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Research Article

Pricing and Performance of IPOs: Empirical Evidence from Indian Stock Market

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Abstract

The Pricing affairs of Initial Public Offerings (IPOs) and their performance in stock market are among the most widely discussed phenomena in economics literature. These two conceptions are critical to an IPO's success or failure. This research paper explores the actual relationship lies between the Pricing of IPOs and their subsequent performance. The study is based on the data of 123 mainstream Indian IPOs which got listed in NSE during 2015 to 2020. The methodical results explain that price adjustment value, percent change in price band value, and offered price value has a significant impact on underpricing/overpricing for selected IPOs. The findings show that, in India, underpricing/overpricing accounts for a higher percentage of IPOs subscription but do not have any impact on the average mean stock.

Key words: Underpricing/Overpricing, Nifty Close, IPO

JEL Codes: G10, G12, G32
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1. Introduction

A financial structure is a mechanism requiring the movement of funds between creditors, lenders and investors. It fosters economic savings and expenditure and improves capital flow into more efficient financial assets than real assets. A stock exchange is a site where individuals exchange assets, financial securities, and other fungible items of value at competitively low rates and at rates that reflect supply and demand. The financial sector plays a significant role in this regard, since it is part of the financial framework. It offers the financial services necessary for sustainable and long-term development in different economic sectors.

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An assembly of stock and exchange markets that represent a variety of financial elements has been recourse by investors. The financial system is split into two parts: the capital market and money market. The primary market provides shares to customers and assists the business sector in raising funds through stock offerings, offers for sale, private placements, and correct issues. Concerns raised are further broken down into IPOs) and further public offer. An initial public

offering (IPO) is the first public offering of stock by a corporation. The initial public offering (IPO) is a major source of capital for companies.

IPOs are significant milestones in the development of every business as it transitions from a start-up/private limited company to a public limited company. A successful IPO will produce enormous wealth for both business promoters and pre-IPO investors. The price of IPOs, especially their underpricing, remains the most contentious problem associated with the IPO phenomenon. Underpricing is an IPO-specific performance indicator. It reflects the difference of valuations between investment bankers and the stock sector at the close of the first day of public trading. It's called capital 'leave on the table' by the first shareholders (e.g., Tully, 1999). It is suspected that IPO underpricing reduces the capital raised by company via the IPO phase (Lin & Chuang, 2011) and is a clear shift of resources to new foreign owners from founders and shareholders. The economic size of the IPO's underpricing is huge and globally recognized.

In general, Indian IPOs are fixed price offers, whereby stock costs are settled before seeking investors' bids. Indian IPO showcases therefore provide an overview to understand why the IPOs are executed at a fixed price rather than book building techniques in an undervaluation and have after some time since been deliberately contrasted. The price performance of Indian IPOs during posting is subsequently crucial to be studied for various purposes. The changes made to the valuation guidance alongside the thriving and decreasing Initial public offering market over the past decade made India an important and fascinating target for this type of study (Avadhani, 2003, Bansal and Khanna, 2012).

The Indian economy requires review due to the improvement it has achieved in the post-liberalization period. To retain liquidity in the Indian stock market, the SEBI has introduced a series of amendments. The policies changed the Indian equity market and raised money through direct investment and fund investments through FIIs. The BSE and the Indian NSE are the major markets in India and the provinces, but trading operations are confined to two main bourses. The overall market capitalization of BSE was about Rs US$2.8 trillion on as of February 2021.

NSE's exchange is comparatively younger but the market share in regular volumes in the cash and derivatives sectors are caught. The trading mechanism in India is a free electronic book of limits where the order is matched by a trading computer. The whole process is ordered in which the orders of investors are balanced with the highest practicable limits instantly. This means the operation remains unknown to both buyers and sellers. This order-driven market ensures more operational clarity.

(Ritter and Welch, 2002) Many scholars have taken a lot of time to research the conduct of initial public offerings. The sum of the IPO underpricing and overpricing is the worth of the IPO's. Underpricing/overpricing in the literature is defined as a variation on the first trading day with an IPO price and a close price on the stock market: this is the scenario most commonly discussed. Initial Underpricing/overpricing is found to be a general occurrence in capital markets worldwide; however the underpricing is different and more prominent and severe in developed countries (Loughran et al. 1994). To date, however, the initial overpricing problem has been analysed very little by scholars, while analysis has demonstrated the presence of premium overpricing in the USA (Ritter and Welch, 2002)

The authorshope that the findings would provide a comprehensive understanding of existing IPO patterns in India. It is also predicted that many groups, including firms planning to be public, prospective purchasers, and members of the general public who may be interested to obtain general knowledge on the Indian stock market, would have meaningful viewpoints in the findings of this research. The results of this study can also help strengthen the theoretical framework of IPO

underpricing/overpricing determinants from the point of view of developing economies like India. Notably, this research would be useful to other developing countries.

The research is split into 6 parts, the introduction being one of them. Section 2 includes a literature review, focusing on past analysis, theory background and original finding determinants. Section 3 summarizes the main objective, while the data, variables and methodology for analysis are discussed in Section 4. Section 5 presents the analytical results and the discussion. Finally, the results of the analysis and recommendations for future research are presented in section 6.

