO's of 55 Indian companies and discover that there is positive impact of listing delay on the initial performance on the listing day, whereas marketing of the IPO has an insignificant impact on the performance of IPO. The above mentioned literature unequivocally suggests that there are various factors which provoke the oversubscription of IPO's. The various hypothesis have been formulated in the next section.

Section 2.2 Hypothesis Development

Issue Price

Issue price is the value of each shares that is offered to the public for subscription. Prices are fixed prior taking into account different weightage factors such as future prospects of the firm, financial viability, prices of the shares within the same industry, and also condition of the market. Prior to making an investment, investors keep an eye on the intrinsic worth of the shares, which guides the investor to understand the fundamentals of the company. Ritter (1998) stated that IPOs are under-priced by investment banks in order to create excess demand and on the opening day of trade, investors are rewarded. Marangu and Moronge (2013) revealed that issue price is one of the significant determinant of IPO oversubscription. They further put forward that even young firms without track record of substantial growth are raising capital at a much higher rate in comparison to a firm with a proven track record.

Due to the extra demand created when companies list their shares below market value, investors who are confident in an IPO's first return will be eager to invest. Additionally, it

might be argued that demand will increase in proportion to the share valuation's uncertainty for optimistic investors Ritter and Welch (2002). Beatty and Welch (1996) opined that firms which are weak in terms of financial viability and riskier tend to keep lower issue price to make sure the issue is fully subscribed. The above literature explains that keeping the price of the shares low during the IPO will have an impact on the oversubscription. In view of the above the following hypothesis has been formulated.

H1. The oversubscription of IPO's is significantly influenced by the issue price

Pricing Mechanism

Fixed price and book building are the two most often employed pricing strategies for an IPO. In case of fixed price mechanism of IPO the degree of information asymmetry is higher, whereas in book building process the price is finalized after the bidding price is over and therefore book building pricing mechanism cause difficulty among investors to determine the accurate value of the firm Mehmood et al.(2020) . Benveniste and Busaba (1997) comparing fixed price and book building pricing mechanism it became clear that under fixed price mechanism investors generally follow other investors, which creates a cascading effect. Pu and Wang (2015) echoed that underpricing and volatility has been observed in the book building pricing mechanism and therefore book building process is associated with more uncertainties in the market. In contrary the dynamic book building process assists the merchant bankers in fixing the price of the shares closer to its market value Katti and Phani (2016). Therefore, based on the evidence available from the literature it has been hypothesized that

H2: The oversubscription of an IPO is significantly influenced by the pricing mechanism.

Issue Size

The total amount expected to be raised from the sale of shares to the general public is known as the issue size. The size of the issue signifies the firm's quality as found by Clarkson and Simunic (1994), and Miller and Reilly (1987), that the size of the issue specified the uncertainty about the firms going for listing. Moreover, it was also noticed that firms with good prospects and track records usually offer larger IPO's which is an indication of good quality, whereas smaller issue size is an indication of bad quality leading to under subscription Goergen et al. (2006) . Carter and Manaster (1990) stated that investors consider the size to assess the IPO performance. Evidence suggest that negative correlation exists between issue size and oversubscription as Low and Yong (2011) identified limited availability of shares is an impetus towards higher over subscription; in contrast large number of shares available for public reduces the chance of oversubscription. Therefore, previous studies reveal that issue size is influential in gauging the rate of oversubscription.

H3: Oversubscription is negatively impacted by issue size.

Firm Size

Larger firms with expanded products lines have better access to capital market due to earning capacity from diversified portfolio Finkle (1998). Therefore larger firms tempt investors to drive for subscription of IPO Ahmad-Zaluki and Kect (2012); Badru and Ahmad-Zaluki (2018) asserted that due to reputable track records, the organization's size is negatively correlated with its risk and fundamental position Beatty and Ritter (1986); Bhabra and Pettway (2003); Kiyamaz (2000). In tune with the literature available the following hypothesis has been framed

H4: Firm size has a favourable effect on IPO oversubscription.

