Determinants of underpricing of IPO – A case study of Indian stock market

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ABSTRACT

The study aims to investigate the reasons of Under-pricing of IPO by analyzing the impact of various factors like Issue Size, Stockholder Ownership Structure and Underwriter Reputation on the Under-pricing of IPOs. The target market chosen was all the IPOs issued In the Indian Stock Market from the Year 2010 to 2019 i.e., 219 Companies, which included 88 Underpriced IPOs and 131 Overpriced IPOs. Initially, exploratory research was undertaken to probe deeper into the topic. After conducting the exploring research, causal research was finalized as the most suitable method to go ahead with. We analyzed the data using tools like Correlation and Regression on various software i.e., Excel and SAS (Enterprise Guide). We concluded the Research by stating a Negligible Positive Relationship of Under-pricing of IPO with Issue Size and a Strong Positive Relationship with QIB and HNI Ownership and a negative Relationship with Retail Investors and Reputation of Underwriters.

Keywords: *IPO, Under-pricing, Underwriters' Reputation, Issue Size, Stockholders Ownership Structure.*

1. BACKGROUND

1.1 Introduction

Due to intense competition in the businesses, the companies have to cope up for survival and often have to develop and expand their business. To maintain the growth of its operations and a sustainable expansion, a large amount of capital is important. One of the possible ways for obtaining this capital is by going public on the stock markets. The process of issuance of IPO can be very critical to the value of a company and a significant event in the life of an established business. One major problem in the issuance of an IPO is to decide the most appropriate price band for the shares that are being issued.

This paper will investigate if the size of the firm, underwriters' reputation and ownership structure will affect the pricing of an IPO. The process of selling and issuing stocks in an IPO is called underwriting. The investment bankers involved in this process are called underwriters. There is a conflict of interest when the goal of the issuer is to get the highest amount of capital which will be done by pricing the shares as high as possible. The underwriters prefer lowering the price to reduce the risk of having an undersubscribed IPO. A lower price band increased the probability of having all the shares being sold out and also reduces the financial burden for these underwriters. Underwriters can lower the price of the shares below its actual value since the issuer does not have complete information of the market condition. Otherwise, the issuer will never opt for an underpriced IPO as it will result in a transfer of wealth to the underwriters instead of the issuer.

The prices offered in the IPO market is negotiated between the underwriter and the issuer while the prices in the secondary markets are negotiated through the demand and supply mechanism. These are the two mechanisms for pricing that can result in the under pricing and over pricing of a stock. Under-pricing is used for expressing the difference between the lower market clearing price during the issue and the offer price. Overpricing is when the price of the stock is lower than the prices in the secondary market on the first day.

We have also tried to establish a relationship between the ownership structure and the pricing of the IPO. Firms usually seek for higher institutional ownership as they provide institutional monitoring and provide valuable information during the marketing of

the IPO. It is considered that Under-pricing may represent compensation given to these institutional investors. Due to which a greater involvement of institutional investors is associated with higher Under-pricing of the IPO. Some firms can also discourage institutional involvement to avoid costs of institutional investment myopia and the have private control of the company. In such a case also, the companies would choose a lower offer price therefore leading to high Under-pricing due to adverse selection.

Other variable of our study is the size of the firm. Firm size is associated with the asymmetry of information. The presence of information asymmetry plays an important role in determining the relationship between firm size and Under-pricing. Firms with smaller size have more uncertainties and have a higher level of information asymmetry than large size firms. Large firms have a track record of operating history, and the data of these forms are publicly available. Therefore they have lower information asymmetry than smaller firms. Which is IPOs of larger firms are usually not underpriced while that of the smaller firms is more underpriced due to lack of information.

1.2 Objectives
The main objectives of our research are to determine which of the following understated factors best explain the phenomenon of Under-pricing in the Indian Financial Market.
a) Underwriter Reputation
b) Size of the firm
c) Stockholder ownership

The secondary objective of this research paper is to build a model based on factors that indicate which Underpriced IPO will help in maximizing returns over the market.