2. Review of Literature

Various studies have been conducted to examine the performance of initial public offerings (IPOs) in various markets. Such researches revealed that initial underpricing is a normal occurrence in all stock markets, with the sum of underpricing ranging from one market to the next. Such researches often show the presence of initial underpricing in these regions.

With the initial stock offers and related risk, Blum (1973) observed the relative success of the over-the-counter sector, the uncertainties involved in the business returns of 400 problems is calculated for 16 intervals of 1 to 1 year after the date of bid. It was mentioned, that the IPOs on and that they had the greatest financial interest were either below priced or forced in on the after-market. In the 1980 'hot issue' market, Ritter (1984) studied 1028 issues in the USA between 1977-82. The research created a theoretical framework that clarified the underpricing mechanism, i.e. Rock's underpricing theory of initial public services.

Grinblatt and Hwang (1989), Welch (1989), and Allen and Faulhaber (1989) argue that the company has the most important knowledge about the chances of a new project, and that issuers openly look at the potential of possible equity problems as they decide the initial IPO rates. Through signing high-quality companies, they will show the true worth of their stock by giving them a discount and keep any of the shares of the latest issues. Underpricing creates a favourable image in the eyes of buyers, allowing the company to market the resulting seasoned equity offerings at advantageous prices. Low-quality companies are prohibited from imitating quality companies, since the profits of the IPO's underpricing are less likely to be derived from marketing their spent problems at a higher profit. The proof to confirm the theory of signals is very mixed. Significant underpricing of Indian IPOs, which were compatible with foreign findings, was found in India, Narasimhan and Ramana (1995). Study has also shown that premium problems are below prices.

Krishnamurti (2002) examined 386 IPOs in the post-liberalization period, from July 1992 to December 1994, to provide proof for widespread underpricing of Indian IPOs. Data from an analytical perspective supports the Indian business underpricing scenario by utilising Raw Returns. It also examined the reasons responsible for the ongoing and insidious phenomenon of low prices on the IPO sector.

The globally observable IPO market pattern has been identified through Singh (2003) by a widespread short-term underpricing, with long-term results. Strong returns were received by Indian investors for six months and subsequently returns declined. Around two- to three years, long-term buyers who keep their portfolios have seen negative returns.

Initial returns (difference between the problem price and the listing price) and long-term results of IPOs were analysed by Pandey (2005). The author investigated 84 IPOs from 1992 to 2002, resulting in a fixed price and book building path from the Indian stock sector. The analysis

showed that IPOs provided only limited amounts of capital by fixed-price form. In contrast, IPOs provided mobilization by book construction.

Sahoo and Rajib (2010) sought to identify the association between retention and IPO success of post-issue promoters groups on listing. The studies examined the effect of financial factors. The sampling of 92 IPOs from the manufacturing and non-manufacturing sectors showed that the listing prices were higher than the bid price between 2002 - 2006 at 46.55 percent of IPOs. The analysis showed a positive relationship between the holding group of post-issue promoters and IPO listing results. The findings also showed that the size of the offer, the periods and the post-issue promoter party holdings were statistically important in affecting the listing success.

The pattern of underpriced initial state-owned offers for 194 firms published in the markets of the Six-Gulf Cooperation Council (GCC) countries between 2000 and 2013 was reported by Batool K. ASIRI and Aala J Haji (2014). It examines factors which may affect irregular profits on the first day of trade and examines the key factors of the underprices of IPOs in the GCC area. Additional factors and other external factors such as seasonal affective disorder have been applied in comparison to already validated variables, such as firm age and height. The analytical results showed that the firm's age and size are obviously important in terms of underpricing and both negative and suggest that there are significant gaps between financial and nonfinancial companies and between banking and insurance firms. Moreover, there was a major gap between the month of Ramadan and the month of the IPO. Almost all seemed notable in the models implemented during the financial crisis era.

Few research have examined at the ex-ante uncertainty theory as a cause of underpricing (see Mantell, 2016). This hypothesis is founded on the assumption that investors will diverge risks into pre- and post-IPO uncertainty (Clarkson and Merkley, 1994). Pre-IPO risk genesis is associated with the capability and efficiency of the company. This risk can come from market regulations (Yang et al., 2018), competition of the business (Alim and Ramakrishnan, 2017), and success in the industry. Other research has shown that post-IPO danger manifests as stock trading risk (Baluja, 2018), the acquisition of market skills and routine (Badru and Ahmad-Zaluki, 2018), and the management of an expanding shareholder base with often competing demands. . This theory hypothesizes that the risk of underpricings would be smaller if the underwriter has a decent reputation (Arora and Singh, 2019). Most studies show that the reputation of underwriter in the underpricing of IPOs has been substantially negative (Khurshed et al., 2016; Arora and Singh, 2019).

3. Aims and Objectives of the study

From the review of existing literature, it appears that over the years pricing of IPOs becomes one of most important issues among the policy makers as well as researchers worldwide. Various companies, institutional investors as well as individual investors, have always been interested to learn more about the relationship between IPO pricing and the stock price of the IPO issuing companies.

It is noteworthy that the researches studies have been made in order to quantify the magnitude as well as to justify the reasons behind the mispricing of IPOs are in fact extremely low.

By examining the trend and pattern of the IPO pricing mainly in the developed countries, very less theories have been formalized by the researchers which only provide limited insight into the factors responsible for the volatility and uncertainty in the price movements of the IPO.

