Article

Do analyst's pre-issue recommendation create value? Empirical evidence from Indian IPO market

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ABSTRACT

This study investigates impact of pre-issue analysts coverage on IPO performance i.e. subscription rate, underpricing, volatility and liquidity. Using pre-issue analyst's recommendation for a sample of 157 IPOs issued in India during the period 2007–2012, we find that analysts' recommendation reduce underpricing. Precisely, more analysts participated in issuing recommendation (including favorable recommendation) reduce underpricing. The result also shows that favorable recommendation issued by more number of participating analyst's boosts confidence of potential investors and hence probability of getting success for IPOs in terms of oversubscription is more. Further, affiliated analysts are associated with lesser oversubscription rate. Additionally, independent analyst's recommendation is inversely associated with underpricing. In support of IPO grading, which is a unique practice in India, we find that superior grading reduce underpricing and attract more response from investors. Further, evidence suggests that pre-issue analyst coverage increase oversubscription rate, while reduce listing day volatility and liquidity for IPO stocks.

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1. Introduction

Analysts' coverage including research coverage has become an essential element of the security issuance process in recent years. Existing studies (Dunbar, 2000; Clarke et al., 2003) find that underwriters utilize analyst firm's to increase their market share in the IPO market. By moving one step ahead, Clarke et al. (2003) document that underwriters prefer to include all-star analysts to gain greater IPO market share. Analyst coverage might be valuable for IPO market participants on account of several reasons. First, analyst coverage can generate publicity for issuing company, thereby potentially increase firm value by generating more customers. Better analyst coverage might lead to greater investor recognition of the IPO firm. Greater investor recognition can lead to higher value for company Merton's (1987). Second, post-IPO analyst coverage boost share price, which can be especially important for insiders wishing to sell their shares in the open market (Chen and Ritter, 2000; Aggarwal et al., 2002). Third, studies suggest that lead investment banks prefer to recruit more co-managers (having own research wing) as part of underwriting syndicate to garner more

analyst coverage following the IPO (Loughran and Ritter, 2002). Bradley et al. (2008) also find evidence that larger syndicate helps in generating more information via after market analyst coverage. Fourth, coming to issuing firm view point, most of the analysts demonstrate biasness while issuing coverage. Analyst firm's coverage is in line with the management policy of the issuing firm (McNichols and O'Brien, 1997). He also finds that analyst's coverage for initial and seasoned public offerings are systematically more optimistic. Finally, analysts are often good at picking mispriced stocks as they have expertise in market study.

Analysts play an important role in capital markets in general and IPO market in particular. For example, by doing in-depth research for their large institutional clients and employers, analysts help in guiding a substantial sum of capital to more productive uses in our economy. Research analysts study fundamentals of firms and project the likely performance on the basis of industry, economic, and business trend information to help their clients make better investment decisions. In an IPO context, if analyst's coverage is available before issue open can helps in reducing information asymmetry between issuing firm and the prospective investors. Even analyst approval from a reputed investment bank (or brokerage firm) may also act as a certification of quality for the issue. Retail investors might believe that most analysts work for them as part of their primary obligation to the investing public. However, full story

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is much more complicated. Some analysts are unaffiliated and they sell their independent research to financial or investment institutions, banks, insurance companies, or private investors on a project or subscription basis. But a large number of analysts are employed by institutions whose financial stake in their coverage may go well beyond their accuracy. Taken together, it is always challenging to investigate whether analyst's issuing coverage (or recommendation) helps in creating value for new issue market participants (i.e. issuing firm, investors, and underwriting firms).

Analyst coverage and its impact on stock price performance of existing listed firms are expansively documented in capital market literature (Moshirian et al., 2009; Jegadeesh and Kim, 2006; Chen and Ritter, 2000; Womack, 1996). However, little evidence is recognized on value implication of pre-issue coverage provided by analysts. In this paper, we hypothesize that whether analysts are doing any value addition in the IPO market, while providing pre-issue recommendation. Value insinuation of analyst coverage for an IPO firm is evaluated at four different points i.e. subscription rate, initial day return (underpricing), after market volatility and liquidity. Taken together, this study is motivated to uncover the usefulness of analysts' recommendation and coverage for making IPO a successful event. In this paper we address five key issues relating to IPO market i.e. (a) Whether analyst recommendation is useful in attracting more subscription from the investors or not?, (b) Can analyst endorsement (pre-issue) for IPOs helps to reduce underpricing?, (c) How do analyst's pre-issue recommendation affect volatility of IPO stocks, both on listing and in aftermarket, and (d) Does analysts' approval of the IPO trigger more liquidity in the market?

The Indian IPO market offers an important setting to extend our understanding of pre-issue analyst coverage (or recommendation) on subscription rate, initial day return, after market volatility and liquidity. Following are the few aspects by which Indian IPO market distinguishes itself from other developed markets: first, unlike US Indian book building mechanism is highly transparent, which allows investors to access subscription related information during book building period. However in US and UK investors are only allowed to access bidding information once book building period is over. Second, Indian regulation does not impose any restrictions on issuing pre-issue coverage. On the surface it is found that brokerage houses including market analysts publish analysts' reports on upcoming IPOs providing investment advice i.e. subscribe, or not to subscribe. Third, another important aspects of IPO process is that with effect from May 1, 2007 it was made mandatory for all IPOs issued in India to be rated by a professional rating agency, and the rating score (assigned on a five-point scale) needs to be revealed in the prospectus. IPO rating is one-time assessment of fundamentals of IPO firm at the time of issue and is intended to aid the prospective investors in their decision making. IPO grading sets an international precedent in primary market regulation (Jain and Sharma, 2008). Fourth, Indian regulation allows the issuers to cap the price band at 20% of the floor price, which is relatively wider than the practice followed in US IPO market.[1] Within the framework of wider price band, Indian IPOs are found priced within the price range, a practice identical to European IPO market. Fifth, unlike USA and other European countries, all valid bids are legally binding in India and all successful bidders are obligated to take allocation of shares. Sixth, Indian IPOs are required to get it listed within twelve days from book closure date, which is significantly higher than the practice being followed in USA. In USA there is no time gap in between offer closing date and listing. Finally, Indian IPO market is passing through a transition phase, where a substantial number of IPOs

are getting oversubscribed at a higher rate in comparison to the developed economies.

This paper examines relationship between pre-issue recommendation (and coverage) issued by analysts and IPO pricing performance. Using a sample of 157 IPOs issued in India during 2007–2012, this paper motivates to interlink between analyst's pre-issue recommendation and IPO performance i.e. underpricing, rate of subscription, aftermarket liquidity, and volatility. Taking cue from the signalling theory, this study postulates that endorsement from analysts is proved to be a useful signal of quality for the issue. Predictive relationship between pre-issue coverage and underpricing is unlikely to be subject to endogeneity issues, because underpricing occurs only on initial day of trading (when listing day close price is compared with offer price) and is unlikely to affect analyst's coverage. Further, analyst's pre-issue coverage is not subject to confounding events, because analyst's coverage for an IPO impounds all information (including fundamentals) available before an issue open for subscription. We evaluate analyst recommendation from five different perspectives i.e. (a) number of analysts participated in issuing coverage (or coverage), (b) analysts affiliation to lead investment bank including any underwriting syndicate member participating in an IPO, (c) strength of coverage, measured as ratio of number of analysts issue favorable coverage to total number of coverage issued by participating analysts, (d) analysts score issued by independent analyst's i.e. capital market database[2] and (e) IPO grading issued by rating agencies, which is unique to the Indian IPO market. Rating agencies contended that IPO rating is an independent and unbiased opinion of a rating agency. Besides analyst coverage characteristics, other control variables i.e. age of the firm, offer size, and venture capital (VC) participation are used in the econometric model to control maturity, size and VC effect.

