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After Market Pricing Performance of Initial Public Offerings (IPOs): Indian IPO Market 2002-2006

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Executive Summary

This paper is motivated by the apparent belief that IPOs are underpriced on the initial listing day and thereafter underperforms compared to the market benchmark. While evaluation of the listing day performance seems straightforward on surface, it actually invokes several complications for the subsequent performance measurement. This paper focuses on the evaluation of price performance of IPOs up to a period of 36 months including the listing day. It also examines the usefulness of IPO characteristics at the time of issue to seek an explanation for the post-issue price performance.

The paper presents fresh evidence on IPO performance, i.e., short-run underpricing and long-run underperformance for 92 Indian IPOs issued during the period 2002-2006. It is reported that on an average the Indian IPOs are underpriced to the tune of 46.55 per cent on the listing day (listing day return *vis-à-vis* issue price) compared to the market index. Another contribution of this paper is the evaluation of the long-run post-issue price performance of Indian IPOs. The long-run performance of IPOs up to a period of 36 months are measured by using the two most promising evaluation techniques, i.e., wealth relative (WR) and buy-and-hold abnormal rate of return (BHAR), both being adjusted with market index, CNX-Nifty. Further, the results evidence that the underperformance is most pronounced during the initial year of trading, i.e., up to 12 months from the listing date followed by over-performance.

To get possible explanations for long-run underperformance for Indian IPOs, factors like underpricing rate (listing day return), offer size, leverage at IPO date, ex-ante uncertainty, timing of issue, age of IPO firm, rate of subscription, promoter groups retention, and price-to-book value (as proxy for growth) are considered. Evidence is found, that initial day return, offer size, leverage at IPO date, ex-ante uncertainty, and timing of issue are statistically significant in influencing underperformance. However, there is no evidence favourable to the age of the IPO firm, rate of subscription, promoter group's retention, and price-to-book value impact on the long-run underperformance.

The empirical results suggest that the investors who are investing in IPOs through direct subscription are earning a positive market-adjusted return throughout the period of study. But investors who have bought shares on the IPO listing day are earning negative returns up to 12 months from the listing date and expect to earn positive market-adjusted return thereafter. For future research, we suggest the extension of this analysis for additional explanatory variables including issue fundamental characteristics of IPO firms. The scope of the research study could even be improved by extending the time period of study prior to 2002.

KEY WORDS

Underperformance

Wealth Relatives

Buy-and-Hold Abnormal Rate

Underprice

IPO

Empirical studies document two different dimensions of post-IPO share price performance. First, that the IPOs are getting listed with significant premium to issue price (large scale underprice). As a result, investors are able to earn abnormal high rate of return in comparison with benchmark index on the listing day (Ibbotson, 1975; Ritter, 1984; Kuklinski, 2003; Purnanandam and Swaminathan, 2004). Second, the underperformance of the IPOs persists in the long run. Hoechle and Schmid (2007) find a significant underperformance of IPO firms over the first year after going public, while there is virtually no underperformance thereafter. Ritter (1991) and Jaskiewicz *et al* (2005) find that the underperformance persists usually up to three to five years after listing.

The purpose of this paper is to evaluate the post-issue share price performance of IPOs issued and listed in the National Stock Exchange (NSE), Mumbai, during the period 2002 to 2006. Post-IPO price performance has been studied with reference to both list price and offer price up to 36 months from the listing day. The study also explores whether the firm characteristics known at the time of IPO are good predictors for subsequent share price performance. Long-run price performance for IPOs is evaluated by using two different methodologies — wealth relative (WR) and buy-and-hold market-adjusted return (BHAR) — for a period of 36 months from the listing day. Both WR and BHAR are evaluated with reference to IPO issue price (henceforth, offer price) and listing day closing price (henceforth, list price).

Empirical evidence has documented that on an average IPOs yield positive listing day return (underprice) followed by negative abnormal returns (underperformance) during the first few years of trading (Omran, 2005; Aggarwal, Liu and Rhee, 2008; Hoechle and Schmid, 2007). However, no particular post-event theory has specified the duration up to which the underperformance persists. We document listing day positive returns for IPOs, followed by persistent underperformance up to the end of 12 months of trading and thereafter a positive market-adjusted return. Our findings are consistent with most of the studies conducted for the developed markets (e.g., Ritter, 1991; Purnanandam and Swaminathan, 2004; and Hoechle and Schmid, 2007).

Past research including Peristiani and Hong (2004); Agarwal, Liu and Rhee (2008); and Bessler and Thies

(2007) indicates that firm characteristics at the time of issue have predictive impact on post-IPO issue share price performance. On using OLS regression model, we find that offer size, underprice, leverage, ex-ante uncertainty, and IPO activity period (i.e., timing of issue) significantly explain the underperformance. However, variables such as post-issue promoter group holding, rate of subscription, age of IPO firm, and offer price-to-book value ratio are statistically insignificant in explaining long-run underperformance.

Broadly, there are three ways in which the paper builds and sheds further insight into the current literature. First, the recent dataset (period covering 2002-2006) has been used to uncover both short-run and long-run after-market price performance. Second, since there has been a lack of consensus on the application of the right method to evaluate the long-run performance, both market-adjusted wealth relatives (WRs) and buy-and-hold returns (BHARs) have been employed. The results obtained from the study provide an important insight for investors intending to invest in IPOs. On the basis of the empirical findings, we suggest that the long-term investors should show caution while analysing IPO firms. This empirical study also explores identification of the proxies for explaining the long-run underperformance of IPOs.

EXTANT LITERATURE

In this section, we present general literature on IPO underpricing followed by international evidence on underperformance, its estimation, theories explaining long-run performance, and the determinants of underperformance.

Majority of the IPO valuation studies focus on the listing day return. Enough empirical evidence suggests that IPOs are underpriced on the listing day (Kim, Krinsky and Lee, 1995; Sullivan and Unite, 1999; Omran, 2005; Vong, 2006; Reber and Fong, 2006; and Khurshed, Pande and Singh, 2008). Many theories are also developed to explain the underpricing of IPOs, e.g., signaling hypothesis Leland and Pyle (1977); information asymmetry model (Rock, 1986); institutional explanation and deliberate underpricing (Hughes and Thakor, 1992; Hensler, 1995; Ruud, 1993; and Taranto, 2003). More recently, Datar and Mao (2006) have suggested that the issuer company deliberately underprices the IPOs to encourage a wider subscription. Underpricing of IPOs is also

Table 1: IPO Underperformance Studies

Author/ Year	Sample Period	Country	Abnormal Return (%)	Underperformance up to
Sohail & Nasr (2007)	2000-2006	Pakistan	-38.10	12 months
Aggarwal <i>et al</i> (2008)	1993-1997	Hong Kong	-48.03	36 months
Jaskiewicz <i>et al</i> (2005)	1990- 2000	Germany & Spain	-32.80 -36.70	36 months
Alvarez & González (2005)	1987-1997	Spain	-27.80	36 months
Derrien & Womack (2003)	1992-1998	France	-6.30	24 months
Ritter and Welch (2002)	1980-2000	USA	-23.45	36 months
Espenlaub <i>et al</i> (2000)	1985-1992	United Kingdom	-21.30	60 months
Almeida & Duque (2000)	1992-1998	Portugal	-13.8	12 months
Khurshed <i>et al</i> (1999)	1991-1995	United Kingdom	-17.8	36 months
Keloharju, M (1993).	1984-1989	Finland	-21.1	36 months
Ritter (1991)	1975-1984	USA	-29.1	36 months

getting attention from the behavioural school of thought. According to the behavioural argument, over-enthusiastic investors bid the price of IPOs beyond its true fundamental value on the listing day. Empirical evidence supporting behavioural imperfection theory includes Welch (1992), Loughran and Ritter (2002), and Ljungqvist and Wilhelm (2003).