1.3 Hypothesis
(i) Null Hypothesis- There is a positive correlation between Underwriter reputation and Under-pricing of IPO.
   Alternate Hypothesis- There is no or negative correlation between Underwriter reputation and Under-pricing of IPO.
(ii) Null Hypothesis – There is a significant relationship between Under-pricing of IPO and Stockholder ownership.
   Alternate Hypothesis- There is not a significant relationship between Under-pricing of IPO and Stockholder ownership.
(iii)   Null Hypothesis- Under-pricing of an IPO depends upon Size of the firm.
   Alternate Hypothesis - Under-pricing of an IPO does not depend upon Size of the firm.

1.4 Review of Literature
There are numerous theories which attempt to explain underpricing. This paper has categorized some of these on the basis of factors like size of the firm, underwriters' reputation and ownership structure.

- **Underwriters Reputation**:
Bharat Wadhwa (2014) concluded that the reputation does not impact underpricing at all. **Dominique Razafindrambinina and Tiffany Kwan (2013)** said that there exists a positive relation between them. The higher the reputation, the lower is the initial return of shares, thus, a higher level of under-pricing. **Rakibul Islam (2014)** concluded that the better the reputation of the investment bankers, the lower is the extent of Under-pricing.

This relation also depends upon the demand of where the IPO is being issued, i.e. if there is a high demand, there would be a positive and significant relationship between underwriters' reputation and level of Under-pricing and if there is low demand, vice-versa will happen (**Berna Kirkulak, 2005).**

- **Ownership Structure**:
Salim Darmadi (2013) examined Under-pricing is related to board structure and corporate ownership in IPOs in the Indonesian market. **Rohit Bansal, Ashu Khanna (2012)** also provides evidence that there is a negative association of level of Under-pricing with the both, board size and institutional ownership which indicates that they play an important role in mitigating the asymmetry of information between the potential investors and the issuer.

However, **Salim Chahine, Nicholas Thome (2009)** concluded that in companies with both CEO duality and strategic shareholders such as corporations and other industry related investors, the degree of Under-pricing was much lesser as the strategic shareholders played a monitoring role. **Sunder Venkatesh (2006)** also employed rank correlations to identify the association between the two variables.

Peter K. Pham, Petko S. Kalev (2001) states that by Under-pricing an IPO, equal and broader ownership structure can be achieved as the small investors participate more due to rewards being greater than information disadvantage.

Erik Westin, Simon Wiklund (2016) concluded that no impact is there is backed by the fact that the presence of venture capitalists ensures fair pricing and not underpricing as the offering price of the issue reflects all available and relevant inside information.

- **Size of the firm**:
Rakibul Islam (2014) concluded that larger the firm, the more access they have to capital and other resources and therefore, the smaller the extent of Under-pricing

There also exists an inter relationship between ownership structure, size of the firm and underpricing. The study found that Indian Business groups or government ownership tend to be more underpriced in comparison to the stand-alone company with a small Issue size. (**Saurabh Ghosh, 2005) (Salim Darmadi, Randy Gunawan, 2012)**

2. METHODOLOGY

2.1 Research Design

Initially, exploratory research was undertaken to probe deeper into the topic. This kind of research is specifically conducted when the problem has not been studied clearly, with the intention to establish priorities and to improve the final research design.

Secondary data such as newspaper articles, previously published research papers and case studies were used.

After conducting the exploring research, causal research was finalized as the most suitable method to go ahead with.

2.1.1 Causal Research: A Casual Research has also been used for the testing of Hypothesis and to establish relationships between the following variables:

1. Under-pricing of IPO
2. Firm Size
3. Stock Ownership of Institutional and Retail Investors
4. Reputation of Underwriter

2.2 Sampling Design

2.2.1 Sampling Unit: The target market chosen was all the IPOs issued In the Indian Stock Market from the Year 2010 - 2019.

2.2.2 Sample Size: The sample size was 219 Companies, which included 88 Underpriced IPOs and 131 Overpriced IPOs. We also added another criterion, i.e., availability of Underwriters' market capitalization data which filtered our data to 55 underpriced IPOs.

2.2.3 Sampling Method: The sampling method chosen was Non-Probability Sampling. Under this all the elements of the population had an unequal and unknown chance of being selected as the sample.

Purposive Sampling was used under this method. Here, Only Those IPOs were selected for analysis which were underpriced between the Years 2010 to 2019.

2.3 Data Collection

The source of data used for our Research Analysis is Secondary source of data.

