INSIGHTS INTO THE IPO UNDERPRICING FOR LISTING ON THE NATIONAL STOCK EXCHANGE

Bharat Wadhwa[1]

This paper attempts to empirically explore the determinants of the underpricing of Initial Public Offerings ('IPOs')[2] *listed on the National Stock Exchange ('NSE'). Various theories explaining the underpricing are examined and the regulatory framework around the IPOs is discussed. The results indicate that the offer price fixation by the merchant banker in book building process and the listing delay positively impact the first day underpricing whereas the money spent on the marketing of the IPO, reputation of the Book Running Lead Manager ('BRLM'), issue size, IPO grading, age of the firm, internal risk, equity retained by the promoters and the PSU/ Private classification of IPOs are insignificant in explaining underpricing. This insignificance can be due to the idiosyncrasy of the IPO study based on the time period and the markets in which the study is conducted. The findings of the study have useful implications for the retail investors, policy makers, market intermediaries as well as investors in the book built IPO.*

Keywords*: Initial Public Offerings, Book Building, Underpricing, Investment Decisions*

JEL classification: G2, G11, G14

1. Introduction

The firm can use either debt or equity to finance investment. There can be different forms to the equity claims in a firm depending on whether the firm is privately owned or publicly traded. The equity choices for the private firms include owner's own equity, venture capital and private equity. Going public is one of the critical landmarks in a company's life cycle. The increased equity can support the future plans of the firm; however, at the same time can subject it to the public eye. Brealy and Myers (2005) observe that American firms tend to use private equity in the inceptive years and eventually opt for public funding. According to Lerner (1994), firms tend to go public when the markets are supportive of the particular industry. In a study of 350 US biotechnology firms backed by venture capitalists, he observed that the firms went public only when the equity valuations were high, otherwise

[1]Bharat Wadhwa, a management student at IIM Kozhikode. He is grateful to his guides, Professor Rani Ladha (Indian Institute of Management, Kozhikode) and Professor Abhilash S. Nair (Indian Institute of Management, Kozhikode) for their valuable suggestions and guidance.

[2]Initial Public Offering (IPO) refers to the first time issue of shares to public by a company.

chose to stick to the private placement route.

A question deserving academic research surrounds why companies go public and allot shares at a lower price to investors, who later sell the shares at a higher price on the day of listing, making significant gains. This phenomenon is known as underpricing and deprives the issuing company of this "money left on the table". This suggests a gain for the investors (in the form of higher initial returns) and cost for the issuing company.

For the IPOs from 1980 to 1997, Purnanandam and Swaminathan (2002) found median IPO in US to be overpriced by 50 per cent relative to its industry peers. IPOs are found to be underpriced in most of the markets (Loughran, Ritter and Rydqvist, 1994).

IPO underpricing is a problem for both primary and secondary markets. On the one hand, in the primary market, it discourages IPO issues by the companies unwilling to leave money on the table. On the other hand, in the secondary market, it encourages arbitrage activities.

In the Indian context, studies on underpricing have been conducted on BSE but limited studies have focused on NSE. Therefore, this paper concentrates on the IPOs listed on NSE to understand the differences vis-à-vis the past studies. Also as compared with the past studies, the regulatory environment concerning IPO listing in India has changed. Further, this paper seeks to analyse the impact of variables - offer price fixation by the merchant banker in book building process, listing delay, money spent on the marketing of the IPO, reputation of the BRLM, issue size, IPO grading, age of the firm, internal risk, equity retained by the promoters and the PSU/ Private classification of IPOs - on the first day underpricing in book built issues.

2. Background and Regulations Surrounding IPOs

2.1 IPO Listing in India

In India, all the IPOs have to be listed on at least one of the 23 recognized stock exchanges in the country. The majority of IPOs are listed on the NSE or the Bombay Stock Exchange ('BSE'), or both. The NSE is India's first fully demutualized stock exchange and the largest exchange in India in terms of both equity and derivatives segments' trading volume[3].

2.2 IPO Regimes

As observed by Kumar (2007), the public issues can be categorized into three broad

[3] Refer to http://www.nseindia.com/

regimes:

- **The Controller of Capital Issue ('CCI') Regime:** Under the Capital Issue (Control) Act, 1947, CCI controlled the pricing of new issues and only fixed price method of IPO pricing was permissible. The new issuers could issue shares only at par. However, the existing issuers, in accordance with the CCI norms, could issue shares at a premium.
- **The Fixed Price Regime:** In India, in May 1992, the Capital Issue (Control) Act, 1947, was abolished. Instead, a new watchdog, Securities & Exchange Board of India ('SEBI'), was established under the SEBI Act 1992, to regulate the securities markets and protect the interest of Indian investors. SEBI gave the issuers the freedom to decide the issue price. SEBI did not play any role in price fixation. However, this methodology suffered from many drawbacks. Firstly, it made the identification of the market clearing price difficult for the BRLM since the price was determined well in advance. Secondly, it led to non - clarity about the time taken to complete the issue process. Thirdly, it led to excessive underpricing in issues, as identified in various empirical studies.
- **The Book Building Mechanism:** In October 1995, the book building mechanism of price discovery was recognized by SEBI. Book building aids price and demand discovery. The issuer discloses a floor price or a price band within which the bids can move, five days before opening of the issue. Bids for the shares quoting the price and the quantity are invited from the investors. On the basis of the demands received at various price levels within the price band, BRLM in close consultation with the issuer arrives at a price at which the security offered by the issuer can be issued[4]. Book building reduces the costs of public issue, the time taken to complete the process and the underpricing. In the Indian context, Ranjan and Madhusoodanan (2004) theorised that on average 'money left on the table' by fixed price route is 38 per cent compared to 6 percent via the book building route.