The observed abnormal listing day return (underpricing) fails to continue in the long run for Indian IPOs. In fact, IPOs are found underperforming in the subsequent periods of trading. Long-run underperformance is extensively documented in the literature (Ritter, 1991; Loughran and Ritter, 1995; McGuinness, 1992; Levis, 1993; Firth, 1997; Megginson, *et al.*, 2000; Omran, 2005; Aggarwal, Liu and Rhee, 2008; Sohail and Nasr, 2007; Hoechle and Schmid, 2007) Table 1 summarizes some international evidence on IPO underperformance. McGuinness (1992) studies the after-market performance of 80 IPOs issued in the Hong Kong market during the period 1980-90. The pricing performance of new issues indicates an excess return of 18 per cent on the initial trading day (listing day). Additionally, he finds that IPOs yield negative market-adjusted returns in the post-listing period up to three years from listing. Madhusoodanan and Thiripalraju (1997) analyse both short-run and long-run after-market pricing performance of the Indian IPOs issued prior to 1997. They indicate that in the short run, the Indian IPOs generate more market-adjusted initial return than the international IPOs. In the long run too (after one year of listing), Indian IPOs generate higher returns compared to the negative returns reported from other countries.

Long-run performance refers to the price behaviour of the IPOs beyond the listing day. International practice documents an application of a variety of methods for evaluation of long-run performance for IPOs, i.e., BHAR (Barber and Lyon, 1997; Jaskiewicz, *et al*, 2005; Bhabra and Pettway, 2003; Bessler and Thies, 2007), BHAR and CAR (Cumulative Abnormal Return) (Choi and Sang-Koo, 2006; Sohail and Nasr, 2007), WR (Ritter, 1991; Loughran and Ritter, 1995; Fama, 1998)¹, BHAR and WR (Drobotz, Kammermann and Waelchli, 2005). Barber and Lyon (1997), suggest that BHAR is more appropriate than CAR for evaluating the long-run price performance for IPOs. Lyon, Barber and Tsai (1999) argue that BHARs are more important because they precisely measure investor experience, i.e., the buy-and-hold experience. Motivated by the existing international practice, we use both WR and BHAR to evaluate the long-term after-market performance for the sample IPOs for a period of 36 months from the date of listing.

THEORIES EXPLAINING IPO UNDERPERFORMANCE

There are several explanations for the after-market underperformance of IPOs. In general, the underlying theories are often cited in the IPO literature to explain the long-run underperformance.

- **Window of Opportunity Hypothesis:** This hypothesis establishes the relationship between the timing of issue and underperformance. Ritter (1991) and

¹ Fama (1998) shows that wealth relatives (WR) are a more appropriate measure for long-run price performance than BHAR.

Loughran and Ritter (1995) argue that the firms that successfully time out their issues during the high valuation period, yield low returns for the investors in the long run. They predict that taking the advantage of queue in the high IPO activity period, the firms manage to overprice their issues. Even some young firms without having substantial growth prospects are able to raise capital from the market at exorbitant prices. However, in the subsequent periods, these issues failed to justify the valuation, as the market quickly adjusted with real valuation. Hot issue market and IPO underperformance is also documented by Jain and Kini (1994), Helwege and Liang (2004), and Loughran, Ritter and Rydqvist (1994). Hoechle and Schmid (2007) show that IPOs associated with overly optimistic growth prospects (and correspondingly high valuation levels) and IPOs going public during the hot issue periods perform substantially worse than the other IPOs. These studies have motivated us to consider *IPO activity period* as a parameter to test the applicability of ‘window of opportunity’ hypothesis in explaining the underperformance.

- ***Impresario Hypothesis or Fads Hypothesis:*** This theory argues that by underpricing IPOs, the investment banks are able to produce more demand for the issue. Underpricing also helps in creating an assured return for the initial day investors. By doing this, they succeed in creating an impression that the brokers and underwriters are giving good investment advice (Shiller, 1990). This hypothesis establishes that the initial return and subsequent underperformance moves in the same direction. More the magnitude of underprice, more is the frequency at which the subsequent correction takes place, resulting in lower returns for IPOs. Other empirical evidence supporting impresario arguments include De Bondt and Thaler (1985), Aggarwal and Rivoli (1990), and Agarwal, Chunlin and Rhee (2006). Fads hypothesis is tested on using ‘underpricing’ as one of the explanatory variable in the regression model.
- ***Divergence of Opinion Hypothesis:*** Miller (1977, 2000) empirically confirms the existence of divergence of opinion hypothesis. He suggests that divergence of opinion or uncertainty about an IPO can attract more overvaluation on the listing day, followed by underperformance in the long run. Magni-

tude of divergence of opinion among IPO investors and long-run underperformance is found to be positively related. This theory is based on the argument that the most optimistic investors tend to buy the IPOs from the market. Uncertainty in quality and pricing of IPOs create a difference in opinion among both the optimistic and pessimistic investors, resulting in overvaluation on the listing day. Subsequently, as the information flows to the secondary market, divergence of expectation gets narrowed down and large scale corrections in the prices take place. Other studies providing ample empirical support for the divergence of opinion hypothesis include Gao, Mao and Zhong (2006), Diether, Malloy and Scherbina (2002), and Houge *et al* (2001). We use *ex-ante uncertainty* as proxy for after-market price variability in the empirical model to find support for the ‘divergence of opinion hypotheses’.

- ***Entrenchment Theory:*** This explanation highlights the relationship between company control and underperformance for IPOs. Morck, Shleifer and Vishny (1988) document that risk of management entrenchment increases with an increase in ownership control. They argued that the negative effect of entrenchment is reflected more while valuing securities. Mazzola and Marchisio (2003) find that family business IPOs, where entrenchment effect is likely to be more, significantly underperform in the long run. We take *post-issue promoter group holding (PIPH)* as proxy for managerial entrenchment to test the entrenchment effect on long run performance.

Several researchers, e.g., Hensler, Rutherford and Springer (1997); Jain and Kini (1994), Bhabra and Pettway (2003); and Jaskiewicz *et al* (2005) have also examined the determinants of IPO underperformance. Firm characteristics known at the time of issue are found having a predictive impact on subsequent price performance (Jaskiewicz *et al*, 2005). They studied 153 German and 43 Spanish IPOs between 1990 and 2000 and found that the IPOs on an average earn an abnormal return of -32.8 per cent for German and -36.7 per cent for Spanish IPOs after three years of going public. They have also evidenced that company size, age of the firm going public, and family influence bear significant impact on long-run underperformance. Bhabra and Pettway (2003) find that prospectus information, i.e., pre-IPO profitability, R&D spending, relative offer size, firm size, and number

of risk factors listed in the offer document help in predicting long-run performance of IPOs. They also document that the underperformance is more severe for smaller and younger firms than that of the large-sized mature firms. Offer size, level of underpricing, insider's retention, industry affiliation, and the IPO activity period are statistically significant (and positive) in explaining long-term survival (Hensler, Rutherford and Springer, 1997). Houge, *et al* (2001) find poor long-run performance for the IPOs bundled with more uncertainties.