We find that analyst's recommendation reduce underpricing. More favorable recommendation including larger pre-issue coverage significantly reduces underpricing for IPOs. We predict that superior graded IPOs are lesser underpriced than poorly graded IPOs. Investigating impact of venture capital participation, we shows that IPOs affiliated to venture capital firms are comparatively lesser underpriced than non-affiliated IPOs. Further, it is documented that some independent analysts prefer to recommend underpriced IPOs. We find a strong positive relationship between analyst recommendation and subscription rate. Increasing consensus among analysts providing pre-issue positive recommendation helps in attracting more response from potential investors. Even recommendation from affiliated analysts including IPO grading trigger positive response among investors. In other words, analyst's coverage is proved as an attestation of quality for IPO firm. These findings provide novel evidence on the role of analyst's coverage on IPO performance. Further, we find that pre-issue analyst coverage reduce aftermarket volatility and increase liquidity for IPO stocks both at listing date and post listing period up to one month from listing.

This study is of particular interest for three reasons; first, we investigate impact of pre-issue analyst's coverage on IPO performance, while most studies link underpricing and post-issue analysts following IPO. This represents a departure from earlier studies by proposing the causality moves from analyst coverage available before the issue open to IPO performance i.e. underpricing, subscription rate, and aftermarket volatility. Theory suggests

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[1] In the USA IPO market a typical price range of $2 or 10% of the floor price is followed.

[2] Not affiliated to any syndicate members, issuing firm and capital market database. In other words, these independent analyst firms are neither a subsidiary nor a joint venture of any of the participants including issuing firm, book running lead managers, participating syndicate members and capital market database.

that underpricing directly results from unbending information asymmetry among the participants. Second it extends existing literature on association between analyst coverage and underpricing. Our evidence validates that analysts issuing coverage before the issue reduces underpricing and hence reduce information asymmetry. Third, contribution of this paper is that it adds to the recent literature on impact of analyst's pre-issue coverage on subscription rate, volatility and liquidity in the aftermarket i.e. up to initial one month from listing. Oversubscription rate and IPO market facilities have grown significantly in recent years in India and witnessed significant reduction in underpricing. In contrast to international evidence, we find larger proportion of favorable recommendation (buy) is not associated with underpriced IPOs. Fourth, study has been applied on emerging Indian IPO market, having unique features i.e. IPO grading, book building (transparency in the offer process), anchor investors and many more.

The rest of the paper is organized as follows: Section 2 reviews existing literature on value implication of analyst's coverage/recommendation. Section 3 describes sample of IPOs and its selection. Section 4 presents the methodology including estimation and explanation of variables, and econometric models. Section 5 provides descriptive statistics for taken sample IPOs. Section 6 discusses empirical results. Section 7 concludes the paper along with implication for theory and practice.

2. Extant literature

Association between underpricing and post-listing analyst's coverage are well documented in the literature (Chemmanur, 1993; Cliff and Denis, 2004). Chemmanur (1993) predicts that direction of causality moves from underpricing to analyst coverage i.e. more underpriced IPOs attract more coverage from analysts in aftermarket. Moving one step further, Cliff and Denis (2004) find that underpricing is a part of compensation for expected post-IPO analyst coverage. Using a sample of 1050 IPOs issued between 1993 and 2000 they find that analysts affiliated to lead underwriter increasingly make post-IPO coverage, when IPOs are issued at significantly discounted to listing day close price. In other words, there is strong correlation between underpricing and post-listing analyst coverage (both in terms of frequency and quality of coverage). They evidenced that in more than 80% cases analysts affiliated to lead banks followed IPOs by issuing coverage, and approximately 95% of these coverage are either strong buy or buy. Evidence also suggests that issuing firms deliberately underprice IPOs to gain broader attention of analyst's and media, thereby creating price momentum (Aggarwal et al., 2002).

Larger coverage from analysts affiliated to lead underwriter is the manifestation of understanding between issuing firm and the lead investment bank, when poor after market performance for the IPOs are expected (James and Karceski, 2006). Investigating analysts (both affiliated and unaffiliated) reports for a sample of 1355 IPOs from November 1996 through August 2000, they find that strength of coverage is negatively related IPO returns. They measured strength of coverage as buy/sell coverage and target price ratio (i.e. target price divided by the stock price on the day before the target price is announced). Consistent with "Booster shots"[3] hypothesis they find that lead underwriter provide booster shot in the form of stronger coverage following the offer date, where a poor after market performance for

the IPO firm is expected. Michaely and Womack (1999) find that affiliated analysts (particularly affiliated to lead underwriter) issued favorable (buy) coverage in the initial year following IPO.

Analyst coverage is not cost free, especially when lead underwriter reputation is involved with affiliating analyst. Issuing firms found compensate investment banks for quality analyst coverage by underpricing the IPOs (Cliff and Denis, 2004). Analyst lust hypothesis (Loughran and Ritter, 2002) argues that issuers deliberately choose an underwriter with a star analyst underpricing the IPOs. Studies i.e. Dugar and Nathan (1995), McNichols et al. (1996), Michaely and Womack (1999), James and Karceski (2006) document that affiliated analysts issue more optimistic coverage than the non-affiliated counterparts. Sette (2011) studied the relationship between competitions among analysts with the degree of optimism in coverage on IPOs. Investigating the analyst coverage for a sample of 3132 IPO issued in USA during 1996 and the end of 2002, finds that the affiliated analysts issue less optimistic coverage when non-affiliated analysts crowd the coverage for IPO. He also document that the analysts affiliated with co-managers are significantly lesser optimistic than the analysts allied with lead underwriter.

Moshirian et al. (2009) examines post coverage buy-and-hold abnormal return in thirteen emerging markets including India to estimate value implications of an analyst coverage. They find that stock prices strongly react to analyst coverage and revisions on event day (and following days). Their study suggests that investors can earn abnormal returns by instantly acting on the coverage; because of greater information asymmetry prevails in an emerging market. Analysts use price-to-book ratios as primary basis for issuing strong buy (or buy) coverage. Existing studies including Womack (1996), Stickel (1995), Barber et al. (2001), Jegadeesh and Kim (2006) and Boni and Womack (2006) focused on value addition functions by analyst's while issuing coverage. These studies document that the investors receive abnormal return by using analyst coverage. Observed positive market reactions to analyst coverage reflect the promising fundamentals including growth prospects for the firm. Jegadeesh et al. (2004) find analysts prefer to recommend those firms having high growth potential and exciting fundamental characteristics.

Given that likelihood of subscription for an IPO depends on strength of analyst coverage, then aftermarket trading volume should be higher for favorable coverage than unfavorable (or avoid) coverage. Irvine (2003) find that positive coverage trigger more liquidity for stocks. He also suggests that stronger initial coverage ensures robust relationship between underpricing and incremental liquidity. Similarly, Brennan and Subrahmanyan (1995), and Brennan and Tamarowski (2000) document that an increase in analyst coverage improves liquidity. Bradley et al. (2006) find no evidence that the market discounts the coverage issued by affiliated analysts. Using a sample of 683 IPOs (from 1999 to 2000), they examine 7400 analyst reports (i.e. initiations, upgrades, downgrades, and reiterations) issued in the year following IPO and they find that analyst coverage in the first year is not affected by underpricing. Further, Bradley et al. (2008) argues that underpricing has significant impact on analyst coverage around the end of quiet period, whereas it has nothing to do with the subsequent coverage issued by analysts. They also find that market discounts optimistic coverage of affiliated analysts issued around the end of the quiet period. Table 1 underlines some important studies in connection with the importance of analyst coverage.