In this backdrop of the above discussion, this study aims to analyses both pricing of Indian IPOs and stock market performance of IPOs. Therefore, the objectives of the study are framed to discover more about the real relationship between IPO pricing and stock market performance of these IPO issuing companies.

3.1 Main Objectives of present study

The primary objectives of the current studies are as follows:

- **To analyse stock market performance of selected Indian IPOs.**
- **To examine the relation between pricing of selected Indian IPOs and their stock market performance.**

3.2 Testable Hypothesis of the study

In order to attain above objectives, we suggest the following hypothesis:

H_{A0} : There are no significant correlations among dependent and independent variables.
H_{A1} : There is at least one significant correlation between dependent and independent variables.

H_{B0} : The independent variables do not have a significant role in determining changes in Nifty Close.
H_{B1} : At least one of the independent variables has a significant role in determining changes in Nifty Close.

4. Research Methodology

4.1 Data sample

Data has been obtained from NSE, CMIE PROWESS, and CAPITAL LINE. The present analysis was mainly confined to secondary results. The secondary data pertains to sample of 123 companies whose IPOs got listed on the National Stock Exchange (NSE) and in formations have continuously been available. The sample of the analysis was based on the following parameters.
(a).The size of population was restricted to the firms which are presently traded in National stock exchange (NSE) in the year 2015 and 2020. Out of the complete universe size of IPOs of only IPOs of 123 corporations listed in this group.
(b) As leading government controlled stock exchange of India and most of IPOs were classified on the stock exchange, NSE- Nifty was selected as the Market Index of study.

4.2 Methodology

4.2.1 Description of Dependent and Independent Variables

The variables listed 1 to 8 are classified as independent variables, while Nifty Close is considered a dependent variable.

1) **Offer Price:** The price of business shares, which could be on at a premium or discount, are sold for the first time to the public. The issue price is determined by the registrar in case of a book building issue, after all requests to the shares have been received. The market price may be above or below the problem price, when it begins to be traded.

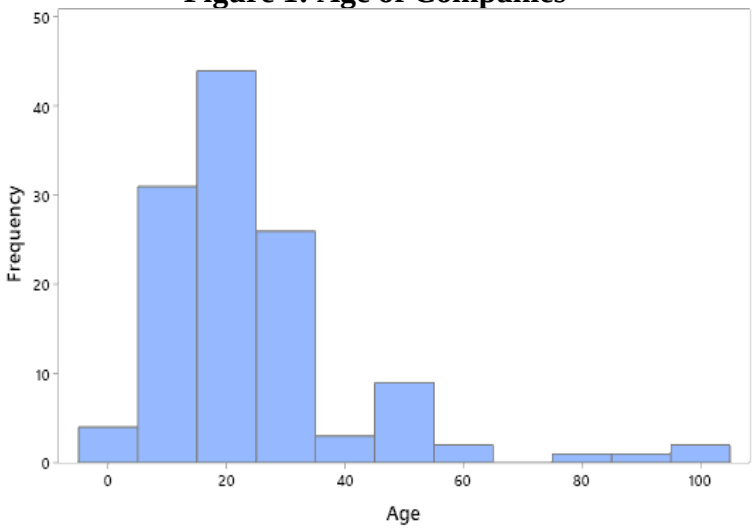
2) **Price Adjustment:** Hanley (1993) may also be interpreted as an expression of uncertainty in the relationship between the final price offer and the price range listed. The study stated that the following phrase will catch this impact:

$$\text{PriceAdjustment} = \frac{P_f - P_e}{P_e}$$

WhereP_f is thefinal offer price and P_e is the expected price

3) Age: The Company's age is one of the most common features in terms of its maturity. Longer-run companies face less price ambiguities when large volumes of information are available at the time of the problem.The time difference between years after the business was incorporated and the year in which the company entered the market with the IPO. Following figure represent the average age of selected companies.

Figure 1: Age of Companies



4) **Subscription:** An IPO subscription provides a customer with an offer to buy stocks shortly to buy. The subscription is defined in terms of the period at which the matter is signed. The subscription reflects the requirement of the IPO among the market investors.

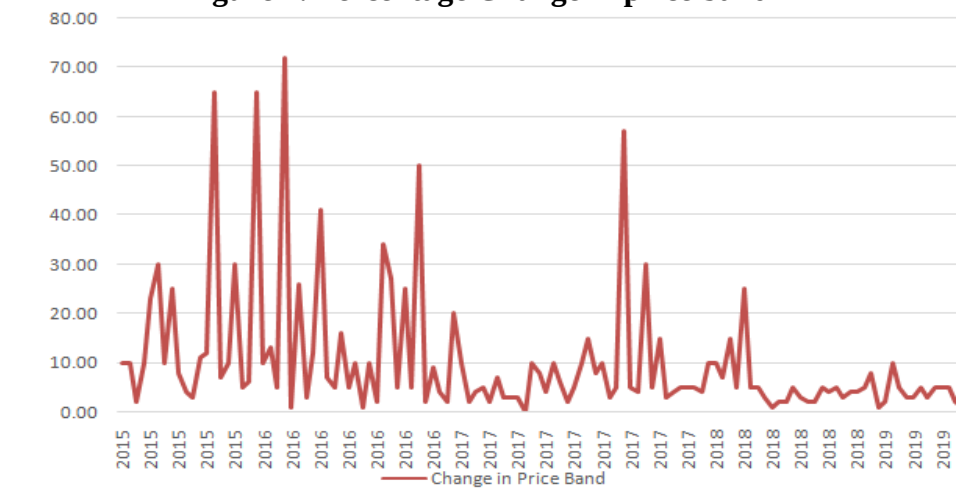
5) **Issue Size:** Issue size is the cumulative amount to be collected by the issuing entity from the IPO. The cumulative amount of the shares sold is the total number multiplicated by the commercial bank's final IPO offer price. The consumer demand for IPOs and the funding

requirements of the company that issued the IPOs on a yield issued by the issuer are reflected in this. In general, the larger the issue size, the lower the price of the issue.