Besides exploring the period up to which IPO underprice persists, many of the studies mentioned in Table 1 also examine factors affecting post-issue price performance. Aggarwal, Liu and Rhee (2008) study after-market pricing behaviour of IPOs issued in the Hong Kong market during 1993 to 1997. They study the after-market performance of the IPOs in relation to the *subscription rate* (the times at which an IPO is subscribed by the investors) and find that IPOs with high investor demand realize a high initial excess return, but a negative long-run return, while the reverse is true for the low demand IPOs. They further argue that in the early phase of trading, the IPOs are unable to be priced at their intrinsic values, but eventually their true values are reflected in their pricing. A negative post-issue IPO performance was reported by Hoechle and Schmid (2007). Based on a

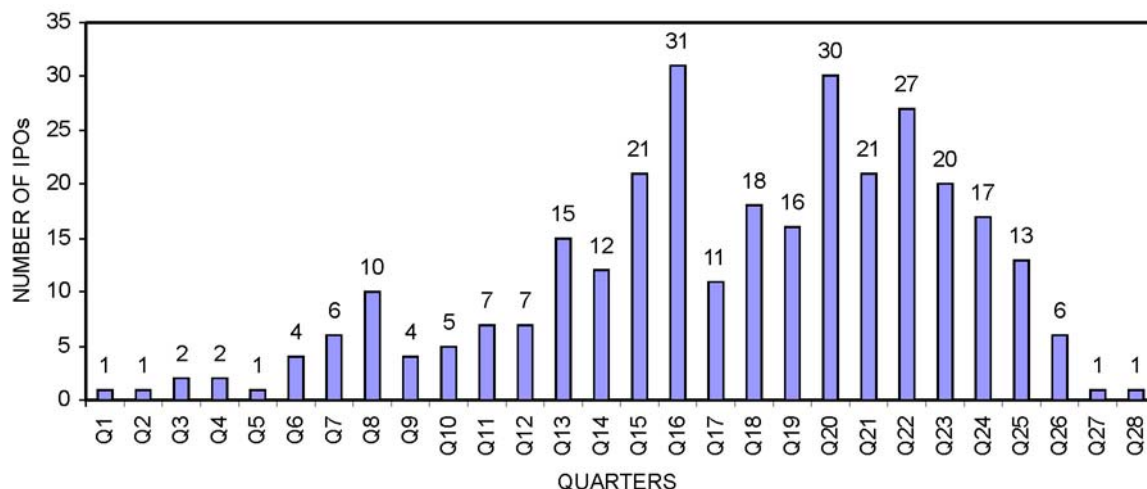
sample of 7,378 IPOs issued in USA during the period 1975-2005, they have evidenced that IPO underperformance is most pronounced during the first year of listing. However, there is no significant underperformance beyond two years from the date of listing. The after-market underperformance has been explained by the fundamental characteristics of the issue firm, i.e., market-to-book ratio, leverage, and research and development expenses scaled by sales. Further, they have found that IPOs issued during the hot period (where IPO activity is optimum) and the issues associated with overly optimistic growth prospects perform worse than the other IPOs. Table 2 provides summary of some leading studies on the key determinants of long-run after-market pricing performance in the international context.

In summary, the existing empirical evidence is unanimous on underpricing of IPOs (positive market-adjusted initial day return). Literature has also shared common views on the most observed IPO pricing performance anomaly, i.e., underpricing or overperformance followed by underperformance for IPOs. However, the literature indicates divergent findings regarding the continuity of underperformance in the post-listing scenario. Most of the studies document underperformance for the new issues up to a period of three to five years from listing. As research on the long-term stock performance of IPOs issued in the Indian market has remained a relatively

Table 2: Explanations of Long-run After-Market Pricing Performance of IPOs

Author/Year	Variable	Implication on After-market Return
Eckbo & Norli (2005), Hoechle & Schmid (2007)	Leverage	IPOs with high leverage ratio outperform in the long run compared to the low levered IPOs.
Sohail & Nasr (2007), Brennan & Franks (1997)	Ex-ante uncertainty	Statistically significant relationship between ex-ante uncertainty and underprice is documented. They also find that investors seek higher returns to compensate for their anxiety about future performance of IPOs.
Aggarwal & Rivoli (1990), Aggarwal, <i>et al</i> (2008)	Subscription rate	IPOs with high initial demand documents negative long-run excess returns.
Jain & Kini (1994), Peristiani & Hong (2004)	Ownership retention	Significant positive relation between after-market price performance and equity retention by original shareholders.
Purnanandam <i>et al</i> (2004).	Price to Book Value	Poor long-run performance is found positively related with IPOs implicitly reflecting high growth expectations at the time of issue (P/BV).
Brav & Gompers (1997), Brav <i>et al</i> (2000)	Offer size	Long-run IPO underperformance is found stronger for smaller firms.
Hensler <i>et al</i> (1997),	IPO activity	Positive relationship between level of IPO activity in the market and long-term survival is found.
Ritter (1991), Levis (1993)	Underprice	More is the initial day return worse is the long-run performance.
Ritter (1991), Bhabra and Pettway (2003)	Age of firm	Younger IPO firms underperforming more than the established firms in the long run.

Chart 1: IPO Activity in India (April 2002-March 2009)



unexplored area, one of the objectives of this paper is to study the after-market pricing performance on the listing day as well as in the long run, i.e., up to 36 months from the listing day. Besides, we explore the predictive relationship between the IPO firm characteristics at the time of issue and long-run underperformance.

DATA SOURCE AND SAMPLE SELECTION CRITERIA

Our sample data have been collected from three different sources. First, the IPO sample is derived from the Prime Database² annual reports for the period 2002 to 2006. Second, we use multiple online databases, including CMIE Prowess, <http://www.nseindia.com>, <http://www.bseindia.com>, <http://www.sebi.gov.in>, and www.capitaline.com for listing and post-listing price information. The firm-specific issue characteristics along with the primary market information are collected from Prime Database and CMIE Prowess. Finally, we complement our sample data with the Red Herring Prospectus (RHP), which was available at the Securities Exchange Board of India (SEBI) website, i.e., <http://www.sebi.gov.in>.

Our sample data covers all IPOs (equity only) issued in India during the period, April, 2002- March, 2006. For the purpose of evaluating the price performance of the IPOs for a period of 36 months from listing, we have used IPO activity up to March, 2009. As one of our ob-

jectives is to investigate, whether the timing of issue has an effect on long-run performance or not, we divide the entire period of study (2002-2009) into 28 quarters, and the frequency of IPOs in each quarter is plotted in Chart 1.

However, the period of sample selection, i.e., 2002-2006, is represented by the 16 quarters (Qr1-Qr16). If in a quarter, more than 5 IPOs have been issued, then we have treated that quarter as high activity period. In other words, a quarter with less than 5 issues is treated as low activity period. As can be seen from Chart 1, quarter nos. 1-6, 9 and 10 are categorized as low activity period. Our methodology of categorizing quarters as high/low activity period is consistent with Helwage and Liang (2004) and Hoechle and Schmid (2007).