Following the large scale information asymmetry which prevails in an IPO market, an investor may find it challenging to appropriately assess the risk and growth prospects of the IPO firm. Recently, due to the increasing capital market activities in India, market

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[3] Michaely and Womack (1999) also find that 'Booster shot' has positive effect on share prices till initial 30 days from the date of offer. Using a sample of 391 IPOs (issued during 1990–1991) they document that during this period most analysts issue strong coverage resulting in larger abnormal returns for the investors.

Table 1
Existing studies on analyst coverage.

Author (year)	Implication of analyst coverage
Barber and Loeffler (1993)	Find a significant price impact of 4% date of publication and a semi-annual average rate of 10.2%.
McNichols et al. (1996)	Find that analysts affiliated to lead investment banks fails to differentiate between good and bad IPOs.
Barber et al. (2001)	Document that investors design profitable trading strategies of buying securities with favorable analyst coverage.
Krigman et al. (2001)	They conclude that IPO firms switch underwriters for SEO, when assured of quality analyst coverage from the lead underwriter.
Adams (2003)	Find that investor reaction is stronger to analysts' coverage made in aftermarket than the pre-issue market.
Drucker and Puri (2005)	Find that all-star analyst coverage is positively related to underwriter selection.
Agrawal and Chen (2008)	Find that the level of analysts' coverage is positively related to the pressure they face.
Ljungqvist et al. (2009)	Find that underwriters having strong research network and analyst coverage have better chance in getting co-manager appointments in the IPOs.
Kadan et al. (2009)	Document that analysts are reluctant to issue pessimistic coverage.

regulator (SEBI)[4] contends that investors need to be equipped with more quality information about the firms approaching new issue market. With effect from May 1, 2007 it was made mandatory for all IPOs in India to be rated by a rating agency, and the rating score to be assigned on a five-point scale, which need to be reflected in the offer document. IPO rating is onetime assessment of the fundamentals of the IPO firm at the time of issue and is intended to aid the prospective investors in their decision making. Jain and Sharma (2008) find that the IPO grading sets an international precedent in primary market regulation. IPO grading, which is unique to the Indian IPO market serves an important certification from unaffiliated external agencies. Grading structure is reported in a scale of 1–5. Higher score indicating stronger fundamentals and vice versa. Rating helps the investors to make better investment choices by meaningfully condensing information in the issuer's prospectus to a single grade. In India IPOs are rated by SEBI approved rating agencies i.e. not affiliated to issuing firm and hence established themselves as an independent research firm issuing pre-issue coverage. However, in practice the issuing firm has the privilege to appoint an agency to rate the IPO. Deb and Marisetty (2010) analyze the efficacy of IPO grading and find that securities with higher IPO grades tend to exhibit lesser underpricing. Krishnamurti et al. (2009) find that IPO grades are significantly and positively influencing with both institutional and retail subscription level.

3. Data and sample selection

IPO sample consists of book-built issues completed on National Stock Exchange (NSE), Mumbai (India). The total number of IPOs listed during April, 2007 and end of March 2012 is 232. The prime database provides information on number of IPOs issued, size of the issue, offer price, list price and other issue specific information. For each IPO firm we retrieved all pre-issue analyst coverage from http://www.capitaline.com and http://www.chittorgarh.com. Capitaline is the online capital market database for companies listed in India, provides information about number of analysts issuing coverage. This database also publishes its own rating for IPOs. Historical daily stock return data including grading (other than Capitaline) information are obtained from http://nseindia.com. Analyst coverage information obtained from these sources are cross referred with a number of online databases i.e. http://www.sebi.gov.in, and http://www.bseindia.com, http://www.moneycontrol.com. For each IPO firm we know number of analyst coverage and brokerage house issuing them. Finally, we had collected issue specific characteristics from the red-herring prospectus of the issuing firm.

We divide analysts into three groups: (a) those are not affiliated with neither issuing firm nor investment banks, (b) those allied with any of the book running lead managers including syndicate,

and (c) those registered with market regulators (i.e. IPO grading by SEBI approved rating agencies). As the key objective of the paper is to track the pre-issue analyst coverage for the IPOs, this paper focuses on a period in which all forms of analysts are participating in the market. Thus we restrict the sample for the period April 2007 to March 2012. Fixed priced offers and financial firms are emanated from the sample, because these IPOs bear different characteristics in terms of pricing and issue fundamentals. In this way, we settled with 157 IPOs having complete information from all respect. Sample period (2007–2012) also witnessed both up and down in the IPO activity. Finally, sample period is close to the current period. Table 2 shows the distribution of sample IPOs across periods. Year 2007–2008 counts lesser number of IPOs (value also), because of a large number of IPOs are not rated during the period. Sample IPOs constitute 67.68% of the volume and 73.67% of the total value of the IPOs issued during the period 2007–2012.

4. Research methodology

This section describes selection and estimation of variables used in the econometric models. We first discuss dependent variables followed by independent variables and control variables. Section 4.2 outlined various econometric models to investigate the impact of pre-issue analyst's recommendation on IPO activity.

4.1. Description and estimation of variables

Our major research question is to investigate the influence of pre-issue analyst coverage on pricing performance of IPOs issued in India. Performance for IPOs is evaluated from three different perspectives i.e. underpricing (initial day return), subscription rate and aftermarket volatility (ex-post price risk). We use these three variables as dependent variables analyst coverage i.e. analyst score from capital market database (AS), number of analysts provide pre-issue coverage (NOAC), IPO grading, strength of analyst coverage (VAR) and affiliation of analyst to investment bank (AA) are taken as predictors. Underpricing evaluates listing day price performance or valuation for IPOs at opening date. Underpricing is extensively used in the literature as measure for departure from offer price and hence points pricing error or money sacrificed by the issuing firm in favor of initial day traders. Subscription rate captures investor's response for the new issue and aftermarket volatility estimates post listing variations in IPO prices. Following are the detail explanation and estimation method for each dependent, independent, and control variables.

4.1.1. Dependent variables
Underpricing (UP): Magnitude of initial day's return (R_i) for the security is estimated as the difference between individual security

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Table 2
Distribution of sample IPOs across periods (2007–2012).