Secondary data for this study mainly comprises internal and external secondary data sources like company record, sales data, financial record, published data, computer stored data, syndicated data sources and institutional syndicated data sources. This data helps to get literature review for the study and also supports the findings of the study. Other benefits include hypothesis designing, validation and providing a sampling frame.

We have collected data from secondary sources to understand the impact of Firm Size, Stock Ownership of Institutional, HNI and Retail Investors and Reputation of Underwriters on the Under-pricing of IPO and we have collected data of Top 88 Underpriced IPO.

The data is collected from reliable sources like Annual Reports of the Company, Bombay Stock Exchange website, NDTV India Website and Money control Website and Bloomberg.

2.4 Approach

● There were a total of 219 IPOs in the Indian Market in the last 10 years. We then filtered the data on the basis of Under-pricing.
● For our study, we took only that issue for which the listing open price is lower than the listing close price, i.e., the IPO is underpriced. Hence, we filtered 88 IPOs from the initial 219 IPOs.
● The data of stockholder ownership, Issue size and Book Running Lead Manager was also collected for all IPOs.
● Market Capitalization of the Underwriters' was used as a proxy for Underwriters' reputation.
● The data was further filtered and only those IPOs were considered for which the Underwriters' firm was a Public and listed firm. This filtered the data to a set of 55 IPOs for the 10 year period.
● This data was then used as an input for performing Correlation and Multiple Regression on Microsoft Excel.
● For performing Logistic and Linear Regression on SAS Enterprise guide, we calculated the daily NIFTY returns (Market Returns) for each financial period that falls in our research timeline.
● The raw return on each IPO was also calculated by using the following formula:

(Listing Close – Issue Price)/Issue Price

● These returns were then compared to the daily market return to determine if the IPO Underperformed or Over performed in comparison to the market.
● The stocks over performing the market were coded as 1 and the stock underperforming were coded as 0.
● Models on SAS were then developed to find out which factors will help in maximizing returns.

2.5 Analysis

In this research paper, the researchers aim to analyze the relationship between Size of the Issue, Stockholder ownership and underwriters' reputation on the Under-pricing of an IPO. The data collected is secondary in nature and is entirely quantitative.

To analyze the above stated relationships, the Correlation and Regression tools of Microsoft Excel are used. Correlation is used to find out the degree of relationship between the size of the Issue, Stockholder ownership and Underwriters' Reputation (All taken individually as Independent variables) and Under-pricing of an IPO (Dependent Variable).

Table 1: Correlation Analysis

S no.	Name of the Factor	Correlation	Degree of Correlation
1	Issue Size	0.0720	A weak uphill relationship
2	Stockholder Ownership		
a)	QIB	0.3630	A moderate uphill relationship

b)	HNI	0.1469	A weak uphill relationship
c)	RII	-0.0353	A weak downhill relationship
3	Underwriters' Reputation	-0.2506	A weak downhill relationship

The above table shows the value of correlation coefficient found out using Microsoft Excel. Each factor was taken individually as an Independent variable with Underpricing of the IPO being the dependent variable.

Hypothesis Testing 1
In this hypothesis, the researchers aim at showing that there exists a relationship between Underwriters' Reputation and Under-pricing of an IPO.

H0: There is a positive correlation between Underwriters' reputation and Under-pricing of IPO.
H1: There is no or negative correlation between Underwriters' reputation and Under-pricing of IPO.

Results:
The correlation value for the above-mentioned factors is -0.2506.
This means that the Null hypothesis will be rejected and we will accept the alternate hypothesis.

Hypothesis Testing 2
In this hypothesis, the researchers aim at showing that there exists a relationship between Proportion of stockholder ownership and Under-pricing of an IPO.
H0: There is a significant relationship between Under-pricing of IPO and Stockholder ownership.
H1: There is not a significant relationship between Under-pricing of IPO and Stockholder ownership.

Results
We divided the Stockholder Ownership further into three categories and their correlation factors is as follows:
a)   QIB: 0.3630
b)   HNI: 0.1469
c)   RII: - 0.0353

For QIBs and HNIs, there exists a positive relationship but for RIIs, there is a weak negative correlation.
Hence, for QIBs and HNIs, we fail to reject the null hypothesis but for RIIs, we reject the null hypothesis and accept the alternate hypothesis.

Hypothesis Testing 3
In this hypothesis, the researchers aim at showing that there exists a relationship between size of the issue and Under-pricing of an IPO.