A sum total of 129 IPOs are issued during the period 2002-2006. From this sample, we excluded 7 IPOs due to missing offer price. To examine the after-market performance (both short-run and long-run), we exclude another 18 IPO firms (including banking and financial companies’ IPOs) due to unavailability of reliable secondary market price data. Further, a sample of 12 IPOs is excluded on account of non-availability of complete information regarding company-specific financials and issue-specific attributes reducing our sample to 92 new issues, which represents 71.32 per cent of the population. Each of the 92 IPOs was tracked for 36 months from the date of listing to evaluate the long-run price performance. These data were cross-checked with the original offer documents. Secondary market price data for all sample IPOs up to a period of three years starting

² Prime Database maintains online data base of all of the initial public offerings issued in India. The database publishes the fundamental characteristics of the issues, i.e., offer size, offer price, syndicate structure, market intermediaries, etc.

from the listing day are taken from <http://www.nseindia.com>. Table 3 explains the sample size and its selection methodology.

Table 3: Description of the Sample of IPOs and Sample Selection Criterion

Total number of IPOs offered during the period	129
Exclusion number of IPOs missing offer price	07
Remaining	122
Exclusion number of IPOs missing or incomplete after-market price data (including banking and financial companies)	18
Remaining	104
Exclusion number of IPOs missing financial and other issue specific information	12
Remaining total number of IPOs eligible for study (Manufacturing = 29, Financial services and packaging =15, Media, IT, and Telecommunication =26, Others = 22) (Industry classifications for IPOs are taken from. http://www.capitaline.com and cross-referred with the RHP on which the issue firm specify the industry category.	92
Percentage of eligible companies in the sample for study	71.32

EMPIRICAL METHODOLOGY

The methodology is explained in terms of analysis of after-market price performance, i.e., performance on the listing day, followed by an estimation of long-term pricing performance over a period of 36 months from the date of listing. Benchmark-adjusted buy-and-hold return (BHAR) and wealth relatives (WR) are used to evaluate the long-run after-market returns for IPOs. The predictive influence of the firm and issue-specific factors on underperformance, i.e., long-run price performance, is then explained.

Short-run After-market Price Performance (Underpricing)

To examine the degree of underpricing of the Indian IPOs, we calculate market-adjusted initial returns for all IPOs. Market-adjusted abnormal return (MAAR) for the listing day is calculated as the difference of initial return calculated for the security (i) on day one to the benchmark return on that day. Miller and Reilly (1987) calculated MAAR using the formula as given in Eq. (1). The MAAR for the IPO stock (i) on day 1 is calculated by using Eq. (1).

$$MAAR_{i1} = \left[\frac{(1 + R_{i1})}{(1 + R_{m1})} - 1 \right] \times 100 \quad (1)$$

Where, $MAAR_{i1}$ is the market-adjusted abnormal rate of return for the stock i on day 1, R_{i1} reflects the percentage change in list price *vis-à-vis* offer price. R_{m1} is calculated as the percentage change in closing market index value on the listing day to market index on the date of closure of issue. The initial day price performance of each IPO has been calculated by using Eq.(1). The above methodology is also in line with Sohail and Nasr (2007). The S & P CNX Nifty³ (hence after Nifty) closing value has been used to calculate the market index return.

Methodology for Computation of Long-run Abnormal Returns

Motivated by the existing international practice, we use both WR and BHAR to evaluate long-term performance for a period of 36 months from the date of listing. BHAR and WR are calculated with reference to both issue price and list price.

Wealth Relatives

The performance of a group of IPOs on using the wealth relatives is evaluated for a specific point of time. Levis (1993) studied the long-run performance of 712 IPOs issued in the UK for the period 1980-88 by calculating the wealth relatives (WR), which he defined as follows:

$$WR_{it} = \frac{1 + \frac{1}{N} \sum_{i=1}^N R_{it}}{1 + \frac{1}{N} \sum_{i=1}^N R_{mt}} \quad (2)$$

Where, R_{it} is the return of the individual IPO stocks i on day t from the offer day; R_{mt} is the market index return for Nifty for the corresponding time period. We calculate the wealth relatives for different time periods, i.e., listing day, at one month, six months, 12 months, 24 months, and 36 months time from the listing day. Wealth relatives have also been evaluated for the IPOs issued each year. The total size of IPOs in the portfolio for discussion is represented by N . The methodology for the computation of WR is consistent with Ritter (1991). The

³ The Nifty is a well diversified 50 stock index accounting for 22 sectors of the Indian economy. It is used in tandem with the Bombay Stock Exchange sensitive index (BSE Sensex) for a variety of purposes including benchmarking fund portfolios, index-based derivatives, and index funds.

WRs of more than one indicates better performance of IPOs over the market index, while a value of less than one indicates underperformance of IPOs.

Buy-and-hold Abnormal Returns (BHAR)

Market-adjusted BHAR has been computed with reference to both offer price and list price. Through this method, we assess the change in the wealth of the investors for the sample IPOs by assuming that the same amount of money is passively invested in the initial day and held for a specified period (excluding initial day) and then compare these with a market benchmark. The market-adjusted BHAR as the excess return for the IPOs over and above the market return is computed as:

$$BHAR_{it} = \prod_{t=1}^T (1 + R_{it}) - \prod_{t=1}^T (1 + R_{mt}) \text{----- (3)}$$

The average BHAR for the entire sample is also calculated to find out the overall performance of the portfolio of IPOs for a specific period of time. The mean BHAR is computed as the arithmetic average of abnormal returns on all IPOs in the sample of size *N*. Mean BHAR is computed by the following formula:

$$\overline{BHAR} = \frac{1}{N} \sum_{i=1}^N BHAR_{it} \text{----- (4)}$$

A positive BHAR for a specific time period is interpreted as a better performance for the IPOs compared to the benchmark return for the same period. The advantage of this method is that the terminal values of both of the investment strategies, i.e., investment on a portfolio of IPO and market index, are compared. From the investors' point of view, BHAR indicated whether the benefit (positive initial day return) accrued in terms of investing through IPO subscription is extended to the late buyers or is completely exhausted on the listing date.

Factors affecting Long-run Price Performance

Multivariate regression (OLS)⁴ is used to test the influence of the explanatory variables on the long-run underperformance, measured by BHAR⁵. While identi-

fying predictors, we focus on those variables that have some theoretical hypothesis and proven predictive power for explaining underperformance. These include offer size (OS), ex-ante uncertainty (Ex-ante), post-issue promoter holding (PIPH), subscription rate (SUB), age of the IPO firm (AGE) initial return (UP), leverage ratio (LEV), and IPO activity period (TIME). Besides, our study also incorporates IPO characteristics intrinsic to the nature of the firms, i.e., offer price– to-book value ratio (P/BV). Table 4 outlines the detailed description of both dependent and independent variables along with the expected impact of predictors on underperformance.

The empirical OLS regression model stands as follows:

$$BHAR_{12} = \alpha_0 + \beta_1(UP) + \beta_2(OS) + \beta_3(PIPH) + \beta_4(LEV) + \beta_5(Ex-ante) + \beta_6(SUB) + \beta_7(AGE) + \beta_8(P/BV) + \beta_9(TIME) + \varepsilon \text{----- (5)}$$

Descriptive Statistics

The key characteristics of 92 IPOs are given in Table 5. Underpricing or the initial day return is estimated as the market-adjusted abnormal rate of return for the IPOs on the listing day. In other words, it is the excess return over the market benchmark being computed on using Eq. (1). The following example discusses the computation of underpricing for the IPO.