Year	Number of IPOs issued	Value of total issue (Billion Rs.)	Sample IPOs/(% of the total IPOs)	Value of sample IPOs (Billion Rs.)/% of total
2007–2008	85	425.95	30/(35.29%)	200.40/47.05%
2008–2009	21	23.33	18/(85.71%)	20.83/89.28%
2009–2010	39	246.96	33/(84.61%)	223.07/90.33%
2010–2011	53	356.00	51/(96.22%)	324.29/91.09%
2011–2012	34	59.00	25/(73.52%)	48.22/81.73%
Total	232	1108.74	157/(67.68%)	816.81/73.67%

return and the market benchmark return. The return of stock "i" at the end of the first trading day is calculated as:

$$R_i = \frac{LP_i - IP_i}{IP_i} \times 100$$

where LP_i (List price) is listing day's closing price for IPO stock and IP_i is the final offer price at which shares were sold to institutional investors. The market return is the return earned on the market portfolio over the same period is defined as follows:

$$R_m \frac{MI_c - MI_o}{MI_o} \times 100$$

where R_m is the initial trading day's equivalent market return. MI_c is the market index value at close of the first trading day, MI_o is the closing market index value at the date of opening of the issue. Finally, we estimate the market adjusted abnormal rate of return (hence after, MAAR) for the IPO stock on the listing day in the following way:

$$UP_i = \left[\frac{(1 + R_i)}{(1 + R_m)} - 1 \right] \times 100$$

The above formula confirms to Miller and Reilly (1987) for calculating the initial return. Market adjusted return is calculated by taking S&P CNX Nifty (henceforth Nifty) index data for the period of study 2007–2012. The bench mark Nifty is a well diversified 50 stock index accounting for 22 sectors of the economy. It is used in tandem with the Bombay Stock Exchange Sensitive Index (BSE Sensex) for a variety of purposes including bench mark fund portfolios, index based derivatives and index funds. Above said methodology confirms to Aggarwal et al. (1993), Sohail and Nasr (2007). Positive value for UP indicates that IPOs are underpriced with reference to listing day close price. Alternatively, an overpriced issue yields a negative UP value at listing day. Both UP and initial day return are used interchangeably throughout this paper.

Realized intra-day (listing day) price volatility (VOLA): Quality of an issue can be evaluated with respect to post listing price variability. IPOs with larger ex-post pricing variability are considered as more risky than IPOs exhibiting lesser price volatility after listing. Volatility refers to variability of prices at initial trading day. Precisely it is the ex-post value uncertainty in the aftermarket for IPO stocks. Realized intra-day volatility for IPO stocks on listing day is estimated as difference between high price and low price scaled by sum of high price and low price. Both high price and low price are taken for listing day only. Existing studies i.e. Ritter (1984), Vong (2006) Sohail and Nasr (2007), Gleason et al. (2008) estimate volatility as standard deviation of post listing returns of the IPOs. Existing studies i.e. Finn and Higham (1988), McGuinness (1992), Wasserfallen and Wittleder (1994), and Corwin and Harris (2001) use standard deviation of aftermarket returns as proxy for ex-ante uncertainty while explaining underpricing.

Rate of subscription (SUB): Another explanation for success of an issue is linked with oversubscription rate. Investors demand is a critical component in IPO's success and is frequently measured by IPO over subscription ratio. Subscription rate evaluates extent of investor's response for an IPO. Estimated as ratio of application size to the issue size (in volume), popularly referred as over subscription rate. Existing studies i.e. Rock (1986), Yong and Isa (2003), Cheng et al. (2005), Ljungqvist et al. (2006) indicate that subscription rate plays an important role in affecting after market performance of IPOs. Agarwal et al. (2006) evidenced that investor's demand for IPOs are positively related to underpricing. IPOs with more investors demand is significantly underpriced, while the IPOs with low demand are presumed as overpriced.

4.1.2. Independent variables

Analyst score (AS): Generally analysts have superior information about new issues (Womack, 1996), because of greater access to data. Most analysts in some way or other linked to investment banks participating in IPO syndicate. Existing studies (Das et al., 2006) find analysts coverage helps in reducing information asymmetry, and hence proves as an attestation of quality. Measuring quality of an analyst coverage is a big challenge. One form of measuring quality of pre-issue analyst coverage as coverage score issued by analysts. In Indian IPO market capital market database publishes an evaluation report for each IPO well before the issue open for subscription. Each evaluation report also contain rating score (coverage) on a scale of 1–100. Higher scale shows better quality and favorable indication for subscription, while lower scale can be interpreted as lesser quality. *Hence, we hypothesize that better score are associated with lesser underpricing, greater subscription rate, and lesser volatility.*

Number of analyst's coverage (NOAC): Studies including Chemmanur (1993), Rajan and Servaes (1997), Aggarwal et al. (2002), Bradley et al. (2003), and Bradley et al. (2008) investigate the influence of the analyst coverage on initial day return. These studies confirmed that number of analysts following a particular IPO is positively related to underpricing. Prior research also suggests that greater analyst's coverage significantly improve information dissemination. This improvement helps in reducing extent of mispricing. The total number of analysts following an IPO is affected by analyst's underlying expectations regarding growth prospects of the issuing firm. Das et al. (2006) argued that more analysts follow an IPO firm where their expectation deemed to be favorable. In other words, number of analysts participating to cover the IPO signals the potential soundness of the firm. Bowen et al. (2008) also evidenced that greater analyst coverage is associated with lower cost of raising capital i.e. lesser underpricing. More analyst's cover a firm public information become more informative and divergence in investor valuation is reduced (Bowen et al., 2008). *On the basis of the above, we hypothesize that number of analysts providing pre-issue coverage contain information about true expectation about future firm performance and hence reduce underpricing and increase oversubscription rate.*

IPO grading (GRADE): IPO grades are assigned on a five-point point scale, where a grade value of '5' indicates highest grading and IPO grade '1' indicates the least grade. The data on GRADE is collected from the red herring prospectus of the IPO firm and cross referred with prime database and http://www.capitaline.com.

When a particular firm is rated by more than one rating agency, we take the highest grade values. Rating agencies are approved by SEBI and well-known for their established research coverage in India. IPO grading is assumed as an independent exercise done by the rating agencies. Though a rating agency claimed as an independent agency, practically it might be biased towards issuing firm, because rating agencies are appointed by issuing firm. In contrast, keeping in view of reputation in the market, they might not produce biased coverage. Keeping this aspect in mind we treat these class of analysts are autonomous and not affiliated with issuing firm. *We therefore hypothesize that IPO grading provides a useful indication of quality and hence reduce underpricing.*

Dispersion in analyst recommendation (DAR): As information intermediary analysts have better access to company information. Large number of analyst's both affiliated and unaffiliated compete with each other while issuing evaluation reports for IPOs. Unaffiliated analysts voluntarily offer their coverage for subscription. Bowen et al. (2008) made a link between analysts coverage dispersion with information asymmetry. They argued that firms with reduced dispersion in analyst's approval lead to lesser information asymmetry. If analyst's reports are more divergent, analysts as a group are lesser effective in building consensus among investors regarding quality of the issue. Taking cue from this, we evaluate degree of dispersion in analyst's recommendation as ratio of positive coverage (i.e. subscribe) to total number of coverage issued by all participating analysts (sum of both positive, negative and neutral recommendation). Based on the potential benefit of DAR, we hypothesize that: *Lesser variation in analyst's endorsement reduces information asymmetry and hence underpricing.*

Analyst's affiliation (AA): One of the most common indicators of credibility of analyst's coverage is affiliation of analyst's to lead underwriter or any other members of investment bank syndicate. Existing studies argued that analysts affiliated with underwriters have superior access to firm's information. Degeorge et al. (2007) find that analysts affiliated with lead underwriter provide more coverage (and issue favorable recommendations) for book-built issues than auctioned offerings. They also evidenced that affiliated analysts provide 'booster shot' i.e. more positive recommendation for recent book-built IPOs following poor secondary market performance. Michaely and Womack (1999) document affiliated analysts are more optimistic about the IPO firm than nonaffiliated analysts. In contrast, Bradley et al. (2006) find no evidence that market discounts affiliated analyst's recommendation. The conventional wisdom is that affiliated analysts lean towards investment banks because of expecting business in future and hence issue favorable pre-issue recommendation to garner more investor response. *Based on the backdrop of existing studies, we hypothesize that affiliated analyst's recommendation increase underpricing and subscription rate.*

4.1.3. Control variables

Besides the above mentioned independent variables a group of control variables i.e. offer value, age of the firm, and venture affiliation are used in the regression model. These control variables will helps in isolating impact of independent variables on dependent variable and hence improves validity of the model.