2.3 Discretionary Allotment

Previously, in India, IPO managers enjoyed considerable influence over the pricing and the allotment of the shares to Qualified Institutional Bidders ('QIBs') on a discretionary basis, a practice still prevalent in many markets. However, in November 2005, SEBI stopped

[4] http://www.sebi.gov.in/cms/sebi_data/commondocs/subsection1_p.pdf

this practice. Now in India allotment is made on a proportionate basis. As per SEBI Guidelines[5], in case of Book built issue, atleast 35 per cent of the net offer to the public is available for allocation to retail individual investors, atleast 15 per cent of the offer to non-institutional investors and at max 50 per cent of the offer to QIBs. In case of fixed price issue, atleast 50 per cent of the net offer to the public is available for allocation to retail individual investors. The balance is available for allotment to non-institutional investors and QIBs.

2.4 IPO Grading

To help the investors with the rationale to invest in an IPO of a company, SEBI made it mandatory for the IPO grading, with effect from May 2007. Grade is a relative evaluation of the fundamentals of that issue relative to other existing equity securities in India. IPO Grading is done on a five-point scale from lowest 1 to highest 5 score. Thus, a higher score hints at stronger fundamentals and vice-versa. IPO grading assesses the issuer company on multiple and broad parameters, ranging from current operations, future prospects, current financial strength, industry in which it is operating, government regulations, corporate governance, competitive strength, and historical background.

The sole purpose was to help the investors, particularly retail investors who constitute around 99 per cent of the subscribers of the IPO, with the ready-made assessment of the fundamentals of the issuer company. This practice was also targeted at minimizing the information asymmetry between the lesser informed retail and the better informed high end investors (consisting of banks, financial institutions and high net worth individuals). However, in December 2013, SEBI made the IPO Grading process by credit rating agencies voluntary.

3. Literature Review

There are numerous theories which attempt to explain underpricing. This paper has categorized some of these points of views into 'Information related' and 'Other' classes.

3.1 Information related theories explaining underpricing

- **Moral Hazard**: Baron (1982) focuses on "delegation contracting" to model the situation in which an issuer not only requires the services of the investment banker for distribution of the IPO but also for fixing the offer price. This contracting mechanism can be adopted when the investment banker has better information than the issuer about the IPO market. Since the issuer will be unable to monitor the

[5]http://www.sebi.gov.in/faq/subsection.pdf

investment banker without incurring a cost, he lets the investment banker underprice the issue (termed as optimal delegation) in order to incentivize the investment banker.

- **Adverse Selection and Rock's Model of Winner's Curse:** Rock (1986) showed that the investors who are better informed regarding high underpricing offers tend to crowd out the uninformed investors. On the other hand, the more informed investors are inclined to withdraw from the issues which are over-priced, hence leaving behind the uninformed investors with the winner's curse problem. Thus, the uninformed investors tend not to participate in over-priced issues. Therefore, firms underprice its IPOs in order to attract such investors. The findings of Koh and Walter (1989) corroborate these results.

- **Information Asymmetry**: Benveniste and Spindt (1989) found that underwriters incentivise the investors to reveal private information about the firm in order to bridge the information asymmetry between the firm and the investors. They also concluded that underpricing is necessary to acquire true information from the relatively more informed investors. Hence, those issues which are offered at the upper end of a price band mentioned in the book building would be more prone to underpricing than the others. Leland and Pyle (1977) theorised that the information asymmetry existing between IPO issuers and the investors can be lowered by observing the signal of the proportion of equity retained by the issuers. Leland and Pyle were amongst the first ones to suggest the need for financial intermediaries in order to resolve information asymmetry.

- **Signaling Hypothesis** - The signaling hypothesis is based on the assumption that the firm knows about its prospects better than the investors would. Allen and Faulhaber (1989) found that in certain circumstances good firms wished to "signal" to their investors towards the good future prospects and hence underprice their IPOs. This finding is consistent with Ibbotson's (1975) conjecture that IPOs are underpriced in order to encourage the investors to be favourable towards future seasoned equities which can be priced higher. Welch (1989) further ratified this in a two-period model, high quality firms are expected to underprice whereas low quality firms will not be able to do so due to high imitation costs. Grinblatt and Hwang (1989) further contributed on this subject stating that the issuers signal higher quality in IPOs by

underpricing as well as retaining some of the firms' shares in their personal portfolio.

- **Underpricing and Promoters' Holding** - In the Indian context, for the financial year 1994-95, Nandha and Sawyer (2002) examined 261 par and 120 premium issues. They found that higher promoters' stake seeks to reduce the ex-ante uncertainty. Therefore, the returns on day of listing tend to be high. This finding is in contradiction with the finding of Su (2004) who finds that large equity retention by the promoters reduces the information asymmetry and therefore lowers the need to underprice. However, Nandha and Sawyer undertook this study for fixed price issues. This Project seeks to examine the impact of the promoters' holding (amongst other variables) in book built issues.