National Thermal Power Corporation Ltd. Computation of Underprice Rate (UP)	
Issue price	: INR 62.00
Issue open date	: 07-10-2004
Issue close date	: 14-10-2004
Market index (CNX-Nifty) as on issue close date	: 1794.75
List price (close)	: INR 75.55
Date of listing	: 05-11-2004
Market index (CNX-Nifty) as on list date	: 1852.30
NTPC IPO returns (Ri)/raw return	: 21.85%
Market index return (Rm)	: 3.21%
Underprice/ Market-adjusted abnormal return (UP)	: 18.06%

Table 5 indicates that underprice (UP) persists in the Indian IPO market during the study period. On an average, Indian IPOs are undervalued at 46.55 per cent at the listing price. For 16 IPOs, the list price is below the offer price indicating IPO overprice for these issues. Once

⁴ OLS regression has been used by some of the recent studies like Bhabra and Pettway (2003), Jaskiewicz *et al* (2005), Agarwal *et al* (2006) for explaining the IPO underperformance.

⁵ Wealth relatives are not considered as dependent variable in the regression model, because it is estimated as value relative for the entire portfolio of IPOs at a specific point of time. Wealth relatives are computed with reference to Eq. (2) as: $WR_{it} = 1 + \frac{1}{N} \sum_{i=1}^N R_{it} / 1 + \frac{1}{N} \sum_{i=1}^N R_{mt}$

Table 4: Summary of Regression Variables

Dependent Variable	Description	Expected Impact
BHAR	The BHAR for each IPO is estimated on using Eq. (3) for the periods, i.e., listing day, one month, three months, six months, twelve months, twenty four months, and thirty six months. BHARs are also estimated with reference to both list price and offer price. Average BHARs (equal weight for each IPO) for each period is estimated on using Eq. (4).	
Independent Variables	Description	Expected Impact
Underprice (UP)	Underprice is the initial day return being computed as MAAR by following Eq.(1). It estimates the return earned by the initial day investors by investing directly through prospectus.	+
Offer size (OS)	Offer size is the amount of capital the company wants to raise through IPO. Offer size is also referred as capitalization of the IPO firm with respect to offer price, estimated as the product of offer price with number of shares offered through IPO.	-
Post-issue promoter holding (PIPH)	Defined as the percentage of shares being owned and retained by the promoter and the promoters group, i.e., group of insiders (promoter, manager CEO, venture capitalists and employees) in the post-issue scenario.	-
Leverage ratio (LEV)	Leverage is calculated as book value of long-term debt to the paid up equity capital of the firm at the IPO date. Pre-IPO debt-equity ratio signals the financial risks of the firm.	-
Ex-ante uncertainty (Ex-ante)	Ex-post standard deviation of the market price for initial twenty trading days (inclusive of listing day) have been used as proxy for ex-ante uncertainty for the after-market performance of IPOs. It indicates the volatility of the IPOs in the post-listing scenario.	+
Times subscribed(SUB)	Indicates magnitude of response of the investors for an IPO. Estimated as the ratio of application size to the issue size (in volume), popularly referred as over subscription rate.	+
Age of IPO firm (AGE)	Age is estimated as the difference between the date of incorporation and the date at which the company goes public and has been rounded to whole numbers in years. Age reflects the magnitude of operational history of the IPO firm.	-
Price-to-book Value ratio (P/BV)	P/BV ratio is estimated as the ratio of offer price to the book value of the firm (per share) at the IPO date. Book value as net of total assets available to shareholders (book value of total assets minus outside liabilities) to the number of shares outstanding at IPO date. P/BV ratio is used as a proxy for overly optimistic growth for IPO.	+
IPO activity Period ⁶ (TIME)	Timing of IPO is regressed with the buy-and-hold return. Dummy variable 1 is used as proxy for IPO issued during hot IPO period, and 0 is used for cold IPOs.	+

we exclude those overvalued IPOs, the average underprices shoots up to 57.72 per cent, which is comparatively higher than the international evidence. The high percentage of undervaluation compared to international findings could be interpreted as Indian issuers leaving too much on the table. The median underprice is reported at 37.06 per cent. A higher spread between the maximum and the minimum values confirms large

scale fluctuations in underprice for the sample IPOs.

Table 5 summarizes firm characteristics for 92 IPOs issued during the period 2002-2006. Underprice (UP) is expressed in terms of percentage. Offer size (OS) is estimated in INR crore, while post-issue promoter holding (PIPH) is scaled in percentages. The age of the IPO firm (AGE) is reported in years. Variables such as issue price-to-book value (P/BV), subscription rate (SUB), and leverage (LEV) are denoted in times. Ex-ante uncertainties (Ex-ante) as the measure of standard deviation of post-listing price behaviour are evaluated in percentages.

Offer size is widely used as proxy for the perceived risk level of the IPO firms. Arguably, small-sized issues are more speculative than the large-sized issues and hence command more underprice (Beatty and Ritter, 1986). Ritter (1984) and Lougrhan and Ritter (1995) use size

⁶ Specifically, we want to investigate whether the timing of issue has an effect on long-run performance. We have divided the IPO issue period (2002-2006) into 16 quarters, and the frequency of IPOs in each quarter is noted as given in Chart 1. By ranking all quarters in terms of frequency of issues, we classify quarters with more than 5 IPOs as high IPO activity period. The classification scheme translates 20 IPOs as part of low activity period while the remaining 72 is part of high activity period. In the OLS model, IPO activity period variable has been taken as 1 for the IPOs issued during the high activity period while it is 0 for IPOs issued during low activity period. This methodology is consistent with Helwege and Liang (2004), Hoechle and Schmid (2007).

Table 5: Descriptive Statistics of Variables used in the Study

Variables	Mean	Median	Max. Value	Min. Value	Standard Deviation	Skewness	Kurtosis
UP	46.55	37.06	258.31	-16.47	54.43	1.83	3.95
OS	297.17	91.94	5,428.90	7.50	825.1	5.44	31.74
PIPH	59.92	61.08	89.50	25.35	13.195	-0.196	-0.378
AGE	14.93	13.00	57.00	1.00	9.854	1.454	3.068
P/BV	4.41	2.87	41.57	-25.47	7.26	2.321	15.7
SUB	23.88	18.16	175.87	1.12	23.56	3.281	18.22
LEV	1.37	0.52	10.84	0.02	0.39	3.46	13.6
Ex-ante	13.57	9.33	84.65	0.70	13.98	-2.24	7.19

along with age, and industry classification as proxy for risk. The mean offer value of the IPOs issued during the period 2002-2006 is INR 297.14 crore. The lowest and the highest offer size was INR 7.5 crore and INR 5,428.90 crore respectively. Large differences in maximum and minimum offer size indicate a wide variation in the distribution of this variable.