6) **Demand for a share IPO or Oversubscription of IPO:** During the subscription period, IPO share demand is the amount of times on which individual investment groups have subscribed to the IPO. In general, the subscription pays for the scale of the market (usually in time).

7) **Price band:** The pricing band is the lower and higher limit of the share price at which the company would go public.Following figure shows the percentage change of price band in selected firms.

Figure 1: Percentage Change in price band



8) **Underpricing/Overpricing _Period:** It is an independent categorical variable that we described and that is further excluded from the analysis, although the required explanation is provided in our study.
The categorical variable Underpricing/Overpricing in the regression equation suggest that to attain identified R-square, the IPOs should be underpriced (coded as 1 in model and overpricing is coded as 0) It will be treated as a dummy/categorical variable in regression analysis.

9) **Nifty Close:** The Nifty Close is a market benchmark used as a dependent variable. Market indexes are the barometer for market behavior. It gives a general idea about whether most of the stocks have gone up or gone down. Often, Market Index is used as a benchmark portfolio performance.

4.3 Techniques Used

4.3.1 Correlations

Correlation coefficients are used to measure the force of the two factors. There are several types of correlation coefficient, but the most common one is Pearson's. The Pearson correlation is a correlation coefficient often used for linear regression (also called Pearson's R. The coefficient of

correlation is measured on a scale from +1 to 0 to – 1. Either + 1 or-1 represents the full association of the two variables. While one attribute rises as the other increases, the correlation is positive &if onedecreases as the other increases, it is negative. The complete lack of association is expressed by 0. In this analysis correlation method is used to determine which independent factors have a strong positive or a negative impact on dependent variable in order to consider them for further regression analysis.

4.3.2 Regression Analysis

Linear Regression Analysis is a method of estimation used to estimate a dependent variable(y) using an independent variable(x). There are parameters which need to be estimated such as the intercept and the coefficients using the means and deviation of observations from means. The basic regression equation can be said as dependent variable(y) is a function of independent variable(x) can be represented as

$$\widehat{\mathbf{y}_\mathbf{i}} = \boldsymbol{\alpha} + \boldsymbol{\beta_1 x}$$

Where alpha (α) is the intercept and Beta 1(β_1) is the coefficient of determination. These are estimated using means, deviation of observation from means and sum of squared deviations. The author will use the method of Ordinary/Generalized Least Squares (OLS) method of estimating parameters which have the properties of linearity, unbiasedness and producing minimum variance during estimation. Since the actual intercepts and coefficients are not known, we estimate these parameters using OLS method and our estimation equation has an error term which determines the difference between the observed y and the estimated y.

It is represented as:

$$\widehat{\mathbf{y}_\mathbf{i}} = \widehat{\boldsymbol{\alpha}} + \widehat{\boldsymbol{\beta}_\mathbf{1}}\mathbf{x_i}$$

And

$$\widehat{\mathbf{e}_\mathbf{i}} = \mathbf{y_i} - \widehat{\mathbf{y}_\mathbf{i}}$$

Where$\widehat{\mathbf{y}_\mathbf{i}}$is the estimation of $\widehat{\mathbf{y}_\mathbf{i}}$ using estimated$\widehat{\alpha}$(intercept) and estimated$\widehat{\beta_1}$ (coefficient) using the OLS method and $\widehat{\mathbf{e}_\mathbf{i}}$is the error/residual term which is the difference between observed and estimated y. Since there are multiple independent variables, Multivariate Linear Regression Analysis using Ordinary/Generalized Least Squares Method of Estimationwill be used by the author. Under this case the regression equation becomes as follows:

$$\mathbf{y_i} = \boldsymbol{\alpha} + \boldsymbol{\beta_1 x_1} + \boldsymbol{\beta_2 x_2} \ldots\ldots\ldots\ldots \boldsymbol{\beta_n x_n}$$

R^2 (Goodness of Fit) score is estimated to identify the explanatory power of independent variables post estimation of results.

When using the OLS method of estimation, the following assumptions must be taken into account:

1. Linear Regression model, that is, parameters are linear.
2. Residuals should be normally distributed.

3. Residuals should move around a constant mean.

4.3.3 ANOVA

ANOVA stands for study of variation and testing of variations in the influence of independent factors on a dependent variable. ANOVA test is a mathematical test used to assess the influence of two nominal predictor variables on a constant performance variable.

ANOVA checks with a dependent variable the influence of two different variables. The influence of independent variables on the predicted consequence along with their contribution to the outcome itself is analysed by a ANOVA test. Random variables will not affect a data collection statistically, while systemic factors should be deemed statistically meaningful.