3.2 'Other' theories explaining underpricing

- **IPO Underpricing and IPO Grading** - Poudyal (2008) in his working paper examined the effectiveness of IPO Grading using regression analysis on 63 IPOs from April 2005 to November 2008. He concludes that less underpricing is found in better graded IPOs; subscription increases with improvement in grading; short-term liquidity is inversely related to IPO grades; and post issue performance of IPOs cannot be explained with grading. Khurshed, *et al*. (2008) studied 251 IPOs inclusive of 47 graded IPOs listed on BSE and NSE from 1999 till August 2008. He finds that grading does not affect underpricing. Also grading helps institutional investors more than the retail investors. Neupane, Paudyal and Thapa (2013) find that for institutional investors' decision to participate in an IPO is influenced by firm quality whereas retail investors are guided by market sentiments. On the contrary Deb and Marisetty (2008), in their study involving 115 ungraded and 44 graded IPOs during the period April 2006 to August 2008 find that grading decreases underpricing in IPOs and influences demand by retail investors. They also concluded that graded IPOs attract greater liquidity and exhibit lower risk.

- **Prospect Theory** - Loughran and Ritter (2004), in a study of firms which went public during 1990-1998, found that these firms had total earnings of $8 billion and left $27 billion on the table while paying $13 billion as fees to the underwriters. In the view of this observation they suggested a Prospect theory based explanation for underpricing in which they stated that IPO issuers leave a lot of money on the table because they are optimistic regarding the prospect of higher trading price in the first

few days post listing. This would offset their loss of wealth in underpricing the IPOs and result in net gain. Loughran and Ritter found that most IPOs leave little premium for the issuers. Very few IPOs leave a lot of money on the table as a result of higher underpricing which leads to net increase in the wealth of the issuers.

- **Protection from Legal Liability** - Tinic (1988) theorised that firms underprice their IPOs in order to protect themselves i.e. a form of insurance against legal liability. In case litigation arises post IPO, then it is potentially harmful to the reputation of both the issuers as well as the investment bankers and hence to guard against this possibility, firms tend to underprice their offerings. This postulate was tested by comparing 134 IPOs post the 1933 SEC regulations and 70 IPOs in the pre-regulation period. It was found that in the post-regulation period, underpricing was more prevalent. Hughes and Thakor (1992) proposed a theoretical link between litigation risk and IPO underpricing it with; however, they did not attribute the litigation risk to be the only cause of underpricing since underpricing is observed even in countries where the legal systems are weak. They also argue that in all the countries due to the risk of loss of reputation of the underwriter and institutional arrangements, underwriters are inclined to underprice the IPOs.

4. Nature of the Data and Variables Used

The study examines all the IPOs listed during the three year period - 1st January 2009 to 31st December 2011 on the largest exchange in India (in terms of trading volume) - National Stock Exchange (NSE).

As a starting point, the data on the NSE website[6] revealed 134 issues listed during the three year period - 2009 to 2011. Out of these, 40 IPOs were removed since the issues were withdrawn or the equity shares of these companies are not listed and traded on NSE. Further, there were one Follow on Public Offers (NMDC) and Rights Issue (Standard Chartered Plc.) during this period. These two issues were also removed. Hence, the final analysis was performed on the dataset of 92 firms.

The data for the last traded price ('LTP') of issue on the listing day, offer price of issue, issue size and the date of incorporation of the company making the IPO issue was obtained from the Ace Analyser database, NSE website and the Offer Document filed with

[6]The data for the IPOs was obtained from the NSE website http://www/nseindia.com/ under the section of book building in IPOs.

the ROC.

For calculating the market return, data of CNX Nifty was used. The data for the Nifty closing price on the listing day of the issue and the Nifty closing price on the offer closing day was obtained from the Historical Index Data on the NSE Website[7].

The regulatory requirements concerning the IPOs make it mandatory for the firms to disclose with the Registrars of Companies ('ROC'), after the closure of the issue in case of a book built issue, the risks envisaged by the company and an estimated amount to be spent on marketing, advertisement and promotion in the IPO Prospectus filed by the company. The data related to the advertisement and marketing expense and the number of internal risk factors concerning the firm were obtained from the Final Offer Document filed with the ROC.

To incorporate the reputation variable of the BRLM, we utilized the annual rankings (based on market share) from the Prime Database.

Dependent Variable (*MAR*)

Underpricing is defined as the difference between the LTP of the issue on the listing day and the issue price. The LTP reflects the equilibrium as determined by the interplay of the demand and supply forces in the market through the listing day. Ghosh (2005), Kumar (2007) and Shelly and Singh (2008) consider this LTP as the true value of the listed share. Underpricing provides a measure of the initial returns for investors. Initial return is calculated as follows:

*Initial Return = [(LTP of issue on the listing day – Offer price of issue)/ Offer price of issue]*100*

Like initial return, market return (CNX Nifty) is calculated for the same period i.e. between the listing day of the issue and the offer closing day.

*Market return = [(Nifty closing price on the listing day of the issue – Nifty closing price on the offer closing day)/ Nifty closing price on the offer closing day]*100*

This initial return is adjusted for the market (CNX Nifty) return during the same period, to arrive at the *Market Adjusted Return* (MAR)[8], the dependent variable.

MAR = [(1+ Initial Return)/ (1+ Market return)]–1

[7] http://www.nseindia.com/products/content/equities/indices/historical_index_data.htm

[8] Jain and Padmavathi (2012), "Underpricing of Initial Public Offerings in Indian Capital Market", VIKALPA, 37, 1

Explanatory Variables

(i) Offer Price Fixation by the Merchant Banker in the Book Building Process (*up_price_band_flag*)

Investment bankers use popularity of IPOs (indication of interest by investors) in pricing the issue (Benveniste and Spindt, 1989). Price fixation towards the upper side of the price band may lead investors to believe that there is good demand for the issue and send a signal to give a premium to the issue on the day of the listing. This may result in a higher trading price on the listing day.