H0: Under-pricing of an IPO depends upon Size of the firm.
H1: Under-pricing of an IPO does not depend upon Size of the firm.

Results:
The correlation value for the above-mentioned factors is 0.0720.
Since, the correlation value is positive, we fail to reject the null hypothesis.

Interpretation:
Hence, we can conclude that Size of the issue, Qualified Institutional Buyers and High Net worth Individuals can become a reason for the Under-pricing of an IPO.

Multiple Regression Analysis
An important observation here is that no factor explains the Under-pricing of an IPO very strongly. Hence, we also performed the **Multiple Regression Analysis on Microsoft Excel** to find out the extent till which all of these factors taken together can explain the phenomenon of Under-pricing of an IPO.

The R Square for the Regression Analysis is 25.31%. This means that all of these factors taken together explains about 25% variation in the Under-pricing of an IPO.

The Significance of F statistics for this regression analysis is 0.01 which means that this analysis is significant.

Hence, all of these factors individually do not have a very strong relationship, but as a model, these factors taken together can explain approximately 25% of the phenomenon of Under-pricing.

In order to build a model to maximize returns on an Underpriced IPO, we also employed techniques of **Logistic and Linear Regression tools on SAS Enterprise Guide.**

Logistic Regression:

Logistic Regression Results

The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Code
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	55
Number of Observations Used	55

Response Profile		
Ordered Value	Code	Total Frequency
1	0	12
2	1	43

Probability modeled is Code='1'.

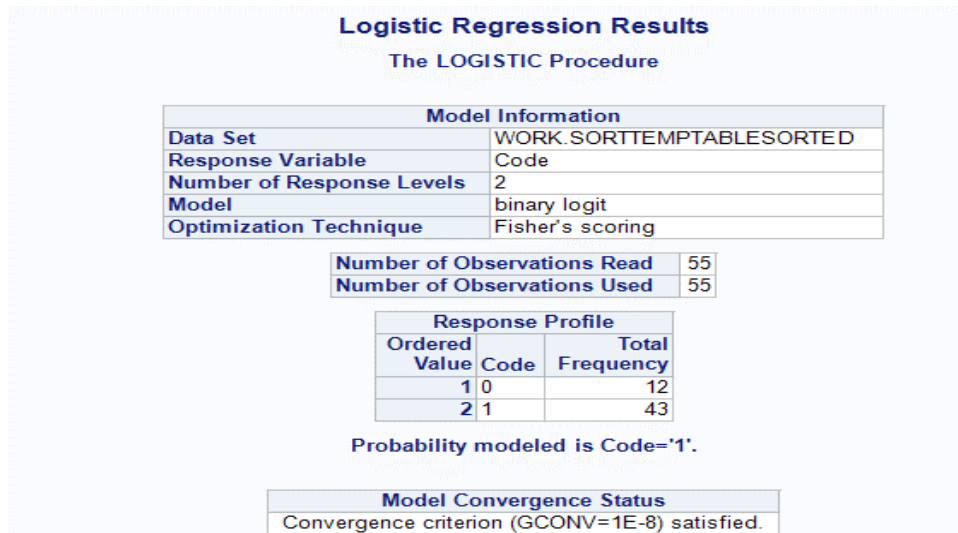| Model Convergence Status |
|---|
| Convergence criterion (GCONV=1E-8) satisfied. |

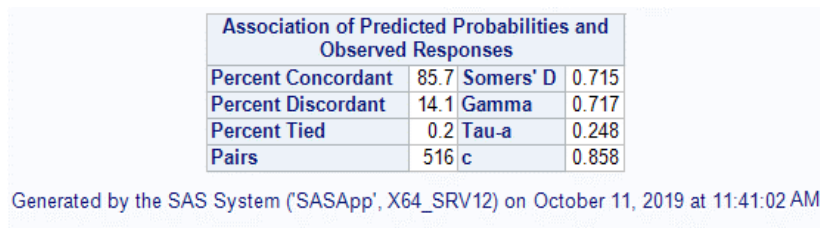**Fig. 1: Logistic Regression Output obtained from SAS**

The above screenshots show the output of the Logistic Regression performed on SAS Enterprise Guide.
The Model Convergence Status is satisfied which means that the model which comprises all the factors taken as a part of research makes a valid model.