4.3.4 Pareto Chart

Pareto Analysis is a predictive decision making tool used to choose a finite range of activities that have a major overall impact. The principle is taken from Pareto (also referred to as the 80/20 rule) that there is 20 percent is the reason behind 80 percent of cause.

5. Analysis and Discussion

First of all Correlation method is used to determine which independent factors have a strong positive or a negative impact on dependent variable in order to consider them for further regression analysis.

Table 1: Correlation test between different independent variables of pricing

Correlations											
	Offer Price (Rs.)	IPO Close	Price_Adj_Final	% Change in Price Band	Age	Period 1	Period 2	Period 3	Period 4	IPO Subscription (in times)	Shares Offered
IPO Close	0.914										
Price_Adj_Final	-0.331	-0.301									
% Change in Price Band	-0.323	-0.295	1								
Age	0.103	0.099	-0.019	-0.025							

Period 1(Jan to Mar)	0.006	-0.005	-0.036	-0.039	0.07						
Period 2 (Apr to Jun)	-0.248	-0.249	0.159	0.162	-0.08	0.263					
Period 3 (Jul to Sep)	0.13	0.144	-0.126	-0.125	-0.15	-0.309	-0.396				
Period 4 (Oct to Dec)	0.103	0.098	0.006	0.005	0.181	-0.269	-0.344	-0.404			
IPO Subscription (in times)	0.044	0.14	-0.117	-0.116	-0.03	0.003	-0.177	0.132	0.033		
Shares Offered	-0.245	-0.25	0.153	0.148	0.053	-0.078	0.237	-0.188	0.031	-0.106	
Nifty Close	0.127	0.127	-0.351	-0.346	0.08	0.003	-0.074	-0.016	0.088	0.14	0.1

Source: Computed by Authors

To prove hypotheses $\mathbf{H_{A0}}$ and $\mathbf{H_{A1}}$ we have used the technique of Karl Pearson's coefficient of correlation method in which author tried to identify which independent factors have a significant correlation (95% Confidence Interval) with Nifty Close. The objective is to identify the direction of relation (positive or negative) with dependent variable (Nifty Close). Using correlation author found more than one independent variable having significant correlation with Nifty Close. They are Offer Price (0.127), IPO Close (0.127), Price_Adj_Final (-0.351), % Change in Price Band (-0.346) and Shares Offered (0.1). So, we reject $\mathbf{H_{A0}}$ and accept $\mathbf{H_{A1}}$.

From table 1 it is clear that IPO closed price value has very high positive significant relation with offer price value. But study has also indicated that offer price has negative and low correlation with price_adj_final and percentage change in price band. Rest of variables has negligible correlation between each other .From above outcomes it is clear that IPO closed price is very much depend upon IPO offer price.

Regression Analysis

From the Multivariate Linear Regression Analysis, using Ordinary least Square Method of estimation, we identified the estimates of intercept and coefficients of 8 independent variables which indicate degree of change in Nifty Close.

The final estimated regression equation is mentioned below:

$$\begin{aligned}\textbf{Nifty Close} &= 10070 - 0.392\ \text{Offer Price (Rs.)} + 0.287\ \text{IPO close} \\ &- 621354\ \text{Price_Adj_Fin} + 2770\ \%\ \text{Change in Price Band} + 7.95\ \text{Age} \\ &+ 3.02\ \text{IPO Subscription (in times)} + 0.000005\ \text{Shares Offered} \\ &+ 0.0\ \text{Underpricing/Overpricing_Overpriced} \\ &- 215\ \text{Underpricing/Overpricing_Underpriced}\end{aligned}$$

In above equation, a one unit change (meaning setting under pricing =1) in under pricing will reflect 215 unit change in Nifty Close.

Table2: Coefficient Value for different variables.

Coefficients					
Term	**Coef**	**SE Coef**	**95% CI**	**T-Value**	**P-Value**
Constant	10070	398	(9281, 10859)	25.29	0
Offer Price (Rs.)	-0.392	0.993	(-2.359, 1.575)	-0.39	0.694
IPO close	0.287	0.78	(-1.258, 1.833)	0.37	0.713
Price_Adj_Final	-621354	231632	(-1080214, -162493)	-2.68	**0.008**
% Change in Price Band	2770	1076	(639, 4901)	2.57	**0.011**
Age	7.95	6.57	(-5.06, 20.96)	1.21	0.228
IPO Subscription (in times)	3.02	2.3	(-1.54, 7.58)	1.31	0.192
Shares Offered	0.000005	0.000002	(0.000001, 0.000010)	2.26	**0.026**
Underpricing/Overpricing (Underpricing)	-215	278	(-766, 337)	-0.77	0.443

Source: Computed by authors

Above table represents that author has examined that coefficient of Price_Adj_Final value, percent change in price band value, shared offered price value has significant impact on overpricing/underpricing as its p-value is less than 0.05. The rest of the variable has no such impact on Overpricing/Underpricing as these variables have p-value greater than 0.05.

Table 3: Model Summary

S	**R-sq**	**R-sq(adj)**	**PRESS**	**R-sq(pred)**	**AICc**	**BIC**
1188.92	21.64%	16.14%	189164401	8.01%	2103.55	2129.71

Source: Computed by Authors

Table 3 clears that the value of R-square is 21.64 percent .This means that this regression only explains approximately 22.00 percent of total variable present in the regression.