Oversubscription of an issue may not be a credible signal of the underpricing of the issue. This is because in many book built issues, Cornelli and Goldreich (2001) have shown that demand for the issue may exceed the supply. Hence, price may not be determined by the intersection of demand and supply forces. In fact the price may be determined at a level at which the demand exhibits the steepest decline. Hence, the price fixation by the merchant bankers (towards the upper or lower side of the price band) may better signal about the demand for the issue and better explain underpricing.

To incorporate the demand variable, we utilize the mean of the price band. A dummy variable denoted as *up_price_band_flag* is used in the model. The issues with an offer price greater than the mean of the price band are classified as High demand issues and assigned a value 1. The issues with an offer price less than or equal to the mean of the price band are classified as Low demand issues and assigned a value 0. In this model, it is expected that the closer the price fixation (by the merchant bankers) towards the upper side of the price band, the greater the underpricing.

(ii) Listing Delay (*Listing_Delay_log*)

Investors expect to be compensated for the money blocked (from the date of closure of IPO to the date of listing). They might accordingly demand additional compensation on the date of listing. Also a long time delay between the date of listing and the date of book closure may induce investors for out of market trades. Moreover, the information not available at the time of subscription may be disseminated during this lag, increasing the underpricing (Ghosh, 2005).

In this model, the listing delay is measured as the number of days between the date of listing and the date of offer closure. The variable is denoted as *Listing_Delay_log***,** which is taken as a natural log of the listing delay. It is expected that the greater the time delay between

the date of offer closure and the date of listing, the greater the underpricing.

(iii) Expense in Marketing the IPO (*Ad_Mkt_Expense_mn_log*)

Promotion reduces underpricing through reduction in chances of adverse selection, (Habib and Ljungqvist, 2001). Also higher the visibility of the upcoming issue, higher the willingness of the investors to invest in the same (Frieder and Subrahmanyam, 2004). Since advertisement and marketing expense drives the visibility, it should lead to lower underpricing.

The variable is taken as a natural log of the advertisement and marketing expense and denoted as *Ad_Mkt_Expense_mn_log.* It is expected that the greater the advertisement and marketing expense, the lower the underpricing

(iv) Reputation of the Book Running Lead Manager (*Ranking_Bankers*)

Investment bankers face conflict of interest between clients (issuing firm) on the one hand and the investors on the other. In case the investment banks are more committed towards the investors (compared to the issue firm) in pricing the issue in a book building process, they are more likely to leave more money on the table to be picked by the investors.

In Indian context, this makes an interesting study since in India BRLM cannot make preferential allotment of the shares to QIBs. Alternatively, reputable BRLM are found to associate themselves with low risk offerings (Carter and Manaster, 1990). Hence IPOs handled by reputable underwriters might also witness lower short-run underpricing (Carter, Dark and Singh, 1998).

In this model, the rankings of the BRLM is denoted as dummy variable *Ranking_Bankers*. It is assigned value 1 if the BRLM is in the top 10 ranks, otherwise the value, 0. The greater the reputation of the Book Running Lead Manager, the lower the underpricing.

(v) Issue Size (*Issue_Size_rupees_log*)

Larger IPOs are assumed to be subjected to more stringent scrutiny and compliance, compared to the smaller ones. Also the larger issues are assumed to be analyzed by multiple BRLMs. This reduces the risk for the larger issues, lowering the underpricing. In the Indian context, Nandha and Sawyer (2002) find size to be a significant variable in explaining underpricing.

Here, the variable is taken as a natural log of the total issue size which is denoted by *Issue_Size_rupees_log.* It is expected that the higher the issue size, the lower the

underpricing.

(vi) IPO Grade (*IPO_Grade*)

Grading reduces the asymmetry of information between the retail (lesser informed) investors and the institutional (better informed) investors. Poudyal (2008) studied 63 IPOs in India from April 2005 to November 2008 and found that higher grading decreases underpricing in IPOs. Deb and Marisetty (2008) find less underpricing in better graded IPOs in India.

The variable is denoted as *IPO_Grade* which takes IPO grades as 5 to 1, as given by the rating agencies. The higher the IPO graded by a rating agency, it is expected that the lower will be the underpricing.

(vii) Age of Firm (*Years_Snc_Inc_log*)

Age of the firm is the taken as the difference between the listing year of the firm and the incorporation year. It is assumed that investors have more trust in an older firm since an older firm provides more disclosure during its operating history. This reduces the risk for the firm, lowering the underpricing (Ghosh, 2005). Also Bubna and Prabhala (2008) have found a negative relationship between the age of the firm and underpricing.

Here, the age of the firm is measured (in terms of number of years) as the difference between the IPO year and the year of incorporation. The variable is taken as a natural log of the number of years between the listing year and the year of incorporation and denoted as *Years_Snc_Inc_log.* It is expected that the older the firm, the lower the underpricing.

(viii) Internal Risk to the Company in Relation to the Issue (*No_Internal_Risk*)

The Disclosure and Investment Protection Guidelines (DIPG 2007) of SEBI require the firms to disclose the internal and external risk factors in the offer document filed with SEBI.

Underpricing is considered by the CFOs as compensation to the investors for the risk of participation in the IPO (Brau and Fawcett, 2006). The ex-ante uncertainty of the investors increases with the increase in the disclosure of the number of internal risk factors.

The variable is taken as the number of internal risk factors, as disclosed by the firm in the IPO prospectus and denoted as *No_Internal_Risk.* If greater number of internal risk factors are disclosed in the prospectus, then greater underpricing is expected.