Offer size (OS): Offer size (value) is amount of capital the company wants to raise through IPO. Offer capitalization is estimated as final offer price (price at which institutional investors are allotted) per share multiplied with number of shares floated in the market. Researchers often use offer capitalization as size and growth proxy for issuing firm. Both offer value and age of the firm are included in the regression because of their reported relationship with IPO performance (Megginson and Weiss, 1991; Ritter, 1984; Sahoo and Rajib, 2011) including underpricing and pricing risk. Studies i.e. Mok and Hui (1998), Rajan and Madhoosudanan (2004) and Yu and Tse (2006) found underpricing is more severe in case of smaller

firms than firms having larger offer value. It is also argued that smaller issues are more speculative than larger issues and hence command more underpricing (Beatty and Ritter, 1986). Offer value and age of the IPO firm is often used as proxies for risks associated with an IPO (Carter et al., 1998; Ritter, 1984).

Age of the IPO firm (AGE): Firms having longer operating history witnessed lesser uncertainties in pricing, because huge amount of information are available at the time of issue. One of the most popular proxies on company characteristics in terms of maturity is age of the IPO firm. Age is estimated in years as difference between date of incorporation and date at which the company goes public (rounded to whole numbers). For example; age of the firm 'NTPC Ltd.' is estimated at 29 years, as the company was incorporated in the year 1975 and it went public on 7th October 2004. Ritter (1991) finds that age of the firm and underpricing moves in opposite direction. However, Suchard and Singh (2007) find a positive association between underpricing and age of the firm.

Level of venture capital participation (VCP): Prior studies had extensively investigated the impact of venture capitalist backing and its impact on IPO performance i.e. underpricing, aftermarket pricing performance and post listing operating performance (Megginson and Weiss, 1991; Jain and Kini, 1994; Brav and Gompers, 1997). Megginson and Weiss (1991) document lesser underpricing for VCP IPOs because of lesser risk as potential investors considered venture capital participation as an attestation of quality and long term viability for IPOs. More recently, Belghitar and Dixon (2012) find venture capital firm's affiliation reduces uncertainty at offering and hence affect negatively the degree of underpricing. IPO firms supported by reputed venture capitalists have less aggressive financial reporting, Wongsunwai (2013). On the basis of existing empirical evidence a *negative relationship between LVCP and underpricing is hypothesized.*

Table A.1 (given in Appendix A) outlines detailed description of all variables along with their estimation procedure and expected impact on volatility.

4.2. Descriptive statistics

Table 3 shows summary statistics for IPOs during sample period 2007–2012. Offer size (OS) is used as proxy for size of the firm. Mean offer value for sample IPOs is INR 521.86 Crore. Mean offer value is more than median value indicating a large number of IPOs are relatively lesser offer value. Further, estimate of skewness and kurtosis and difference between largest and smallest values shows that distributions of IPOs across offer size are non-normal. Capital market database is one of the leading analysts which are constantly issuing pre-issue coverage for IPOs. Mean AS score of 38 points (in a scale of 1–100) is reported by the analyst 'capital market' for IPOs issued during 2007–2012. Lesser average score for AS are indicative of inferior quality for the issue.

Table 3 summarizes firm characteristics for 157 IPOs issued during the period 2007–2012. Values for OS (offer price multiplied with number of shares issued) are estimated with INR Crore. AS is evaluated as points in the scale of 1–100. Variable NOAC is calculated as frequency of analysts (excluding capital market) issuing coverage before the issue. DAR is estimated as a ratio of number of favorable (subscribe) coverage to the total number of analyst's coverage. IPO grading (GRADE) is expressed in terms of a scale of 1–5, being issued by approved rating agencies. Age for the IPO firm is calculated as the difference between the date of incorporation and date of listing, and measured in years. Subscription rate (SUB) is the ratio of application size to the issue size (in volume). The UP is estimated difference between security return and market return on listing (using Eq. (3)). Variable VOLA is estimated as realized intra-day volatility for IPO stocks on listing day is estimated as difference between high price and low price scaled by sum of high price and low price. The variable

Table 3
Descriptive statistics for IPOs (2007–2012).

Particulars	Mean	Median	Standard deviation	Max. value	Min. value	Skewness	Kurtosis
OS[a]	521.86	120.60	1633.32	15199.40	23.30	7.10	55.96
AS	38.00	40.00	9.73	55.00	10.00	−1.20	0.95
NOAC	3.90	3.00	2.40	12.00	1.00	1.30	0.90
DAR	0.60	1.00	0.50	1.00	00	−0.30	−1.90
GRADE	2.80	3.00	1.00	5.00	1.00	−0.02	−0.59
AGE	15.00	12.00	12.00	96.00	2.00	3.10	15.00
SUB	14.79	3.43	27.00	161.00	0.90	3.00	10.00
UP	14.23	6.18	32.75	189.60	−46.10	1.94	5.98
VOLA-list	0.17	0.14	0.13	0.96	0.03	1.63	2.73
List-liquidity	2.62	1.84	2.35	9.58	0.07	1.13	0.39

[a] Variables including OS, AGE, and SUB exhibit larger skewness and kurtosis. Natural logarithm transformation has been effected for these variables to take care of skewness and kurtosis. The skewness and kurtosis values reported for Log(OS), Log(AGE), and Log(SUB) is 0.974, 0.915, 0.176, 0.516, and 0.707, 0.698.

list-liquidity is estimated as the ratio of quantity of shares traded (on listing day) to quantity of shares issued through IPO.

Generally an IPO firm attracts attentions of a number of analysts (NOAC) both in the pre-issue and post listing period. During sample period an average of 3.86 analysts including capital market issue coverage for IPO firm. Recognizing the importance of number of analysts issuing recommendations, this study further evaluate coverage of each analysts participating in the coverage. Mean value for the variable DAR indicate that approximately 60% of the coverage are positive (subscribe) out of the total number of analysts issuing coverage. IPO grading is another coverage available in the Indian IPO market. On an average, IPOs are getting a grade value of 2.80 (in the scale of 1–5) during the sample period, indicating average fundamentals. Average age for Indian IPO firms is 15.00 years. There are ten firms with an age of more than 30 years and if we exclude these firms from sample then the average age for the firms would be 12.19 years, which is virtually similar to the median age of 12 years for the sample IPOs.

During the sample period IPOs are getting subscribed at a rate of 14.79 times. The median value for over subscription rate is 3.43 with a standard deviation of 26.69 times. Mean SUB value is more than the median value indicating large number of issues is subscribed at higher than 3.43 times. Further, a large difference between maximum and minimum value of SUB along with large standard deviation suggests wide variations in rate of response for sample IPOs. Table 3 shows that IPOs are underpriced in India during the period 2007–2012. On an average Indian IPOs are underpriced at the rate of 14.23%, which is significantly lesser than prior periods. For 52 IPOs, the list price is below the offer price indicating IPOs are overpriced. Once we exclude these IPOs, the average underpricing shoots to 28.13%, which is comparatively higher than international evidence. Higher percentage of underpricing compared to international market can be interpreted that Indian IPO firms are leaving too much in the table. The median underpricing is reported at 6.18%. We also estimate the volatility and liquidity of the IPO stocks at listing. Listing day average volatility for the IPO stocks is estimated at 0.17 with a median value of 0.14. The listing day liquidity shows a maximum value of 9.58 to a minimum value of 0.07. Higher average liquidity value for IPO stocks is reported on listing day than the post listing period, which shows that IPOs are more liquid (or highly traded) on initial listing day.