Average PIPH is 59.92 per cent with a median value of 61.08 per cent. Skewness and kurtosis values suggest the near normal distribution for the variable. Pre-IPO promoter groups' average holding in the firms stands at 86.12 per cent (data is not reflected in the table). Hence on an average, the promoter groups dilute 26.20 per cent through IPOs while keeping the majority share ownership and control with them. The low percentages of dilution through IPOs and holding of high percentages of equity in the post-IPO scenario reflect the promoter group's confidence in the IPO firms. The average age for the Indian IPO firms is 14.93 years. There are nine firms with an age of more than 30 years and if we exclude these firms from the sample, then the average age for the firms would be 12.75 years, which is virtually similar to the median age of 13 years for the sample IPOs. It indicates that the sample is uniformly distributed in terms of their operational history.

P/BV ratio reflects the fundamental valuation multiples for the firm at the time of issue. It is also widely presumed as growth proxy for the IPO firm. As shown in Table 5, the P/BV ratio varies from -25.47 to 41.57 times, with a standard deviation of 7.26. Only one IPO firm, i.e., 'Allsec Technologies,' reported a negative BV making the P/BV ratio negative. Once we exclude that firm, the minimum P/BV value for the sample is found to be 0.29 times. A huge difference in the P/BV values (range between maximum and minimum values) makes it a

very important variable for our analysis. On an average, the IPOs got subscribed 23.88 times. The median value for the over-subscription rate is 18.16 with a standard deviation of 23.56. The mean SUB value is more than the median value indicating that a large number of issues are subscribed at a higher rate. Further, a significant difference between the maximum and the minimum value of SUB along with a large standard deviation suggests wide variations.

Leverage is estimated as the ratio of book value of long-term debt to paid-up equity capital of the firm. The debt component in the capital mix indicates the exposure of the IPO firm towards risk capital. Pre-IPO leverage signals financial risk and hence affects valuation of the IPOs. Table 4 indicates that the mean value of leverage is 1.06 times. Median values of 0.52 indicate that the average IPO firms do not have a risky capital structure at the time of becoming public.

Ex-ante uncertainty is used as proxy for risk surrounding the IPOs. Unfortunately, we do not have historical market price data for IPOs. We therefore use ex-post standard deviation of the market price for the initial 20 trading days as proxy for ex-ante uncertainty in our regression analysis. Sohail and Nasr (2007) also undertake ex-ante uncertainty as proxy for market risk of IPOs. They estimate standard deviation of the first 20 days' return of IPO as a measure of ex-ante uncertainty and document significant relationship between ex-ante uncertainty and underprice. In the Indian context, Ghosh (2005) uses volatility of stock return just after the listing as proxy for uncertainty. The data for ex-ante in Table 5 report a mean value of 13.47. Though the highest value is 84.65, a low median value of 9.33 indicates lesser variability in the post-listing prices.

EMPIRICAL FINDINGS

Evaluating Price Performance on using WR

To separate the short-run phenomenon and the long-run underperformance, it is important to consider the performance of IPOs from the issue price as well as listing day closing price. After-market performance is evaluated for a period of 36 months from the initial day. The after-market performance for the sample IPOs has been computed with reference to offer price and listing day close price by using both WR and BHAR. Table 6 highlights WR with respect to offer price and listing day closing price.

Wealth Relatives

Table 6 reports 36 months' wealth relatives for all the 92 IPOs issued during the period 2002-2006 in the Indian IPO market. The period of study taken for estimation of wealth relatives includes listing day, one month, six months, twelve months, and twenty four months from the date of listing. Following is the formulae by which the wealth relatives are computed:

$$WR_{it} = \left(1 + \frac{1}{N} \sum_{i=1}^N Rit\right) / \left(1 + \frac{1}{N} \sum_{i=1}^N Rmt\right), \text{ which is consistent with Ritter (1991).}$$

Where, Rit is the return for individual IPO stocks i at time t , Rmt is the market index return for the corresponding time. The total size of IPOs in the portfolio for discussion is represented by N .

Table 6: WR with respect to Offer Price and Listing Day Closing Price

Time Period	WR Calculated with Reference to List Price COLUMN (A)	WR Calculated with Reference to Offer Price COLUMN (B)	Number of IPOs(N) (redundant column)
Listing day (L)	NA	1.466	92
L + 1 months	0.975	1.426	92
L + 6 months	0.995	1.402	92
L + 12 months	0.998	1.416	92
L + 24 months	1.043	1.537	92
L+ 36 months	1.063	1.469	92

Table 6, Column (A) reports an increasing trend in the WRs starting from one month to thirty six months from

the date of listing. Less than one values for the WRs are reported up to 12 months from the listing date. However, WRs of greater than one are found beyond 12 from listing. The WRs of more than one indicates better performance for IPOs over the market index, while a value of less than one indicates underperformance for the portfolio of IPOs. Our findings suggest that the IPOs underperform up to 12 months from the date of listing and thereafter the set of IPOs outbeat the market index. Alternatively, the portfolios of sample IPOs for the period 2002-2006 are consistently losing their values with respect to the market benchmark till 12 months from listing. It can also be interpreted in such a way that the initial day traders who have purchased the IPOs at the initial day closing price and have held it for one, six, and twelve months, cannot expect positive market-adjusted returns. However, in the longer period (more than 12 months), positive returns can be expected.

Table 6, Column (B) reports WRs with respect to offer price. WRs are greater than one across all time periods, i.e., one, six, twelve, twenty-four, and thirty-six months. This indicates that underperformance does not exist when offer price is considered. In other words, those investing in shares during IPO offer period are able to get positive returns up to three years from listing. However, the pattern for WRs shows a continuous declining trend up to one year and fluctuates thereafter, though WR for 24 months and 36 months are higher than WR on the listing day. On the listing day, WR is found at 1.466, indicating that the IPOs generate 46.6 per cent return when compared to the offer price. In other words, the IPOs are underpriced at a rate of 46.6 per cent on the listing date. Hence it can be concluded that IPO investors should either sell their shares on the listing day or should wait for a period longer than two years before selling it to earn an abnormal return.

On comparing the results for Column (A) and Column (B), it can be inferred that investors buying at the list price do not benefit till 12 months from the listing date. Our findings are consistent with international evidence (Ritter, 1991; Levis, 1993; Almeida and Duque, 2000; and Jaskiewicz *et al*, 2005). The initial subscribers who are investing at offer price are able to earn an abnormal rate even for a longer period up to 36 months from the date of listing.

Evaluating Long-run Price Performance on using BHAR

Table 7 details the long-run performance of IPOs using BHAR. It reports the distribution of BHAR from the listing day up to 36 months, with reference to both offer price and list price. Panel 'A' shows market-adjusted 'BHAR_List,' computed from the list price. Panel 'B' reports 'BHAR_Offer' being evaluated with reference to offer price.

The empirical results in Panel A of Table 7 shows negative BHARs up to 12 months from the date of listing. For longer periods, e.g., 24 months and 36 months, positive BHARs are documented. Negative BHARs can be interpreted as IPOs underperforming the market benchmark during the period, while positive BHARs indicate overperformance in relation to the market index. This suggests that there is significant underperformance till 12 months from the listing day which vanishes thereafter. The results also suggest that the investors who are investing in IPOs at a list price must hold these shares beyond one year to earn a positive return on it. The mean BHAR for 24 and 36 months from the initial day are found at 1.96 per cent, and 0.35 per cent respectively. In contrast to international evidence (Aggarwal, Liu and Rhee, 2008; Alvarez and González, 2005; and Ritter and Welch, 2002), where the underperformance even continued up to 36 months, we find positive benchmark-adjusted return after one year. Median BHAR values are always (for the entire period of study) found to be less than the mean values, which reflects the often-cited characteristic of IPOs as being long-term investments.