(ix) Post Issue Equity Retained by Promoters (*Equity_promoters*)

The total post-issue equity held by the promoters provides insights into the stability of the future expected cash flows (Leland and Pyle, 1977). Therefore, large equity retained by the promoters positively signals high value of the firm and depicts the firm's confidence regarding the stability of the cash flow. Allen and Faulhaber (1989) concluded that the high value firms retain more equity because they come in the seasoned equity offerings. Hence, they want to "signal" to their investors towards the good future prospects and hence underpricing their IPOs. Higher promoters' stake reduces the ex-ante uncertainty leading to higher initial returns and the resulting underpricing, (Nandha and Sawyer, 2002).

The variable is denoted as *Equity_promoters*, taken as the percentage of the post equity capital retained by the promoter group. It is expected that the higher the percentage of equity retained by the promoters, the higher the underpricing.

(x) PSU vs. Private Firms' Issue (*Govt_Private*)

Private firms are expected to perform better than the government enterprises (Megginson *et al*., 1994). Since investors consider the PSUs as less efficient than their private counterparts, they expect higher return to compensate them for the ex-ante uncertainty. Hence, they expect greater discount at the time of issue, leading to higher underpricing.

A dummy variable, *Govt_Private*, is used to indicate the PSUs with IPOs. The presence of PSU firm with IPO is shown with a value equal to 1 and 0 otherwise. It is expected that PSU firms' issues (IPOs) are underpriced as compared to the private firms' issues

5. Model Specification

5.1 The Model

To explain the level of underpricing, linear regression model (OLS framework) has been used. To begin, Market Adjusted Return (*MAR*) is regressed on ten independent variables as follows:

$$MAR = \beta_0 + \beta_1 (up\_price\_band\_flag) + \beta_2 (Listing\_Delay\_log) + \beta_3 (Ad\_Mkt\_Expense\_mn\_log) + \beta_4 (Ranking\_Bankers) + \beta_5 (Issue\_Size\_rupees\_log) + \beta_6 (IPO\_Grade) + \beta_7 (Years\_Snc\_Inc\_log) + \beta_8 (No\_Internal\_Risk) + \beta_9 (Equity\_promoters) + \beta_{10} (Govt\_Private) + \varepsilon$$

where, *up_price_band_flag* denotes Offer Price Fixation by the merchant banker,

Listing_Delay_log denotes Listing Delay, *Ad_Mkt_Expense_mn_log* denotes Expense in marketing the IPO, *Ranking_Bankers* denotes Reputation of the Book Running Lead Manager, *Issue_Size_rupees_log* denotes Issue Size, *IPO_Grade* denotes IPO Grade, *Years_Snc_Inc_log* denotes Age of Firm, *No_Internal_Risk Internal* denotes Risk to the Company in relation to the issue, *Equity_promoters* denotes Post issue equity retained by promoters, *Govt_Private* denotes PSU vs. Private Firms' Issue, β'sdenote regression coefficients and ε is the error term.

5.2 Problem of Multi collinearity

Multicollinearity refers to the condition when one or more of the independent variables are correlated to each other. It occurs when the test results indicate that none of the independent variable is significant (none of the t-statistics for coefficients significantly different from zero), while the R^2 (model's explanatory power) is high and the F-statistic is significant. This indicates that while the independent variables individually do not explain the variation in the dependent variable, the variables together have the explanatory power.

Multicollinearity is tested by observing Variance Inflation Factor ('VIF') and Tolerance. VIF measures the amount of variance of the regression coefficients that is inflated by multicollinearity problems. Tolerance indicates the amount of variance in an independent variable that is not explained by the other independent variables. Using conservative estimates, for detecting multicollinearity and dropping variables, the analysis used the VIF level less than 3 or Tolerance greater than 0.33.

5.3 Problem of Heteroscedasticity

Heteroscedasticity results when the variance of the error terms (residuals) is not the same across all observations in the sample. An econometric issue in cross sectional data regressions is that of heteroscedasticity. Wooldridge (2008) observes that while large sample sizes depict asymptotic normality, the heterogeneity in cross sectional data can lead to heteroscedasticity. Bubna and Prabhala (2008) in testing for underpricing found their regression model to be heteroscedastic.

In order to confirm the validity of our results and test for heteroscedasticity, the Breusch and Pagan test is conducted. The test statistic for Breusch-Pagan test (chi-squared distribution)

$$\text{BP chi-square test} = n * R^2_{resid} \text{ with k degrees of freedom}$$

where, n is the number of observations, R^2_{resid} is R^2 from a second regression of the

squared residuals from the first regression on the independent variables, k is the number of independent variables.

5.4 Out of Sample Testing

It is used to predict the forecasting power of the model i.e. how well the values predicted by a model fit the values actually observed from the data outside the study period. The period between 1st January 2012 and 31st December 2013 is considered to serve as an out-of-sample testing period. To test how accurately the predicted values fit the actual, we used Root mean square error (RMSE). RMSE represents the absolute fit of the model to the data - how close the observed data points are to the model's predicted values.

6. Empirical Results

6.1 Descriptive Statistics

The Table 1 indicates that the IPO return varies from -91.2 per cent to 96.0 per cent with a mean value of -1.5 per cent. Of 92 issues considered in the study, 48 issues (52.17 per cent) closed (on the listing day) at a premium to their offer price (underpriced issues), whereas 44 issues (47.82 per cent) closed at a discount to their offer price (overpriced issues). The average underpricing of -1.5 per cent is significantly different from 105.6 per cent as reported by Shah (1995) for the sample of IPOs listed from 1991 to 1995. This decline in the underpricing can be attributed to the changes in the regulation concerning IPO in 1995 when SEBI recognized the book building mechanism of price discovery.