4.3. Econometric models

To investigate whether pre-issue recommendations are associated with underpriced IPOs, we use following econometric model with UP as dependent variable. Independent variables include: AS, GRADE, NOAC, VAR, AA. Besides these predictors, offer size (OS), VCP, and age of IPO firm (AGE) are used as control variables. Natural Logarithm values for the variables i.e. OS, AGE, and SUB is used

to take care of the skewness.

$$UP = \alpha_0 + \beta_1 \text{Log}(OS) + \beta_2 \text{Log}(AGE) + \beta_3(AS) + \beta_4(GRADE)$$
$$+ \beta_5(NOAC) + \beta_6(DAR) + \beta_7(AA) + \beta_8(VCP) + \epsilon \quad (1)$$

Rate of oversubscription provides a powerful setting for IPO to examine effect of pre-issue recommendations on investor's response for IPOs. Regression Eq. (2) is used to test whether analysts' get success in creating demand for IPOs through published recommendations and evaluation report.

$$\text{Log}(SUB) = \alpha_0 + \beta_1 \text{Log}(OS) + \beta_2 \text{Log}(AGE) + \beta_3(AS) + \beta_4(GRADE)$$
$$+ \beta_5(NOAC) + \beta_6(DAR) + \beta_7(AA) + \beta_8(VCP) + \epsilon \quad (2)$$

Besides Eqs. (1) and (2), we use following regression equations to evaluate impact of analyst recommendation (pre-issue) or coverage on volatility and liquidity of IPO stocks at listing day.

$$\text{VOLA-list} = \alpha_0 + \beta_1 \text{Log}(OS) + \beta_2 \text{Log}(AGE) + \beta_3(AS) + \beta_4(GRADE)$$
$$+ \beta_5(NOAC) + \beta_6(DAR) + \beta_7(AA) + \beta_8 \text{Log}(SUB)$$
$$+ \beta_9(VCP) + \epsilon \quad (3)$$

$$\text{List-liquidity} = \alpha_0 + \beta_1 \text{Log}(OS) + \beta_2 \text{Log}(AGE) + \beta_3(AS)$$
$$+ \beta_4(GRADE) + \beta_5(NOAC) + \beta_6(DAR) + \beta_7(AA)$$
$$+ \beta_8 \text{Log}(SUB) + \beta_9(VCP) + \epsilon \quad (4)$$

5. Empirical results and analysis

In this section we discuss results for regression Eqs. (1)–(4). Sections 5.1 and 5.2 discuss results for regression Eqs. (1) and (2) indicating the impact of pre-issue analysts' coverage on underpricing and subscription rate respectively. Section 5.3 outlines the empirical results for the regression Eqs. (3) and (4).

5.1. Impact of analyst's coverage on underpricing

Table 4, Model 2 shows the results for regression Eq. (1), which outlines the impact of independent variables on underpricing after controlling the effects of AGE, OS, and VCP. Variables including AS, GRADE, NOAC, SUB and VCP are significant in explaining UP. However, age of the firm, OS, AA, and DAR found insignificant in estimating UP. Among the significant variables, AS, and SUB are positively associated with underpricing while others i.e. GRADE, NOAC, and VCP inversely related with underpricing.

Table 4
Regression result with UP as dependent variable.

	Model	Unstandardized coefficients		Standardized coefficients	T	Sig.	Collinearity statistics		Adjusted R^2	Significant F change
		β	Std. error	β			Tolerance	VIF		
1	(Constant)	16.430	13.686		1.201	.232				
	Log(OS)	−4.130	2.166	−.160	−1.907	.048	.887	1.128		
	Log(AGE)	6.665	3.761	.141	1.772	.078	.992	1.008	0.031	0.104
	VCP	−.221	.262	−.071	−.842	.401	.892	1.121		
2	(Constant)	18.958	16.787		1.129	.261				
	Log (OS)	−3.759	2.621	−.146	−1.434	.154	.493	2.028		
	Log (AGE)	4.617	3.587	.098	1.287	.200	.888	1.126		
	VCP	−.434	.250	−.139	−2.134	.048	.798	1.252		
	AS	.377	.331	.112	2.039	.025	.527	1.897		
	GRADE	−9.706	4.476	−.282	−2.168	.032	.301	3.319	0.303	0.000
	AA	−8.509	5.843	−.129	−1.456	.147	.652	1.533		
	NOAC	−.690	2.253	−.050	−2.306	.003	.189	5.285		
	DAR	−.241	2.829	−.117	1.998	.046	.133	7.522		
	Log (SUB)	11.334	1.945	.494	5.828	.000	.712	1.404		

Note: Durbin–Watson statistics is 1.909.

Table 4 reports coefficient estimates and *t*-values for OLS regression Eq. (4). The dependent variable; UP is estimated difference between security return and market return on listing (using Eq. (3)). Explanatory variables include SUB, VCP, OS, AGE, AA, NOAC, DAR, GRADE, and AS. Sample data comprises of 157 IPO firms went on public during the period 2007–2012. The F statistics is found significant at 1% level. Variable SUB is estimated as ratio of application size to the issue size (in volume), popularly referred as over subscription rate Values for OS (offer price multiplied with number of shares issued) are estimated with INR Crore. AS is evaluated as points in the scale of 1–100. Variable NOAC is calculated as number of analysts issuing coverage before the issue. DAR is estimated as a ratio of number of favorable (subscribe) coverage to total number of analyst's coverage. IPO grading (GRADE) is expressed in terms of a scale of 1–5, being issued by approved rating agencies. Variable AA is a dummy variable coded as 1 when participating analysts are affiliated any investment and 0 otherwise. VCP is estimated as percentage of pre-issue equity ownership being held by the venture capital firms. Age for the IPO firm is calculated as the difference between the date of incorporation and date of listing, and measured in years. We use log transformation for the variables SUB, OS, and AGE as LSUB, LOS, and LAGE.

Consistent with existing evidence (Aggarwal et al., 2002), we find that favorable coverage provided by independent analysts (i.e. capital market database's analyst score – AS) are positively associated with underpriced IPOs. Higher the analyst's score more likely the issue is listed at higher prices. This result confirms the 'compensation hypothesis' (Cliff and Denis, 2004) that underpricing is a part of compensation being provided to the analysts for expected post-IPO analyst coverage. Variable AS shows a strong significance at 5% indicating high explanatory power. Observed positive relationship between UP and AS stems from the fact that, analysts (especially those are unaffiliated to underwriter and issuing firm) choose to provide favorable coverage for underpriced IPOs to establish their reputation in the market as investor friendly advisors and to ensure that their clients (investors) are able to earn a good return at the point of listing. By doing so they will able to establish their reputation among investor community.