Listing Delay

An important factor to take into account when subscribing to shares is the interval between the closing date of the issue and the listing date. Investors consider the time gap as the opportunity cost of capital, as the funds are blocked till the listing date whereby, marketability risk also arises. Therefore, on the basis of this it can be interpreted that higher the listing gap, lower will be the demand for subscription of IPO Low and Young (2011). Mok and Hui (1998) and Su and Fleischer (1999) establish in their study that there is a positive association between IPO initial results and the listing date. Thus, when there is a delay in listing the market expectation changes. Accordingly the following hypothesis has been framed

H5: Oversubscription is negatively affected by a delayed listing.

Underwriter's Reputation

The reputation of the underwriter carry a positive sentiment for the investors to subscribe for IPO. Prior literature also suggests that oversubscription and underwriter reputation have a positive correlation. The reputation of the underwriter is an indication of status of the firm which further intensify the expectation of listing return Thorsell and Isaksson (2014); Arora Singh (2019). In spite of previously available literature there is a requirement for further studies to explore the relationship between underwriter reputation and oversubscription as there are mixed results like Banerjee and Rangamani (2015), in contrary Albada et al. (2019) reveal negative relationship among the variables. Thus it can be hypothesized that

H6: Underwriters reputation has an impact on oversubscription.

3. Data and Methodology**3.1. Sample and data collection**

In fulfilling the objective of the paper, 179 IPOs listed in BSE and NSE has been taken into consideration. The secondary data pertaining to issue price, pricing mechanism, i.e. if the

issue is fixed type or book building type, issue size, firm size, underwriter reputation, listing delay has been manually extracted from prospectus as obtained from the website of Securities Exchange Board of India (SEBI). However, for computing underpricing which is proxied by through raw return, closing market prices as obtained from the Chittorgarh. The analysis spans the sample period from Jan 2009 to Dec 2020. Table I provides a summary of the study's variables.

Table I. *Description of Variables*

Variables	Description
Oversubscription (OS)	Number of times issue is subscribed
<i>Independent Variables</i>	
Issue Price (IP)	Price at which share are issued at IPO
Issue Size (ISZ)	Proceeds received from issuing new shares
Firm Size (FZ)	Total assets during the IPO proceedings
Underwriter's reputation (UW)	(IPO Proceeds Underwritten by underwriter/ Total IPO Proceeds)*100
Raw Return (RR)	Percentage of the offer price that has changed from the first trading day's closing price
Listing Delay (LD)	Days between the close of the issue and the exchange listing
Boom Market (BM)	Dummy variable equals to one for the firms in a year where more IPOs were issued during the sample period than average
Price Mechanism (PM)	Dummy variable which takes the value of 1 if fixed price and 0 if book building issue.

Note: List of variables used in the study.

3.2. Model Specification

Following Rahim et al. (2013), Tajuddin et al. (2015), the present study deploys OLS regression analysis for achieving the objective of examining the determinants of oversubscription of analysis for achieving the objective of examining the factors which influence IPO oversubscription in India. The cross sectional regression model applied is specified as follows:

$$Osb = \alpha + \beta_1 ISP + \beta_2 ISZ + \beta_3 FZ + \beta_4 UWR + \beta_5 RR + \beta_6 LD + \beta_7 PM + \mu$$

Where μ is error term. In addition, this study assessed model efficiency and looked into robustness regression and quantile regression models.

Firstly, robust regression analysis differs from OLS regression and provides better regression coefficient estimates, because it removes the outlier in the dataset, which is omitted in the least square regression (Mehmood and Rashid, 2020). Secondly, to get a complete view of the predictor variable influence, quantile regression was performed. In quantile regression, specific percentiles (or quantiles), such as 10th, 25th, 50th and 90th are used to define the relationship of predictor variables because specific percentiles parameter estimates the changes by a unit change in the predictor variable.

4. Results & Discussion

Table II presents overview of Under Subscription and Over Subscription statistics. To meet the objectives of the study we have gathered data for 179 IPOs listed on the Indian Exchanges during 2009- 2020. The secondary data such as pricing mechanism, issue price, issue size has been gathered from the red herring prospectus of the companies published for IPO.