Table 1: Summary Statistics of the Selected Variables

List Year	No. of Issues	Average of IPO Period Return*	Max of IPO Period Return	Min of IPO Period Return	Average of Listing_Delay	Max. of Listing Delay	Min. of Listing Delay
2009	13	-0.056	0.314	-0.566	20	25	15
2010	54	0.019	0.773	-0.912	17	41	12
2011	25	-0.068	0.960	-0.726	21	174	12
Aggregate	92	-0.015	0.960	-0.912	19	174	12

**IPO_Period_Return = [(LTP of issue on the listing day - Offer price of issue)/ Offer price of issue]*100*

The listing delay varies from 12 days to 174 days as indicated in Table 1. The mean value of 19 days is significantly different from the listing delay reported by studies of Shah (1995) and Majumdar (2003). Shah (1995) reports an average listing delay of 11 weeks whereas Majumdar (2003) reports an average delay of over 151 days. The improvement in

the listing delay can be attributed to the advancements in the functioning of markets.

6.2 Regression Results

From the Table 2, it is observed that the price fixation by the merchant bankers in the book building process is affecting the underpricing. The coefficient of *up_price_band_flag* variable is positive and significant at less than 1 per cent. It indicates that if the price is fixed towards the upper side of the price band (more than the mean), then 26.5 per cent higher market adjusted return can be expected, keeping other independent variables constant. The result is consistent with Pande and Basu (2011).

Similarly, listing delay (time delay between the date of listing and the date of offer closure) affects underpricing. The coefficient of *Listing_Delay_log* variable is positive and significant at 5 per cent. This may indicate that the information not available at the time of subscription may be disseminated during this lag, increasing the underpricing. The result is consistent with Ghosh (2005). However, the other explanatory variables considered do not significantly influence the *MAR*. A possible reason for this can be that there is no one size fit all model for IPO studies and the results can vary based on the time period and the market selected. As regulatory environment changes and economy passes through different troughs of economic cycles, IPOs are expected to have different performance.

Pande and Vaidyanathan (2007) also found no significant impact of marketing spend on the underpricing. The insignificance of the IPO Grading is in consonance with Khurshed *et al*. (2008) who studied 251 IPOs (inclusive of 47 graded IPOs listed on BSE and NSE) from 1999 till August, 2008.They found that IPO grading does not affect underpricing. Sahoo and Rajib (2010) found age of the firm insignificant in explaining underpricing. Pande and Basu (2011) found internal risk factors as inconclusive in explaining underpricing.

***Problem of Multicolinearity*:** Table 2 indicates variables up_price_band_flag and Listing_Delay_log are significantly different from zero and individually explain the variation in *MAR*. By observing VIF and Tolerance in the Collinearity statistics, we conclude that the 10 independent variables are not correlated (Refer Table 2) since for all the independent variables' VIF was less than 3 and Tolerance more than 0.33.

***Problem of Heteroscedasticity*:** With 92 *MAR*, n is equal to 92. The Breusch-Pagan test (chi-squared distribution) test statistic is *16.376 ($n \times R^2 = 92 \times 0.178$).*The one-tailed critical value for a chi-square distribution with ten degree of freedom and α equal to 5 per

Table 2: Regression Estimates of the Underpricing Model

	Coefficient	p - value	Tolerance	VIF
(Constant)	-0.419	0.076		
up_price_band_flag	0.265	0.004*	0.803	1.246
Listing_Delay_log	0.069	0.027**	0.887	1.127
Ad_Mkt_Expense_mn_log	0.032	0.431	0.356	2.809
Ranking_Bankers	-0.096	0.348	0.415	2.408
Issue_Size_rupees_log	0.004	0.845	0.599	1.668
IPO_Grade	0.013	0.800	0.452	2.210
Years_Snc_Inc	-0.001	0.843	0.716	1.397
No_Internal_Risk	0.001	0.801	0.560	1.787
Equity_promoters	-0.128	0.606	0.698	1.433
Govt_Private	-0.039	0.805	0.630	1.588

* Significant at less than 1 per cent level, ** Significant at less than 5 per cent level

cent is 18.31. Since the test statistic is less than the critical value, we fail to reject the null hypothesis of homoscedasticity. This indicates constancy of the residuals (homoscedasticity) in the set of significant independent variables. Hence, our cross sectional data is homoscedastic which adds to the validity of our results.

6.3 Out of Sample Testing

Using the estimated coefficients of the independent variables from Table 4, we calculate the predicted value of the dependent variable (*MAR*) for all the IPOs listed on NSE in the out of sample testing period.