Through ANOVA, the study is able to identify the contribution of each independent variable in explaining the impact on regression analysis and what are the significance level of factors contributing to the analysis and along with that whether the assumptions OLS method are met or not.

Table 4: Analysis of Variance

Variance							
Source	**DF**	**Seq SS**	**Contribution**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Regression	8	44491431	21.64%	44491431	5561429	3.93	0
Offer Price (Rs.)	1	3340904	1.62%	220183	220183	0.16	0.694
IPO close	1	129898	0.06%	191661	191661	0.14	0.713
Price_Adj_Final	1	22089785	10.74%	10171572	10171572	7.2	0.008
% Change in Price Band	1	6667321	3.24%	9371365	9371365	6.63	0.011
Age	1	2809200	1.37%	2072566	2072566	1.47	0.228
IPO Subscription (in times)	1	1438598	0.70%	2431331	2431331	1.72	0.192
Shares offered	1	7176978	3.49%	7212700	7212700	5.1	0.026
Underpricing/ Overpricing	1	838747	0.41%	838747	838747	0.59	0.443
Error	114	1.61E+08	78.36%	1.61E+08	1413532		
Total	122	2.06E+08	100.00%				

Source: Computed by Authors

It is clear that in regression equation only three variables has a significant impact i.e. Price_Adj_Final, % Change in Price Band and Shares offered. Other variables found negligible impact in regression equation.

On the basis of Multivariate Linear analysis author found that out of 8 independent variables, 3 variables are having a significant impact in determining changes in Nifty Close namely Price_Adj_Final, % Change in Price Band and Shares Offered and their respective coefficients (table 2). Their contribution in explaining the total variation is given by ANOVA Table (table 4). All together these 3 variables explain 17.5% variation in Nifty Close out of a total explanation of 21.64% which includes other independent variables. Other 5 independent variables are statistically insignificant therefore are not ideal for determining changes in Nifty Close. So, we reject $\mathbf{H_{B0}}$ and accept $\mathbf{H_{B1}}$.

Figure 2: Residual Plots for NIFTY Close.

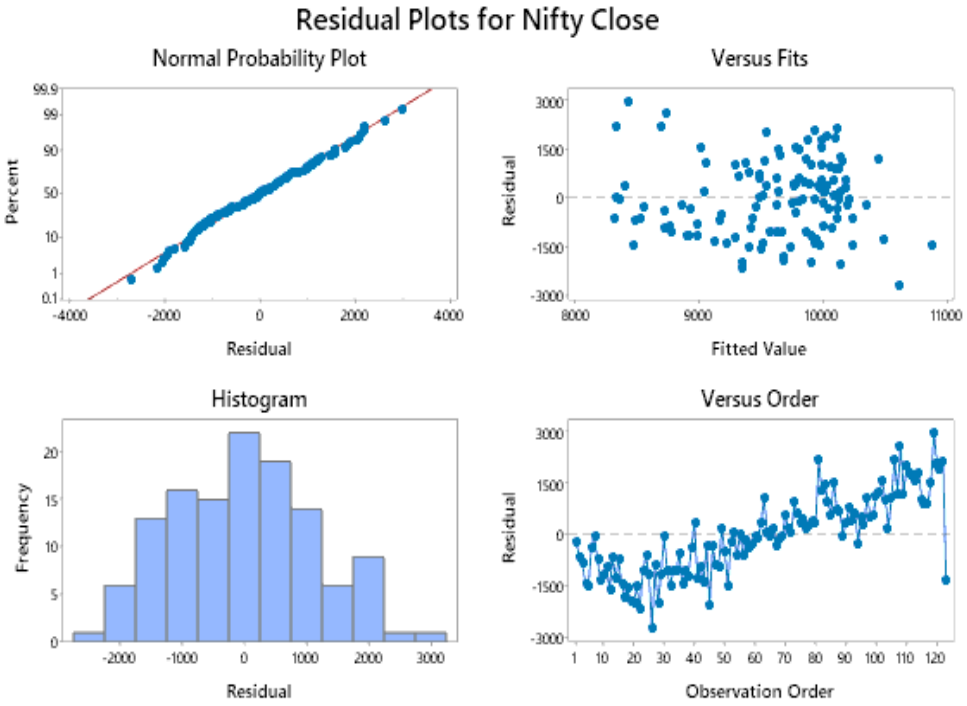
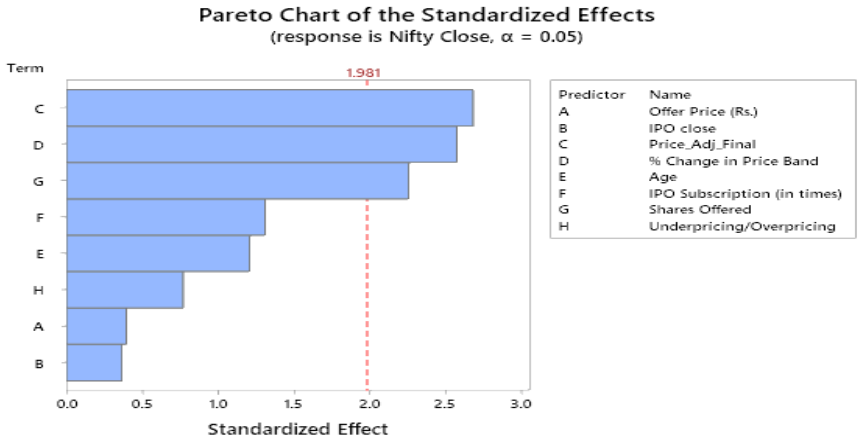