Table II. *Overview of Under Subscription and Over subscription during 2009-2020*

Year	No of IPO offered	Osbs Mean (times)	Usbs Mean (times)	No Osbs (%)	No Usbs (%)
2009	21	9.17	0	100%	0%
2010	70	15.42	0.96	98.6%	1.4%
2011	39	3.87	0	100%	0%
2012	11	11.96	0.96	98.6%	1.4%
2013	4	5.3	0	100%	0%
2014	6	29.25	0	100%	0%
2015	21	15.74	0.76	90.5%	9.5%
2016	20	36.17	0	100%	0%
2017	38	50.72	0	100%	0%
2018	24	31.53	0.91	87.50%	12.5%
2019	17	47.85	0.85	98.6%	1.4%
2020	16	71.41	0.93	98.6%	1.4%
Total	179				

Note: Table 2 presents the average oversubscription (Osbs) and Undersubscription (Usbs) of IPOs during 2009 to 2020; Source: Prepared by authors.

It was observed that during this period the oversubscription rate is high in comparison with the under subscription. Further indicates that an increasing trend in oversubscription leads to high initial return that is on the first day of trading as shown in the table. Most of the IPO issues were oversubscribed during these periods with 2020 being the highest (71.41 times) and 2013 being the lowest (5.3 times). Such a huge variation shows that the demand for IPOs in India fluctuates substantially for varied market sentiments. Surprisingly, during the pandemic period i.e., 2020 has witnessed highest oversubscription due to investors' hope for recovery of Indian market. The facts and figures in Table II indicate over all bullishness of the Indian IPO market. After the subscription process starts through either book building or fixed price mechanism the bidders place order in their respective investment category.

Once the bidding period is over the company finalises the IPO price in consultation with the Book Running Lead Managers and fix a cut off rate. Additional demand from the investors than the Issue size leads to oversubscription. Oversubscription is the dependent variable we are examining in this study which measures the investor's interest in the primary issue market. For example, an oversubscription of more than one specifies higher investor demand and less than one leads to under subscription. Several studies pointed that oversubscription as a factor of higher initial return post listing Michaely and Shaw (1994); Bajo and Raimondo, (2017); Bhattacharya (2017). Now the factors which can have a

positive influence on the oversubscription are issue price of the shares, pricing mechanism which is either fixed pricing mechanism or book building, listing delay i.e. delay in listing the stock in the market for trading, firm size has represented the assets of the firm, issue size and underwriter reputation measured in terms of market share of the underwriters, raw return i.e. underpricing and boom market, i.e. when the firm bring in IPO.

Table III shows the descriptive statistics of variables under the study. On an average, Indian IPO markets have seen 25.05 times oversubscription with median of 4.920 times. Maximum oversubscription was 273.05 times which indicates that some issues were largely oversubscribed. The differences in minimum subscription (0.760 times) and maximum subscription (273.05 times) point to high level of variance in IPO subscriptions in Indian market which is also evidenced by huge standard deviation 44.735 times. The log value of the average issue size is 5.960 confirms that most the firms coming up with reasonable issue size and the fluctuation in the issue size i.e., standard deviation 1.477 depicts stable IPO markets in India.

Table III. Descriptive Statistics of all variables from Jan 2009 to Dec 2020

Variables	Mean	Median	Standard Deviation	Min	Max
OS	25.025	4.920	44.735	0.760	273.050
IP	305.737	195.000	311.616	10.000	1766.000
ISZ	5.960	6.129	1.477	3.375	9.798
FZ	8.933	8.804	2.128	2.773	17.558
LD	3.017	2.000	2.196	2.000	32.000
UR	2.379	2.394	1.550	0.106	7.979
RR	2.379	0.052	1.550	0.106	7.979
Obs	179				

Note: Table III presents the descriptive statics of variables used in the study. IP is issue price at which shares are issued at IPO, ISZ is issue size issue size which is proceeds received from issuing new shares, FZ is firm size measured by total assets, UR is underwriter's reputation derived from (IPO proceeds underwritten by underwriters/Total IPO proceeds) *100, RR is raw return percentage change in the closing price on the first trading day from the offer price, LD is delay in listing derived from number of days between close of issue and listing on exchange, BM (boom market) is a dummy variable equals to one for the firms in a year where number of IPO is greater than average no of IPOs issued during the sample period, PM (Pricing Mechanism) is a dummy variable which takes the value of 1 if fixed price and 0 if book building issue.