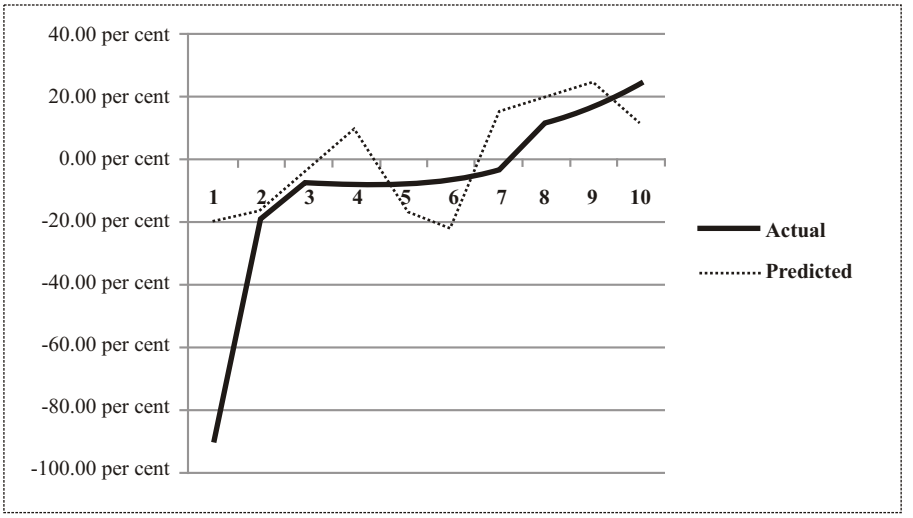
Drawing upon the research of Goyal and Welch (2003) and Butler, Grullon and Weston (2005) related to the out of sample forecasting of the stock market variables, accuracy of the current model in forecasting the dependent variable (*MAR*) for a time period outside the period is tested.

In the Chart 1, the predicted *MAR* with the actual *MAR* is plotted. As can be observed in Appendix Table A.1, the forecasting error (difference between actual and predicted *MAR*) varies from -.6973 to .1517. The calculated RMSE for the forecasted observations is 0.2483. This variation may be due to a limited number of observations (10 IPOs) in the out of sample period.

7. Conclusion

To understand the underpricing of the IPOs listed on the NSE has important

Chart 1: Plotting of Actual and Predicted Market Adjusted Return (MAR)



implications for the investors, particularly retail investors who constitute around 99 per cent of the subscribers of the IPO.

The paper finds the price fixation (by the merchant bankers) in the book building process as an important variable in explaining underpricing. It is observed that if the price is fixed towards the upper side of the price band (more than the mean), then 24.5 per cent higher returns can be expected than when price is fixed towards the lower side of the price band. Since the offer price is set (and disclosed) after the book building closure, the investors cannot use these results ex-ante to make the gains. However, if they have invested in the IPO, by observing the setting of the offer price in the price band, they can expect to make gains (on the day of listing).

Further, listing delay (time delay between the date of listing and the date of offer closure) positively affects underpricing. This may be on account of the additional compensation expected by the investors for the money blocked. Alternatively, information not available at the time of subscription may be disseminated during this lag, increasing the underpricing.

The insignificance of the IPO Grading is in consonance with the result of other researchers.This reconfirms the concern that it is not possible to incorporate all the risk factors in a single grade. Debt instruments have well defined cash flows and time horizon; however, this is not the case with the equity instruments. IPOs with same grade have

different prices and performances. Rating of IPO is not a recommendation to "buy", or "sell" a stock; it is just an indication of quality of the issuing company. Also IPO grading reduces the information asymmetry, but this lacks sufficient evidence.

These possible explanations and the insignificance of the IPO Grading in explaining underpricing might explicate why SEBI made IPO Grading voluntary in December 2013. However, over time as the Indian markets develop and the confidence in rating increases, we may see a difference that could be similar to the western experience.

8. Limitations

There is no one size fit all model for IPO studies and the results can vary based on the time period selected. As regulatory environment changes and economy passes through different troughs of economic cycles, IPOs are expected to have different performance.

This study covered only a short period of 36 months and a longer horizon (of more than 100 months) could be considered. However, this could not be done due to the change in regulatory conditions in 2005 which was likely to puzzle the results of the study.

9. Future Scope of Research

The CNX Nifty covers 22 sectors of Indian Economy. However, an industry-wise analysis could not be performed since sufficient number of IPOs could not be found in few industries in recent years. Hence, an industry-wise analysis can be performed in future by referring to the industry classification by some other source.

References

Allen, F. and G. Faulhaber (1989), "Signaling by Underpricing in the IPO Market", *Journal of Financial Economics*, Vol. 23, pp. 303-323.

Bubna, A. and N. R. Prabhala (2008), When Book Building Meets IPOs, *Unpublished Working Paper, University of Maryland*. Retrieved from Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1081272, Accessed on 7 March 2014.

Butler, A. W., G. Grullon and J. P. Weston (2005), "Can Managers Forecast Aggregate Market Returns?", *Journal of Finance*, Vol. 60, pp. 963-986.

Baron, D. P. (1982), "A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues", *The Journal of Finance*, Vol. 37, pp. 955-976.

Benveniste, L. M. and P. A. Spindt (1989), "How Investment Bankers Determine the Offer Price and Allocation of New Issues", *Journal of Finance*, Vol. 24, pp. 343-361.

Carter, Richard and Steven Manaster (1990), "Initial Public Offerings and Underwriter Reputation",

Journal of Finance, Vol. 45, pp. 1045-67.

Carter, R. B., F. H. Dark and A. K. Singh (1998),"Underwriter Reputation, Initial Returns, and the Long-Run Performance of IPO Stocks", *The Journal of Finance*, Vol. 53, pp. 285-311.

Deb, S. S. and V. B. Marisetty (2008), "Information Content of IPO Grading", Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1276243, Accessed on 7 March 2014.

Frieder, L. and A. Subrahmanyam (2005), "Brand Perceptions and the Market for Common Stock", *Journal of Financial and Quantitative Analysis*, Vol. 4, pp. 57-85.

Ghosh, S. (2005),"Underpricing of Initial Public Offerings: The Indian Experience", *Emerging Markets Finance and Trade*, Vol. 41, pp. 45-57.

Goyal, A. and I. Welch (2003), "Predicting the Equity Premium with Dividend Ratios", *Management Science*, Vol. 49, pp. 639-654.