Table 7 reports buy-and-hold abnormal returns. The BHAR_list is measured from the listing day closing price

and the BHAR_offer is measured from the offer price. The sample consists of 92 Indian IPO firms, which are subsequently listed in the National Stock Exchange, Mumbai, and the Bombay Stock Exchange, Mumbai, from 2002-2006. The buy-and-hold abnormal return (BHAR) is defined as follows:

$$BHAR_{it} = \prod_{t=1}^T (1 + R_{it}) - \prod_{t=1}^T (1 + R_{mt})$$

Where, R_{it} is the return of the individual IPO stocks i at time t and R_{mt} is the market index return for Nifty for the corresponding time t .

Table 7, Panel B reports average BHAR_Offer at 46.55 per cent on the listing day, which fails to keep its momentum as the trading continues. However, throughout the period of study, the IPO portfolio records positive BHAR, suggesting that the investors investing at the offer price are able to get positive returns throughout the holding period. Exactly at 24 months from the listing day, the IPOs are able to generate a maximum market-adjusted BHAR of 50.13 per cent, which is significantly higher than the initial day return. This can be attributed to large scale bullishness in the market during the period 2006-07 and 2007-2008.⁷ While comparing the BHAR_List and the BHAR_Offer, it is apparent that the list day traders cannot get short-term excess returns in India (at least up to two years from listing). It is only those investors who acquire stocks through direct subscription to IPOs are able to earn excess returns compared to the market index. Hence it can be concluded that if investors buy shares during IPO offer period at offer price, they will get a return higher than the market return across all periods. However, if investors buy shares on the listing day, their return will not match the

Table 7: Buy and Hold Return (BHAR) Relative to List Price and Offer Price

Periods Post-IPO	Panel A: BHAR_List (Relative to List Price)			Panel B: BHAR_Offer (Relative to Offer Price)		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
Listing day	NA	NA	NA	46.55	37.06	54.44
L + 1 month	-1.98	-3.04	19.58	44.17	29.31	63.72
L + 6 month	-2.06	-14.07	57.54	39.40	18.64	81.65
L + 12month	-1.44	-21.96	80.61	41.24	5.17	118.13
L + 24 month	1.96	-30.47	125.24	50.13	-6.69	221.06
L + 36 month	0.35	-61.27	159.10	41.91	-42.02	233.28

⁷ Most of the IPOs in our sample got listed during the period 2004-2005 and 2005-2006. Twenty four months from the listing day for these set of IPOs falls in the period 2007-2008, which witnessed bullishness in the secondary market.

index return.

Explanation for IPO Underperformance

The BHARs for the IPOs up to a period of 36 months from the date of listing are computed by using Eq. (3). BHAR at 24 and 36 months from the date of listing are excluded from the regression analysis, as overperformance for IPOs are reported. However, we find underperformance, i.e., negative (average) BHAR up to initial 12 months of trading. Hence BHAR_12 which measures the underperformance rate for buy-and-hold return for the IPOs at 12 months from listing is taken as predicting variable.

The empirical OLS regression model using BHAR_12 as dependent variable is as follows:

$$BHAR_12 = \alpha_0 + \beta_1(UP) + \beta_2(OS) + \beta_3(PIPH) + \beta_4(LEV) + \beta_5(Ex - ante) + \beta_6(SUB) + \beta_7(AGE) + \beta_8(P/BV) + \beta_9(TIME) + \varepsilon \text{ ----- (6)}$$

Table 8 presents OLS regression results for Eq. (6). Empirical results indicate that the taken variables, i.e., UP, OS, PIPH, LEV, Ex-ante, SUB, AGE, P/BV, and TIME collectively explain the variation in BHAR_12 (underperformance) by 21.60 per cent ($R^2 = 0.2160$). Less value for R^2 is also reported in the international literature⁸ (Bhabra and Pettway, 2003, Jaskiewicz et al., 2005, Agarwal et al, 2006). Results in Table 8 indicate that the variables including UP, OS, LEV, Ex-ante, and TIME are statistically significant in explaining BHAR_12. The variables i.e. PIPH, SUB, AGE, and P/BV are statistically insignificant. While doing the regression for underperformance, we take care of the possibility of heteroskedasticity and multicollinearity⁹ problems. The diagnosis

⁸ Bhabra and Pettway (2003) estimate adj.R²= 14.96%, Jaskiewicz et al. (2005), estimate R² value of 16.3%, Agarwal et al., (2006) estimate R² = 21%.

⁹ The tolerance and VIF values for all independent variables are within the acceptable limits, i.e., tolerance values of more than 0.19, and VIF values of less than 5.3 are documented for each independent variable. Further the conditional index (CI) values are reported at less than 30, indicating the absence of multicollinearity. The Durbin-Watson statistics value is estimated at 1.867, which is close to the 2.0 (and substantially higher than 1.0), showing no evidence of autocorrelation. Homoskedasticity assumption is also tested through the levene's test using SPSS. The significance values for the variables PIPH, AGE, and SUB are reported as 0.556, 0.738, and 0.362 respectively. The significance result for homogeneity of variance for the variables are >.05, which shows that the error variance of the dependent variable is equal across the groups. Hence no heteroskedasticity is observed for the variables, PIPH, AGE, and LEV.

test for the linearity of the variables is tested effecting transformations for the independent variables.¹⁰

Table 8 reports the coefficient estimates and *t*-values from OLS regressions. The dependent variable in the regressions is the IPO firms' one-year buy-and-hold abnormal returns (BHAR_12) compared to market benchmark of Nifty. The explanatory variables are under price (UP), IPO activity period, scaled by a dummy variable of 1 for the hot IPO period and 0 for the cold IPO period (TIME), Offer size (OS), age of the IPO firm (AGE), Price-to-book value ratio (P/BV), Post-issue promoter group retention (PIPH), debt-equity ratio of the IPO firm at IPO date (LEV). Ex-ante uncertainty is estimated as standard deviation for post-issue after-market prices for initial 20 trading days (Ex-ante); subscription rate is calculated as the ratio of application size scaled by the issue size in volume (SUB). The sample data comprises

Table 8: Multivariate BHAR Analysis: Firm Characteristics and IPO Performance

Variable	Unstandardized β Coefficients	t Value	Interpretation
Constant	94.627	1.849	Significant*
UP	-0.301	-1.574	Significant*
OS	-10.761	-1.488	Significant*
PIPH	-0.385	-0.582	Insignificant
LEV	10.449	2.022	Significant**
Ex-ante	12.354	1.451	Significant*
SUB	11.196	1.056	Insignificant
AGE	-0.556	-0.671	Insignificant
P/BV	-0.400	-0.710	Insignificant
TIME	-82.114	-3.722	Significant***
$R^2 = 0.2160$			
F value = 12.511*			

Note: Values marked with *, **, and *** indicate significance at the 10%, 5%, and 1% level.