The log of average firm size is 8.933 while the minimum value is 2.773 and maximum value is 17.558 indicates that firms with varied size have gone for IPO in Indian markets during the study period. On an average, Indian IPOs are listed in stock market in 3 days' minimum is 2 days and maximum is 32 days. These statistics indicate that a very few Indian firms take longer days for listing in stock market. The log of average raw return is 2.379 and the minimum and the maximum value is 0.106 and 7.979 which corroborate prior available literature that highly demanded issues leads higher initial returns Chowdhury and Sherma (1996); Sohail et al. (2018).

Formulated hypotheses were tested using ordinary linear regression analysis on a sample of 179 IPO's out of almost 287 IPO's due to non-accessibility of information. Moreover,

the study also applied Quantile regression technique to unearth the determinants of oversubscription as it curtails the error as against ordinary least square regression Baum (2013); Buchinsky (1998). Table IV presents results of OLS regression after adjusting for heteroscedasticity although the model is free from multi-collinearity. We used variance inflation factor to test multi-co-linearity among the independent variables.

Table IV. OLS Regression results of oversubscription model

Variables	Co-eff	Std.error	T-stat	VIF
Constant	1.7638**	0.737	2.39	
IP	0.2269**	0.1173	1.93	2.96
ISZ	-0.2476**	0.1167	-2.12	1.88
FZ	0.1420**	0.0618	2.3	1.71
UR	0.6197***	0.148	4.19	1.42
RR	0.4517***	0.0658	6.86	1.39
LD	-0.3609	0.3025	-1.19	1.26
BM	0.4711**	0.2307	2.04	1.11
PM	-0.3243	0.9627	-0.34	1.09
Obs	179			
Adj R^2	0.3383			
F - Statistics	12.38***			
Diagnostic test				
Breusch – Pagan Test for Heteroskedasticity chi2 (p-value)	1.06 (0.302)			

Note: Table IV showing the results of OLS regression of oversubscription model with statistical sample size of N =179. All variables are transformed into log to handle the heteroskedasticity. ** indicates significant at level at 5% and *** indicates significance at 1% significance. IP is issue price at which shares are issued at IPO, ISZ is issue size issue size which is proceeds received from issuing new shares, FZ is firm size measured by total assets, UR is underwriter's reputation derived from (IPO proceeds underwritten by underwriters/Total IPO proceeds) *100, RR is raw return percentage change in the closing price on the first trading day from the offer price, LD is delay in listing derived from number of days between close of issue and listing on exchange, BM (boom market) is a dummy variable equals to one for the firms in a year where number of IPO is greater than average no of IPOs issued during the sample period, PM (Pricing Mechanism) is a dummy variable which takes the value of 1 if fixed price and 0 if book building issue.

The variance inflation factor is below 3 while the acceptable value is 10 ($VIF < 10$). These results indicate that the levels of multicollinearity are insignificant. The reported adjusted R^2 of 0.338 shows that the explanatory (independent) variables cause 33.80% of the variations in IPO over-subscription in Indian Market. The reported adjusted R^2 is much higher than the earlier researches in this area, by Low and Yong (2011); Albada et al. (2019). We discover that the IPO over-subscription ratio is highly and positively correlated with the underwriters' reputation at 1% significance level ($p < 1\%$). Drawing support from the previous studies, oversubscription of Indian IPOs was influenced by underwriters, which also agrees with the conclusions of the earlier investigations by Khurshed et al. (2011); Arora Singh (2019).