Grinblatt, M. and C. Y. Hwang (1989), "Signaling and the Pricing of New Issue", *Journal of Finance*, Vol. 44, pp. 393-420.

Habib, M. and A. Ljungqvist (2001),"Underpricing and Entrepreneurial Wealth Losses in IPOs: Theory and Evidence", *Review of Financial* Studies, Vol. 14, pp. 433-458.

Hughes, P. J. and A. V. Thakor (1992), "Litigation Risk, Intermediation and the Underpricing of Initial Public Offerings", *Review of Financial Studies*, Vol. 5, pp.709-742.

Ibbotson, R. G. (1975), "Price Performance of Common Stock New Issues", *Journal of Financial Economics*, Vol. 2, pp. 235-272.

Khurshed, A., S. Paleari, A. Pande and S. Vismara (2008), " IPO Grading in India: Does it Add Value to the Book Building Process?", Retrieved from www.unibg.it/dati/bacheca/530/36104.pdf Accessed on 7 March 2014.

Kumar, S. S. S. (2007), "Short and Long-run Performance of Book Built IPOs in India", *International Journal of Management Practices and Contemporary Thoughts*, Vol. 2, No. 2, pp. 20-29.

Leland, H. E. and D. H. Pyle (1977), "Informational Asymmetries, Financial Structure and Financial Intermediation", *The Journal of Finance*, Vol. 32, pp. 371-387.

Lerner, J. (1994), "Venture Capitalists and the Decision to Go Public", *Journal of Financial Economics*, Vol. 35, pp. 293-316.

Loughran, T. and J. R. Ritter (2004), "Why has IPO Underpricing Changed OverTime", *Financial Management*, Vol. 33, pp. 5-37.

Loughran, T., J. R. Ritter and K. Rydqvist (1994), "Initial Public Offerings: International Insights", *Pacific Basin Finance Journal*, Vol. 2, pp.165-199.

Megginson, W. L., R. C. Nash, and M. V. Randenborg (1994),"The Financial and Operating Performance of Newly Privatized Firms, *Journal of Finance*, Vol. 49, pp. 403-452.

Nandha, M. S. and K. R. Sawyer (2002), "Ex-ante Uncertainty in Initial Public Offerings: The Indian Market", *Finance India*, Vol.16, No. 3, pp. 961-976.

Neupane, S., K. Paudyal and C. Thapa (2013), "Firm Quality or Market Sentiment: What Matters

More for IPO Investors?", *Journal of Banking and Finance*, Vol. 37, pp. 2255-2267.

Pande, A. and R. Vaidyanathan (2007), "Determinants of IPO Underpricing in the National Stock Exchange of India", *ICFAI Journal of Applied Finance*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1081272, Accessed on 7 March 2014.

Pande, A. and S. Basu (2011), "New Insights into Pricing of Book-Built IPOs in India", *International Research Journal of Applied Finance*, Vol. 2, pp. 39-45.

Poudyal, S. (2008), "Grading Initial Public Offerings (IPOs) in India's Capital Markets: A Globally Unique Concept", Retrieved from http://iimahd.ernet.in/publications/data/2008-12-08Sanjay.pdf. Accessed on 7 March 2014.

Purnandam, A. K. and B. Swaminathan (2002), "Are IPOs Underpriced?", *Working Paper*, Cornell University, New York.

Ranjan, N. and T. P. Madhusoodanan (2004), "IPO Underpricing, Issue Mechanisms and Size", *Institute for Financial Management and Research*, Chennai.

Rock, K. (1986),"Why New Issues are Underpriced", *Journal of Financial Economics*, Vol. 15, pp.187-212.

Shah, A. (1995), "The Indian IPO Market: Empirical Facts", *Technical Report*, *Centre for Monitoring Indian Economy*, Mimeo 14, pp. 1-29.

Shelly and B. Singh (2008),"Oversubscription and IPO Underpricing: Evidence from India", *ICFAI Journal of Applied Finance*, Vol. 14, pp. 65-73.

Tinic, S. M. (1988),"Anatomy of Initial Public Offerings of Common Stock", *The Journal of Finance*, Vol. 43, No. 4, pp. 789-822.

Welch, I. (1989), "Seasoned Offerings, Imitation Costs and the Underpricing of Initial Public Offering", *Journal of Finance*, Vol. 47, pp. 695-732.

Appendix

Table A.1: Estimates of the Forecasting Error
(Difference between Actual and Predicted MAR)

Company	**Actual *MAR* (in per cent)**	**Predicted *MAR* (in per cent)**	**Forecasting Error (in per cent)**	**Forecasting Error squared**
VKS PROJECTS LIMITED	-90.00	-20.27	-69.73	0.4863
BHARTI INFRATEL LIMITED	-20.00	-16.52	-3.48	0.0012
SPECIALITY RESTAURANTS LIMITED	-9.03	-16.45	7.42	0.0055
NATIONAL BUILDINGS CONSTRUCTION CORPORATION LIMITED	-9.03	-2.70	-6.33	0.0040
PC JEWELLER LIMITED	-9.03	8.64	-17.67	0.0312
TRIBHOVANDAS BHIMJI ZAVERI LIMITED	-7.95	-23.11	15.17	0.0230
V-MART RETAIL LIMITED	-4.31	14.85	-19.16	0.0367
MT EDUCARE LIMITED	10.00	18.41	-8.41	0.0071
JUST DIAL LIMITED	15.00	23.89	-8.89	0.0079
CREDIT ANALYSIS AND RESEARCH LIMITED	23.00	11.24	11.76	0.0138
			Sum	0.6167