¹⁰ OLS regression for Equation 6 with transformed variables was also undertaken as confirmatory measure. We find no significant change in the beta coefficient values as well as directions (Positive/negative) variables when the transformed data is used. However for P/BV we report insignificant but negative regression coefficient with BHAR_12, which is different to the untransformed version of the variable. But the result is statistically insignificant. Hence it doesn't lead to any significant impact on the earlier interpretation for the determinants of BHAR_12. We also document a decline in the estimation power of the OLS regression when the transformations are effected for the independent variables. As there is no significant improvement either in the variables or the model itself we resort to the analysis and interpretations of the regression results of the variables in the untransformed form.

92 IPO firms going public in the period 2002-2006.

Table 8 establishes that UP, OS, LEV, Ex-ante, and TIME document significant predictive relationship with underperformance. Amongst the significant variables, UP, OS, and TIME show negative association with underperformance, while both LEV and Ex-ante are positively related with underperformance. Statistically, the most significant variable¹¹ in our regression model is timing of IPO activity, which has a negative sign, and thus has an inverse impact on the long-run IPO market performance. Put it differently, IPOs issued during the period when IPO activity is more, the after-market return is reported less, indicating more underperformance in the long run. These results are found to be consistent with the market timing theory (window of opportunity hypothesis), Loughran and Ritter (1995); Helwege and Liang (2004) and Loughran, Ritter and Rydqvist (1994).

The second most important variable in Table 8 is the leverage ratio. The coefficient estimate of 10.449 is positive and is significant at 5 per cent indicating that IPOs with high leverage ratios underperform compared to IPOs with low leverage ratios. The empirical results for the impact of leverage on subsequent after-market performance is consistent with Eckbo and Norli (2005) and Hoechle and Schmid (2007). However, it is important to note that leverage is affected by the IPO issue itself through the issuance of new equity and is likely to be adjusted subsequently. Such dynamic changes in firm characteristics cannot be captured in a BHAR regression framework.

Consistent with literature (Ritter, 1991; Levis, 1993; Agarwal, Chunlin and Rhee, 2006), we document statistically significant, but negative relationship between the listing day return (underpricing) and market-adjusted BHAR_12 at 12 months from the date of listing. IPOs with a higher initial return generate lesser subsequent performance, suggesting that the high expectation of the investors at the maiden trading day fails to extend to the following trading periods. It can also subscribe to the view that the excessive mispricing due to information asymmetry in the bull run (2002-2006) starts making correction in the after market; hence downward

pressures in the prices are observed. The IPO firms with a high initial day valuation ends with low after-market returns. Conversely, firms with low initial returns, i.e., a relatively low market price on the first day of trading outperform in the subsequent trading periods in the long run. Empirical results are found inconsistent to Kooli, L'her and Suret (2006).

In order to explain the effect of firm size on underperformance, we run OLS regression with offer size as proxy for the firm size. The empirical results reveal that offer size has statistically significant but negative relationship with BHAR_12, suggesting that larger the offer size the lesser is the magnitude of long-run underperformance. A stronger long-run underperformance is observed for small-sized firms.

Our model findings indicate that the ex-ante uncertainty variable has a positive sign. It indicates that ex-ante uncertainty has a positive influence on long-run underperformance. The results suggest that the IPOs surrounded with more risk at the time of issue underperform more in the long run than the IPOs with less risk. The findings are not exactly in line with Ritter (1984) and Sohail and Nasr (2007). Both these studies have found significant positive relationship between IPO return and ex-ante risk proxies for uncertainty while our findings do not corroborate ex-ante to be significant variable.

Our results also clearly indicate that PIPH, SUB, AGE, and P/BV are not significant in estimating BHAR_12. However, their relationships with BHAR_12 have interesting dimensions. These variables excluding SUB show negative regression coefficients with underperformance. Negative regression coefficients for AGE suggests that more mature firms underperform less compared to the younger firms. Similarly, the IPO firms in which the post-issue promoter groups' retention is more, underperformance is less. The positive regression coefficient between underperformance and SUB suggests that initial enthusiasm for IPO fails to continue in the after-market in the long run.

CONCLUSION AND IMPLICATIONS

This paper examines the after-market price performance for initial public offerings issued during the period 2002-2006. We present fresh evidence on IPO performance anomaly, i.e., initial day underprice and long-run underperformance for a broad set of 92 Indian IPOs. We

¹¹ Standardized regressions coefficients (beta) values for TIME, LEV, UP, OS, and Ex-ante are estimated at -0.397, 0.229, -0.203, -0.178 and 0.167 respectively. The data was not shown in the table.

report that on an average, the IPOs are underpriced to the extent of 46.55 per cent at the list price. The high initial day return may be due to the over-expectations of the investors.

Using both wealth relatives (WRs) and buy-and-hold abnormal return (BHARs) as price performance measure, we estimate the long-run performance for the sample IPOs up to a period of 36 months from the date of listing. We find that the IPOs significantly underperform the market benchmark up to a period of 12 months from the date of listing and vanish thereafter. In fact, we document that the IPOs are also over-performing the market benchmark at 24 and 36 months from the initial day. In conclusion, we find fresh evidence on IPO price performance anomaly, i.e., underpricing followed by underperformance. However, contrary to international evidence where the underperformance continues up to three to five years, our results show underperformance up to the initial year of trading only. Moreover, by using buy-and-hold return as an alternative measure for evaluation of IPOs, we find that investors who buy at offer get positive returns throughout the period, while the initial day traders are required to wait for more than 12 months to earn a positive return.

As a possible explanation for long-run underperformance, when compared to market benchmark, we find evidence in support of IPO activity period, leverage, initial day return, offer size, and ex-ante uncertainty. However, we find no evidence favourable to the age of the IPO firm, rate of subscription, promoter group's retention, and price-to-book value in predicting the long-run underperformance. On the basis of the above findings, we suggest the following towards explaining underperformance: First, IPOs issued during a high IPO activity period shows less returns because the over-expectation of the investors in the bullish market fails to continue for a long period. Second, consistent with the

window of opportunity hypothesis, the issuers on taking the advantage of bullishness might put premium valuation at offer (inefficient pricing). When these shares start trading in the secondary market, the inefficiency in the pricing gets corrected, resulting in less valuation. Third, risky IPOs fail to attract more interest from the investors, i.e., IPOs perceived to be more risky and uncertain at the time of issue results in greater underperformance.

The results obtained from the study provide important information to investors intending to invest in IPOs. We find that IPOs are underpriced on the listing day. Investors investing in IPOs at the offer price and holding these shares over a longer period are better-off compared to investors investing in shares on the listing day. Investors investing at the list price would not get excess returns at least up to two years from listing.

Pre-IPO firm-specific characteristics such as age, post-issue promoter holdings, and price-to-book value cannot be relied upon for judging the long-term and short-term performance. However, offer size, leverage, and timing of the issue need to be analysed carefully. On the basis of the empirical findings, we suggest that the long-term investors should exercise caution before investing in IPOs. Issuing firms and investment banks could be able to make a trade-off in the short-term underpricing and long-run underperformance. In a broader sense, the empirical research can be referred to as a manual for assessing potential returns ascribed to the IPOs as per the market condition and issue-specific signals. The research is amenable to filling up the gap in identifying the proxies for explaining the long-run underperformance of IPOs. Last but not least, the research would be able to provide a new dimension to the research on IPO value and its impact on the post-listing performance. ✓

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