The intuition for this finding is that if the market share goes up by 1 % there will be simultaneous increase in oversubscription by 0.61 times. Underwriter reputation is based on market share as lead underwriter. Thus, investors value quality of an IPO based on the

reputation of underwriters. This finding indicates that firms should select underwriters based on underwriters' reputation and past successfulness for oversubscription of IPOs. Evidence is presented that the impact of the raw return on IPO oversubscription is significantly positive even at 1% level ($p < 1\%$). The raw return reflects the demand of market post listing of shares. We observe that firms listing that happens with oversubscription in issues tend to deliver the high positive returns. The results also indicate that the timing of the IPO issue impacts the oversubscription significantly at 5% level ($p < 5\%$). IPOs issues during the boom market period see oversubscriptions.

The OLS results present that issue price impacts oversubscriptions significantly positive at 5% level ($p < 5\%$) while studies by Welch (1992) revealed negative correlation notifying that firms usually set low issue price to hype up the subscription. The findings are supported by earlier investigations by Mehmood et al., (2020); Low Yong (2011). The listing delay emerged out as statistically insignificant with respect to subscription of IPO. The results contradict with the previous empirical researches by Low and Yong (2011). We also find that the issue size has reasonably negative relation with IPO oversubscription ($p < 5\%$). That is the smaller the issue size means a smaller number of shares available for subscription. Our result shows that issue size increases the likelihood of IPO oversubscription Mehmood et.al (2020), which is contrary to the existing studies by Arora and Singh (2020); Banerjee and Rangamani (2015).

We contend that fewer shares result in a short supply of shares in the IPO market, which raises demand for company shares. The finding suggests that investors' subscription decisions are affected by the total number of shares floated. The co-efficient of firm size on IPO oversubscription is significantly positive at 5% level ($p < 5\%$). Thus, the results indicate that generally investors are risk averse and have more confidence in larger firms which would lead to IPO oversubscription. Large firms considered to be less risky and provide more information to investors. Therefore, investors willing to subscribe for a greater number of shares for large firms than smaller firms. The results also confirm the earlier studies by Badru and Ahmad-Zaluki (2018); Badru et al. (2019). On the pricing mechanism of IPO issues, the result shows no significant relation exist between pricing mechanism and IPO over-subscription. Studies by Benveniste and Busaba (1997), Katti and Phani (2016) imply that the book-building mechanism increases the likelihood of IPO oversubscription due to less uncertainty compared with the fixed pricing mechanism.

Table V. Robustness regression analysis of all variables from Jan 2009 to 2020

Variables	Co-eff	Robust HC3 Std.error	T-statistics
Constant	1.7638**	0.7663	2.3
IP	0.2269	0.1399	1.62
ISZ	-0.24768*	0.1415	-1.75
FZ	0.1421	0.1024	1.39
UR	0.61978***	0.1561	3.97
RR	0.45172***	0.0844	5.35

Variables	Co-eff	Robust HC3 Std.error	T-statistics
LD	-0.3609	0.3435	-1.05
BM	0.47119*	0.2520	1.87
PM	-0.3243	1.1434	-0.28
Obs	179		
R ²	0.3681		
F - Statistics	12.5***		

Note: Table V reports the robust Inferences using a Heteroskedasticity-Consistent Standard Error Estimator (HCSE) estimator of OLS parameter estimates (Mackinnon & White, 1985; White, 1985; White, 1980; Hayes & Cai, 2007). *indicates significant at level at %, ** indicates significant at level at 5% and *** indicates significance at 1% significance.

Table V presents the analysis of robust regression methodology to estimate the relationship of oversubscription. Robust regression analysis was employed in the data set to gain results that are resistant to errors due to outliers. Robust regression are being considered as an alternative to least squares regression, which delivers better regression coefficient estimates than least square regression. Due to its iterative procedure it aids in identifying the outliers and minimize its influence on coefficient. The data set in our study revealed that Issue Size (10%) was significantly negative, whereas Underwriters reputation (1%), Boom Market (10%) and Raw return (5%) were significantly positive. Therefore, these variables were stronger upon oversubscription.