We then calculated the percentage misclassification which came out to be 18.18%. Misclassification rate depicts the number of events that are predicted as nonevents and the number of nonevents that are predicted as events as calculated by using the variables specified in the model.

Since the percentage misclassification is very low, the model built is a reliable model.

Linear Regression

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	85.7	Somers' D	0.715
Percent Discordant	14.1	Gamma	0.717
Percent Tied	0.2	Tau-a	0.248
Pairs	516	c	0.858

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Using Linear Regression on SAS Enterprise guide, we aimed to identify the variables which build the best model based on these criteria:

a) R- Square: It is a measure of how well next value can be predicted using the structural part of the model and the past values of the residuals.

b) C(p) or Mallow's CP: It is used to assess the fit of a regression model that has been estimated using ordinary least square. It is applied in the context of model selection, where a number of predictor variables are available for predicting some outcome, and the goal is to find the best model involving a subset of these predictors. A small value of C(p) means that the model is relatively precise.

c) AIC: Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. AIC estimates the relative amount of information lost by a given model: the less information a model loses, the higher the quality of that model.
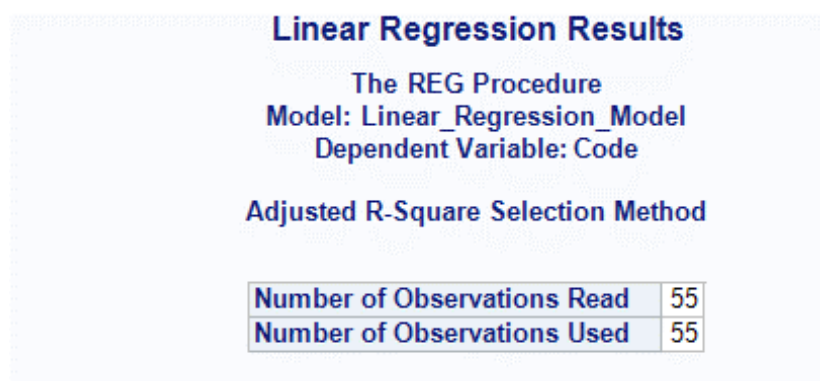
Linear Regression Results

The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: Code

Adjusted R-Square Selection Method

Number of Observations Read	55
Number of Observations Used	55

Fig. 2: Linear Regression Results obtained from SAS

Number in Model	Adjusted R-Square	R-Square	C(p)	AIC	Variables in Model
2	0.1836	0.2138	0.8132	-104.5033	Market Capitalization of Book Ru HNI
2	0.1797	0.2101	1.0506	-104.2418	Market Capitalization of Book Ru QIB
3	0.1780	0.2237	2.1881	-103.1978	Market Capitalization of Book Ru QIB RII
2	0.1730	0.2036	1.4599	-103.7939	Market Capitalization of Book Ru RII
3	0.1723	0.2183	2.5299	-102.8170	Market Capitalization of Book Ru HNI RII
3	0.1703	0.2164	2.6539	-102.6795	Market Capitalization of Book Ru HNI Issue Size
3	0.1697	0.2158	2.6891	-102.6405	Market Capitalization of Book Ru QIB HNI
4	0.1648	0.2266	4.0014	-101.4071	Market Capitalization of Book Ru QIB RII Issue Size
3	0.1647	0.2111	2.9849	-102.3141	Market Capitalization of Book Ru QIB Issue Size
3	0.1618	0.2084	3.1582	-102.1237	Market Capitalization of Book Ru RII Issue Size
4	0.1616	0.2237	4.1878	-101.1981	Market Capitalization of Book Ru QIB HNI RII
4	0.1598	0.2221	4.2917	-101.0822	Market Capitalization of Book Ru HNI RII Issue Size
4	0.1552	0.2177	4.5655	-100.7775	Market Capitalization of Book Ru QIB HNI Issue Size
1	0.1495	0.1653	1.8895	-103.2074	Market Capitalization of Book Ru
5	0.1478	0.2267	6.0000	-99.4086	Market Capitalization of Book Ru QIB HNI RII Issue Size
2	0.1347	0.1668	3.7951	-101.3057	Market Capitalization of Book Ru Issue Size
1	0.0508	0.0684	8.0294	-97.1668	QIB
1	0.0438	0.0615	8.4658	-96.7616	HNI
2	0.0426	0.0781	9.4168	-95.7405	QIB RII
2	0.0348	0.0705	9.8935	-95.2936	QIB HNI
2	0.0327	0.0685	10.0193	-95.1762	QIB Issue Size
2	0.0278	0.0638	10.3175	-94.8989	HNI RII
2	0.0265	0.0626	10.3984	-94.8240	HNI Issue Size
3	0.0248	0.0790	11.3572	-93.7967	QIB RII Issue Size
3	0.0243	0.0785	11.3892	-93.7665	QIB HNI RII
1	0.0219	0.0400	9.8273	-95.5165	RII
3	0.0163	0.0709	11.8690	-93.3164	QIB HNI Issue Size
3	0.0105	0.0655	12.2135	-92.9955	HNI RII Issue Size
4	0.0057	0.0794	13.3330	-91.8195	QIB HNI RII Issue Size
2	0.0057	0.0425	11.6705	-93.6585	RII Issue Size
1	-.0185	0.0004	12.3399	-93.2904	Issue Size