In the line of expectation, we find IPO grading has inverse association with underpricing. Given strong explanatory power (at 5%), we can assertively conclude that higher grading significantly reduce underpricing. An inverse association between GRADE and underpricing is consistent to Deb and Marisetty (2010). Couple of reasons has been propagated for this occurrence. First, higher grading could allow issuing firms to demand a better premium on their offer, hence reduce the gap between offer price and list price. This observation also conforms to SEBI's argument that all other things remains same, a security with stronger fundamentals would command a higher offer price. Second, firms with superior GRADE have strong management capabilities and hence able to take pricing decision by doing extensive research on potential market demand, hence rightly priced their issues. Third, whilst there is ample of reason to believe that IPO grades are biased towards issuing firms, because rating agencies are hired by issuing firms. Investors might take a note that super rated IPO firms either purchase the grade and (or) collude with the rating agencies to obtain favorable grade. As a result potential investors do not show their excitement for these issues on listing date.

In contrast to existing studies (i.e. Aggarwal et al., 2002; Bradley et al., 2008) we find that number of analysts pre-issue coverage is negatively associated with underpricing. The coefficient on NOAC remains significantly negative at 1%. The result indicates that larger number of analysts prefer to stay away from issuing recommendation for underpriced IPOs. This could stem from following arguments: First, given that analysts create awareness and increase knowledge of the potential investors apparently reduce information asymmetry and hence lesser underpricing as evidenced by Bowen et al. (2008). Second, larger participation of analysts for supplying pre-issue recommendation brings more competition among themselves. Competition brings more transparency and each analyst is motivated to issue unbiased reports owing to reputation effect. More analyst's cover a firm public information become more informative and divergence in investor valuation is reduced (Bowen et al., 2008). As a result scope for earning abnormal return on listing day is reduced. Similarly, we find a negative correlation between affiliations of analysts with underpricing, which is consistent to international evidence. However, the empirical relationship for AA with UP is statistically insignificant.

Consistent with Bowen et al. (2008), dispersion in analysts recommendation (DAR) bears negative correlation with underpricing, suggesting that majority analysts declined to offer favorable coverage for underpriced issues. In other words, analysts issue pre-issue buy (or subscribe) coverage only when they convinced about strong fundamentals (including growth prospects) of the firm, rather taking short term gain on initial day as basis for issuing recommendation. If favorable coverage issued by majority analysts are viewed as an indicator of quality, then negative correlation between DAR and UP, suggests that analysts look into fair valuation, while issuing coverage for IPOs. Understanding negative correlation coefficient for NOAC, DAR, and GRADE, a plausible explanation might be that more number of analysts commonly agreed with quality of issue

could trigger issuing firm to charge higher prices and hence reduce underpricing.

Consistent with previous studies (Belghitar and Dixon, 2012), IPOs backed by venture capital reduces underpricing. Observed inverse association between VCP and underpricing stems from following arguments: First, Venture capital firms have better understanding about business structure of the firm. Potential investor's sees VC backing as an attestation of quality in terms of business outcome, reporting and reliability in disclosure. Second, affiliation of VC establishes a long term positive prospects and market presumes that IPO firms supported by VCs are of lesser risk. Taking an advantage of that belief issuing firm put premium price on the issue and hence reduce underpricing. In support of existing studies i.e. (Yu and Tse, 2006; Beatty and Ritter, 1986), we find larger issues significantly reduce underpricing i.e. offer price is more close to listing day close price. As expected coefficient associated with subscription rate (SUB) has a positive sign, indicating that underpriced IPOs attract more subscription from the investors than the over-priced issues. This could be driven by the reason that investors expect a wind fall profit at listing day. Oversubscription rate shows a strong significance at 1% indicating a high explanatory power. Results for control variables are identical to those reported in prior research. Offer size (OS) shows a strong negative correlation to underpricing (UP), at 1% significance indicating that if the float is very large, the underpricing rate would be low, because availability of large number of shares issued the turnover ratio would be low. Further, bigger firms have wider analyst coverage and market making ability and hence set higher offer price, resulting lesser demand at listing day. Finally, other control variable i.e. AGE is insignificant to explain underpricing, though the regression coefficient is positive.

Diagnostic tests for above results i.e. collinearity statistics comprising of Tolerance and VIF (variance inflation factor) values for all independent variables are within the acceptable limits. Further, conditional index (CI) values are reported at less than 30, indicating absence of multicollinearity in the data variables. The Durbin–Watson statistics value is estimated at 1.909, which is close to 2.0 (and substantially higher than 1.0), showing no evidence of autocorrelation. 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.

5.2. Impact of analyst's coverage on subscription rate

Table 5, Model 2 shows the predictive relationship between analyst coverage and response rate for IPOs i.e. results for Eq. (2) after taking the effect of control variables Log(OS), Log(AGE), and VCP. Coefficient for AS is positive and significant at 5%, indicating that analyst coverage trigger more subscription from the investors. In other words, more favorable coverage (in terms of higher score) issued by analysts IPOs are getting subscribed at a better rate. This may be due to the fact that an unaffiliated analyst's issue favorable coverage only when they are convinced about promising growth prospects (including fundamentals) of the issuing firm. If subscription rate is viewed as an indicator of quality, then positive relationship between analyst coverage and subscription rate suggests that capital market analyst score (AS) correctly indicates fundamentals and hence quality of the issuing firm. From the viewpoint of investor, it can be argued that pre-issue analyst coverage add another dimension to certification of quality for IPO firm.

Table 5 reports coefficient estimates and t-values for OLS regression Eq. (2). The dependent variable; UP is estimated difference between security return and market return on listing (using Eq. (3)). Explanatory variables include SUB, VCP, OS, AGE, AA, NOAC, DAR, GRADE, and AS. Sample data comprises of 157 IPO firms went on public during the period 2007–2012. The F statistics is found

significant at 1% level. Variable SUB is estimated as ratio of application size to the issue size (in volume), popularly referred as over subscription rate Values for OS (offer price multiplied with number of shares issued) are estimated with INR Crore. AS is evaluated as points in the scale of 1–100. Variable NOAC is calculated as number of analysts issuing coverage before the issue. DAR is estimated as a ratio of number of favorable (subscribe) coverage to total number of analyst's coverage. IPO grading (GRADE) is expressed in terms of a scale of 1–5, being issued by approved rating agencies. Variable AA is a dummy variable coded as 1 when participating analysts are affiliated any investment and 0 otherwise. VCP is estimated as percentage of pre-issue equity ownership being held by the venture capital firms. Age for the IPO firm is calculated as the difference between the date of incorporation and date of listing, and measured in years. We use log transformation for the variables SUB, OS, and AGE as LSUB, LOS, and LAGE.

As expected, Table 5 indicates that coefficient associated with DAR has a positive sign. This suggests that any increment in proportion of favorable recommendation to total coverage issued by analysts helps to attract more response from potential investors. Larger number of positive (favorable) recommendation issued by analysts shows a strong significance at 5%, indicating a high explanatory power. There are a couple of observations that could make this relationship. First, more participating analysts issue favorable coverage have strong signal to the market regarding quality of the issue. Second, when a larger group of analysts issue buy (or subscribe) recommendation it is likely that investors crowd the market in anticipation of better returns in the aftermarket trading. In fact, the common opinion revealed by the analysts for the IPO is an indicator of established quality for the issue, which further helps in building confidence for investors. We can conclude that pre-issue analyst's coverage for IPO is useful for investors in making investment decisions.

Table 5 also indicates that IPO grade as a predictor shows strong a strong significance at 5% level indicating a high predictability of GRADE to subscription rate for the issue. In other words, superior rated IPOs are subscribed at a higher rate and vice-versa. The positive association between grading and subscription indicate that though rating agencies are appointed by the issuing firms still then they are viewed as an independent analysts certifying quality of the issue. If subscription rate is viewed as an indicator of quality, then positive coefficient for grading, suggest that IPO grading correctly reflects the fundamentals (including growth prospects) of the IPO firm. Conceptually, grading agencies are SEBI recognized analysts having wider research network and have some sort of established reputation in the capital market. This evidence is consistent to Krishnamurti et al. (2009).