Table VI. *Quantile regression of oversubscription model*

Variables	10th	25th	50th	75th	90th
Constant	-0.9072	-0.1472	2.1858**	3.1076***	2.8099***
IP	0.3729***	0.4646***	0.1720	0.1349	0.1253
ISZ	-0.0415	-0.1452	-0.4336***	-0.2649*	-0.0897
FZ	0.0429	0.0865	0.2908***	0.2217***	0.1937**
UR	0.4247***	0.7219***	0.9675***	0.47497***	0.2759
RR	0.3639***	0.5486***	0.6412***	0.5448***	0.4278***
LD	-0.3882	-0.5199	-0.8202*	-0.4284	-0.67978
Diagnostic					
Pseudo R2	0.1269	0.1978	0.2666	0.2342	0.2208

Note: Quantile regression (Robustness test). *indicates significant at level at %, ** indicates significant at level at 5% and *** indicates significance at 1% significance.

Table VI describes the results of quantile regression methodology to quantify the determinants of oversubscription and also to certify the results of the ordinary least square method. Quantile regression is generally seen as advantageous over OLS as the median value changes and the impact of only the median value gets eradicated (Davino, Furno, & Vistocco 2014). Quantile regression assesses the impact of the explanatory variables on right tail that is 90th, 75th, 50th, 25th and 10th quantile of oversubscription which is the dependent variable. Issue price reveals to be a reliable predictor at 1% level of significance in 10th and 25th quantile. Issue size is negatively associated with median (50th) and 75th at 10% and 1 % level of significance level. However, it has no impact on the extreme right tail i.e 90th quantile.

Therefore, our result shows that issue size increases the likelihood of IPO oversubscription Albada et.al (2019). Firm size positively impacts 50th, 75th and 90th quantile at 1% and 5 %. Notably the impact is stronger in the 50th quantile in comparison to the higher quantiles. Underwriter's reputations astonishingly tempt investor's demand at 1% level in 10th, 25th, 50th and 75th quantile. The impact is stronger at 75th quantile as compared to the lower quantiles and leaving no impact at extreme level of significance. Listing delay lacks statistical significance in all the quantiles. Raw return is significant at 1% in all the quantiles. Fascinatingly, raw return has a stronger impact on oversubscription on all levels of oversubscription, which is in line with what was noticed by Cornelli et al. (2006), Tajuddin et al. (2019). As a result, quantile regression provides a wider perspective to comprehend the impact of independent variables on the dependent variables beyond their mean values.

5. Conclusion

The present study assessed the imperative factors for oversubscription of IPO's. A total of 179 IPO's were included between 2009- 2020 listed in NSE and BSE. The preliminary results showed that maximum oversubscription was 273.05 times which reflects the interest of the investors in the subscription of IPO's. OLS regression has been used to trace out the determinants of oversubscription. Robustness regression technique has also been employed to lessen the coefficient-impacting effect of the outliers. The study results have been substantiated through quantile regression. The results revealed that issue size negatively impacts oversubscription, whereas issue price, firm size, underwriter's reputation, raw return and boom market negatively influences oversubscription. The study's findings help researchers, investors, and other organisations better understand the reasons that lead to oversubscription. Investors are bitterly placed in terms of investing if they are wrongly guided in IPO subscription, as the parameters undertaken in this study will be an auxiliary that will equip the investors prior to investment in quality IPO's. It is also to be noted that for better response from the investors, the issuers are suggested to select reputed underwriters and also to launch the IPO during the boom period with an optimistic sentiment so that investors can earn higher initial return.

This study constraint its horizon in understanding the characteristics that influence oversubscription of initial public offerings. Future studies in this area is required to get detailed view of the influencing factors that en route for IPO oversubscription, as the study's findings is limited to the extent of the variables available. Further research could explain the diverse factors impacting oversubscription with respect to specific variable related to industries, macroeconomic factors and also suggest studies influencing oversubscription post pandemic.

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