Figure 4: Pareto Chart showing Standardized Effects



The chart given above is based on 80-20 percent rule or Pareto Analysis, with reference to regression analysis which suggest the significant variables (can be verified from p-values) which explain maximum variation in the present regression analysis. The red dotted line (1.981) determines the margin of 20% key factors is calculated through Pareto analysis. The number of factors crossing the threshold is significant contributors and key 20% factors for the present variables of regression analysis. In other words, it indicates that 20 percent of total variables that impact 80 percent in the Nifty (dependent variable) are Price_Adj_Final, Percentage Change in Price Band and shared offered.

Table 2: General Linear Model.: IPO Subscription (in times) versus Underpricing/overpricing, Period

Factor Information					
Factor	**Type**	**Levels**	**Values**		
Underpricing/Overpricing	Fixed	2	Overpriced, Underpriced		
Period	Fixed	4	1, 2, 3, 4		
Analysis of Variance					
Source	**DF**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Underpricing/Overpricing	1	53657	53657	21.49	o.ooo
Period	3	7361	2454	0.98	0.404
Underpricing/Overpricing*Period	3	5451	1817	0.73	0.537
Error	115	287119	2497		
Total	122	361146			

Source: Computed by Authors

This model is a system defined output, since these two factors are categorical/nominal in nature so there are no continuous observations in these predictors. The objective here is to identify whether an observation in particular period or underpricing and overpricing strategies have a significant impact on subscription levels using ANOVA General Linear method. Here the objective is not to identify the explanatory power but to check the impact and direction of impact. Our independent variables are categorical and dependent variable is continuous so, ANOVA is used to compare means of categorical variables and their interactions.

From table 5, it is clear that that underpricing/overpricing has a significant impact on IPO subscription. While period has no significant impact on IPO.

Factorial Plot

Figure 5: Interaction Plot presents periodically impact of underpricing/overpricing on Subscriptions

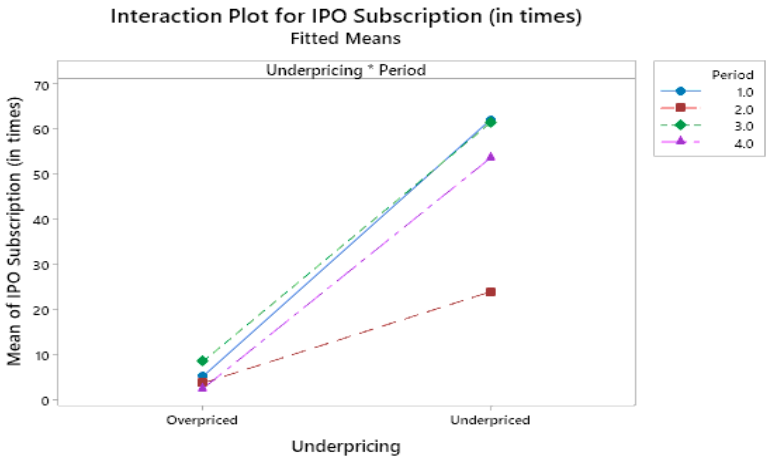


Fig. 5 reflects the movement of means of IPO subscription towards higher mean values when IPOs are underpriced for different periods.

It is visible from the results and the plot that Underpricing has a significant impact on IPO subscription. Eventually greater subscriptions when IPOs issued in period 1, 3 and 4. That means Period 1, 3 and 4 are much dependent on Underpricing/Overpricing strategy. In second period subscriptions are less.

Table 3: General Linear Model: Nifty Close versus Underpricing/Overpricing, Period.

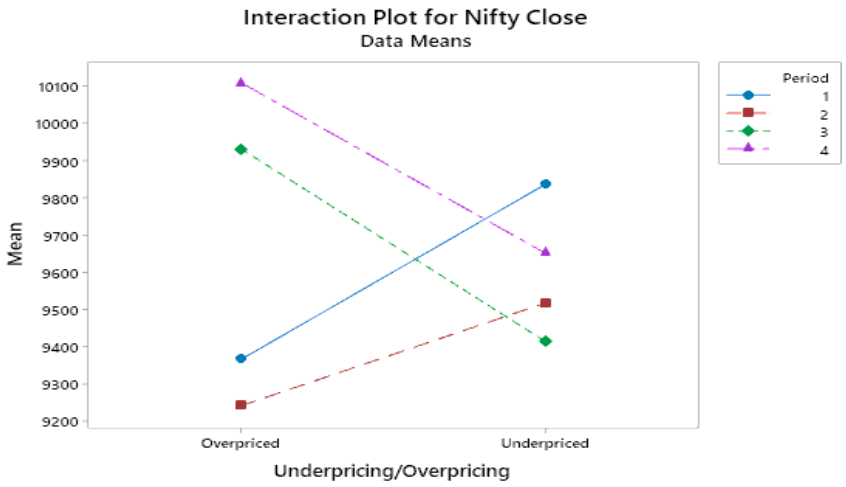
Factor Information					
Factor	**Type**	**Levels**	**Values**		
Underpricing/Overpricing	Fixed	2	Overpriced, Underpriced		
Period	Fixed	4	1, 2, 3, 4		
Analysis of Variance					
Source	**DF**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Underpricing/Overpricing	1	86130	86130	0.05	0.824
Period	3	3394731	1131577	0.66	0.581
Underpricing/Overpricing*Period	3	4937731	1645910	0.95	0.417
Error	115	198245222	1723871		
Total	122	205634095			