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The above screenshots show the output of the Linear Regression performed on SAS Enterprise Guide.
Based on all the models, the two factors that together make the best model is Underwriters' Reputation and Stockholder Ownership of HNIs.

3. FINDINGS AND CONCLUSION
● The correlation coefficient for **issue size** with the under-pricing of an IPO is positive but is not a significant value. Therefore, this shows a very low correlation between these two factors.
● The correlation coefficient for **stockholder's ownership (QIB, HNI and RII)** with the under-pricing of an IPO is positive and the highest amongst all. Therefore, this shows a moderate correlation between the factors. One possible explanation for this relationship to exist could be that the firms strive for higher QIB and HNI ownership as they provide institutional monitoring and valuable information during the pre-IPO phase. Hence under-pricing can represent a compensation given to them. The motive for promoters to under-price the IPO is to maximize their wealth and ensure that corporate control stays within their hands.
● The correlation coefficient for **underwriters' reputation** with the under-pricing of an IPO is negative. Therefore, this shows a negative correlation between these two factors which is contrary to the popular belief that underwriters' reputation has an impact on the under-pricing of the IPO.
● We built various regression models on Microsoft Excel and SAS Enterprise Guide.
1. The **multiple regression model on Excel** shows an R square value of 25.31% for regression analysis. This implies that all of these factors taken together, explains 25% of the under-pricing of IPOs.
2. The **linear regression model on SAS** for Mallow's CP, AIC and R square shows that a combination of underwriters' reputation and stockholder ownership of HNIs form the best model which gives an R square of 21% which means that if an investor invests taking into consideration the underwriters' reputation and stockholder ownership, it has 21% chances of performing above the market.
3. The **logistic regression model on SAS** tells us that the model made with all of the factors combined is a valid model and the misclassification value is very low which tells us that the model is a reliable one. Hence, based on this model, we will be able to earn excess return over the market 81.82% of times we invest in an under-priced IPO.

4. RECOMMENDATION
The purpose of the study was to assess the underpricing of IPOs on Indian markets for about 10 years. Therefore, in the future, analysis can be made for other countries to be more comprehensive by referring to the global IPO problems in countries such as the USA, China, Japan, etc. and for a span of more than 10 years such as 20-30 years for better results. Future research should concentrate on modeling the regulatory environment with different constraints within a given economy and linking its relative impact on the degree of Under-pricing. We conclude this analysis by agreeing that IPO Under-pricing is a complex phenomenon to be understood with the aid of a single generalized theory.

5. LIMITATIONS
Research limitations are based on the belief that research is flawed and it always involves some degree of trade- off.
There are several drawbacks that could influence the study outcome.

The first is the collection of data. We are not able to get all the information needed for the regression test due to the data missing issue and confidentiality. As a consequence, it is possible to collect only limited numbers of IPOs from the industry, and this aspect may distort the conclusion of this study.

The second is the cost's ignorance. The degree of IPO Under-pricing can be expanded without IPOs issuing fees, underwriter costs and transaction costs.

Also, the study is limited to Indian Companies only.

In view of the above, we suggest that, in addition to the above-mentioned points, future studies also consider adding further examination of independent variables, including the category of industry, joint effect by combining size of the issue with a firm age.

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