Source: Computed by Authors

This model presents system-defined performance. Due to the categorical/nominal characteristic of both these two specified factors (Underpricing/Overpricing and Period); the predictors do not have any continuous observations. Using the ANOVA General Linear Approach, the aim is to examine whether an observation in a certain period or pricing strategies in terms of Underpricing/Overpricing have a substantial effect on Nifty Close. The true purpose is to assess the impact and direction of impact rather than to determine the explanatory influence. As our independent variables are categorical and the dependent variable is continuous, so we are comparing the means of categorical variables and their associations using simple ANOVA.

Table 6, shows that Underpricing/Overpricing strategy and period of listing is not vital for any performance change in Stock Markets.

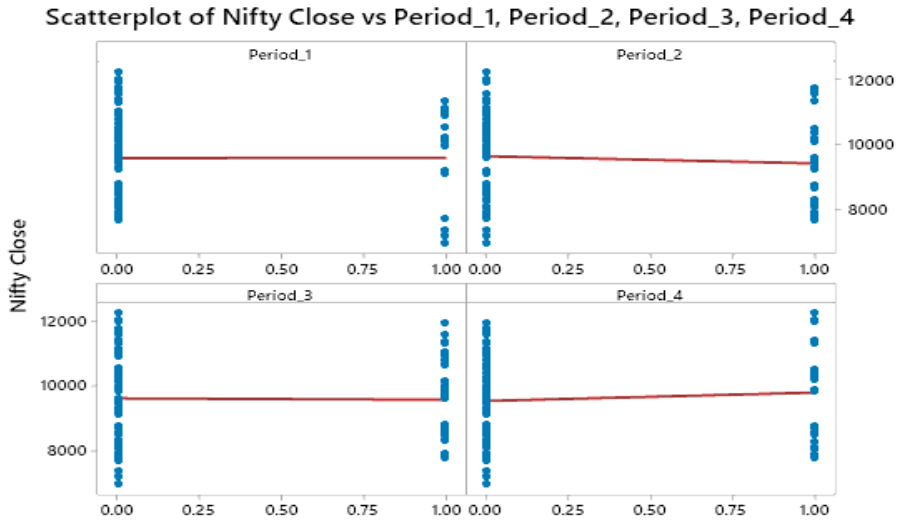
Figure 6: Interaction Plot showing associations between Underpricing/Overpricing approaches and mean stocks periodically



The graph given above is showing the movement of means of Nifty Close towards in different direction in different periods which explains inability of categorical variables holding sufficient power to explain significant variation in Nifty Close.

Periods are dependent Underpricing/Overpricing strategies are dependent on each other but, neither of them nor their interaction is significant to cause much change in mean Stocks as they do not move in a specified direction in graph (Figure 6).

Figure 7: Graphic representation exposing an impact of 'PERIOD' (Independent Variable) on issued IPOs (Nifty)



The foundation of above graph is based on the concept that when a particular period is non operational, its value is considered to be 0 while 1 value means that particular period is operational. A straight/ parallel line in center indicates there is no relation between or no significant impact among variables. If the fit line moves upwards in right direction at 1, that particular period has positive impact and if it moves downwards in right direction at 1 that means that period has a negative impact on Nifty close when it is operational. A perfect relation would

be suggested if the fit line (red) is closer to or at an angle of 45 degrees in upward or downward direction.

The figure 7 shows impact of categorical independent variable PERIOD of issuance of IPOS on Nifty Close (stock Market). Since period of issuance had no significant relationships or were not useful in determining the performance of stock markets with low insignificant p-values in our test runs for regression so were excluded from the analysis of final equations as above mentioned in the paper. This chart is an indicative of no significant movements and correlations. Period 1 and Period 3 have almost 0.00 correlation. While Period 2 has a minute impact in negative direction and Period 4 has very minute impact in positive direction.

6. Conclusion

We have examined the correlation between the independent variables which represent dependent variable Underpricing/Overpricing. From the analysis it is clear that only offered price value has positive relation with IPO price value but has slightly negative relation with price_adj_final and percentage change in price band.After correlation analysis study has examined multivariate Linear Regression Analysis and identified the estimates of intercept and coefficients of 8 independent variables which indicate degree of change in Nifty Close. Author has examined that coefficient of Price_Adj_Final value; Percent change in price band value, shared offered price value has significant impact on overpricing/underpricing. With ANOVA it is clear that in regression equation only three variables has a significant impact i.e. Price_Adj_Final, % Change in Price Band and Shares offered data analysis has been done by referring the key financial variables from various authentic sources.

The first research hypothesis predicted that at least one important correlation exists between dependent and independent variables and the second research hypothesis predicted that at least one of the independent variables plays a major role in deciding Nifty Close changes.

We found that underpricing /overpricing has major impact upon IPO subscription of selected organization but underpricing /overpricing has not significance interaction to cause much change in mean Stocks.

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