As expected, AA shows a significant but inverse association with SUB. The difference here is that AA predicts subscription rate at 10% level, which is relatively weaker than the prediction power of other characteristics of analyst's coverage i.e. AS, VAR, and GRADE. Observed market reaction to pre-issue affiliated analysts coverage suggests that market discounts recommendation issued by analysts affiliated to investment banks. Conceptually this relationship is appealing, as affiliated analysts tend to be more biased while issuing coverage for IPO firm. In contrast to the existing studies (Irvine, 2003), this study document an insignificant association between number of analysts issuing coverage (NOAC) and subscription rate (SUB). However, it is interesting to note that regression coefficient for NOAC with respect to SUB is positive, indicating more analysts issuing pre-issue coverage more likely IPOs got oversubscribed at higher rate. This insignificant association between NOAC and subscription rate can be interpreted that investors are not giving more importance to the volume of analysts issuing coverage before the IPO. This could be driven by the argument that in India most of

Table 5
Regression result with SUB as dependent variable.

	Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics		Adjusted R^2	Significant F change
		β	Std. error	β			Tolerance	VIF		
1	(Constant)	−1.263	.561		−2.253	.026				
	Log (OS)	.357	.089	.318	4.022	.000	.887	1.128		
	Log (AGE)	.420	.154	.204	2.727	.007	.992	1.008	0.134	0.000
	VCP	.002	.011	.014	.179	.858	.892	1.121		
2	(Constant)	−2.046	.689		−2.969	.003				
	Log (OS)	.061	.111	.054	.548	.584	.494	2.024		
	Log (AGE)	.261	.150	.127	1.738	.084	.906	1.104		
	VCP	.012	.011	.088	1.138	.257	.805	1.242		
	AS	.033	.014	.228	2.435	.016	.548	1.824	0.349	0.000
	GRADE	.437	.186	.292	2.351	.020	.313	3.200		
	AA	−.465	.244	−.162	−1.907	.058	.668	1.496		
	NOAC	.138	.095	.231	1.457	.147	.192	5.210		
	DAR	.205	.118	.326	2.073	.046	.136	7.373		

Note: Durbin–Watson statistics is 1.718.

pre-IPO coverage is issued by smaller unorganized broking firms, which does not have established reputation in the market.

Control variables i.e. OS, VCP, and AGE bear positive association with subscription rate, suggesting that matured and larger firms attract more response from potential investors than younger and smaller firms. However, their association with subscription rate is statistically not compelling. As expected association between VCP and SUB is positive. This relationship is also conceptually appealing as VC's participation in an IPO firm is viewed as a corroboration of promising growth prospects. However, the relationship is statistically not significant.

Model 2 is significant at 1% level (significant F change = 0.000). The adjusted R^2 at 0.349 (34.9%) implies that the model explains a large portion i.e. 34.9% of the variability of SUB for IPOs during the period 2007–2012. Variables i.e. DAR, GRADE, AS, and NOAC are a better fit for actual amount of oversubscription rate. The collinearity statistics comprising of Tolerance and VIF (variance inflation factor) 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 1.718 for SUB model, which is close to 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 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. Diagnosis test results are not shown in Table 5.

5.3. Impact of analyst's coverage on volatility and liquidity

In this section we discuss impact of analyst coverage on volatility and liquidity of IPO stocks at short run i.e. listing day. Table 6, panel A and B, explains impact of analyst's recommendation on listing day volatility and liquidity respectively subject to the effect of control variables OS, AGE, and VCP. Panel A indicate that variables AS, NOAC, OS, SUB and VCP are significant in explaining intraday realized volatility for IPO stocks on listing day.

Table 6 reports coefficient estimates and t-values for OLS regression Eqs. (3) and (4). Sample data comprises of 157 IPO firms went on public during the period 2007–2012. Statistical significance for the variables is adjudged on using a two tailed test at 1% (*), 5% (**), and 10%(***) level. The F statistics is found significant at 1%

level. Variable VOLA is estimated as realized intra-day volatility for IPO stocks on listing day is estimated as difference between high price and low price scaled by sum of high price and low price. The variable list-liquidity is estimated as the ratio of quantity of shares traded (on listing day) to quantity of shares issued through IPO values for OS (offer price multiplied with number of shares issued) are estimated with INR Crore. AS is evaluated as points in the scale of 1–100. Variable NOAC is calculated as frequency of analysts (excluding capital market) issuing coverage before the issue. DAR is estimated as a ratio of number of favorable (subscribe) coverage to the total number of analyst's coverage. IPO grading (GRADE) is expressed in terms of a scale of 1–5, being issued by approved rating agencies. Variable AA is a dummy variable coded as 1 when participating analysts are affiliated any investment and 0 otherwise. Age for the IPO firm is calculated as the difference between the date of incorporation and date of listing, and measured in years. Variable SUB is estimated as ratio of application size to the issue size (in volume), popularly referred as over subscription rate. The LVCP is estimated as percentage of pre-issue equity ownership being held by the venture capital firms. Age for the IPO firm is calculated as the difference between the date of incorporation and date of listing, and measured in years.

As expected the coefficient of AS, and NOAC is negative, indicating that the volatility of listing day prices are inversely associated analyst's recommendation, suggesting that pre-issue analyst coverage helps in plummeting intra-day volatility of IPO stocks on listing. If positive coverage signals quality of the issue, then pre-issue coverage rightly helps in controlling volatility for IPO stocks. Even other form of analyst coverage i.e. GRADE, and AA bears negative association with volatility (though they are insignificant). Consistent with existing studies Belghitar and Dixon (2012), we find LVCP is inversely associated with listing day volatility. It indicates IPOs affiliated with VCs are lesser volatile than the non-venture (VC's) backed IPOs. As expected the coefficient of OS is negative, indicating that larger IPOs are lesser volatile than smaller IPOs, because larger IPOs offload a large volume of shares in the secondary market. Table 6, panel 'A', provides strong support for the hypothesized relationship between SUB-rate and VOLA-list, indicating that subscription rate proved to be relevant in explaining after market price volatility for IPO stocks. Results found consistent with, Vong (2006), and Reber and Fong (2006), which suggests that the larger the subscription rate, larger would be the volatility of the aftermarket price. Such a high degree of positive association between subscription and listing day volatility ascribes to the following arguments:

Table 6
OLS regression for VOLA-list and list-liquidity as dependent variable.

Variables	Panel A Regression Eq. (3) Dependent variable = VOLA-list	Panel B Regression Eq. (4) Dependent variable = list-liquidity
(Constant)	0.475	10.582
	7.662*	11.593*
AS	−0.005	−0.087
	−3.744*	−4.823*
GRADE	−0.006	−0.367
	−0.337	−1.997**
DAR	0.005	0.133
	0.516	0.869
NOAC	−0.004	−0.048
	−2.520*	−2.392*
AA	−0.001	0.103
	−0.009	0.325
Log(AGE)	0.013	0.288
	0.967	1.878***
Log(OS)	−0.019	−0.918
	−1.990**	−6.464
Log(SUB)	0.009	0.151
	1.853***	1.834***
LVCP	−0.049	−0.157
	−2.416*	−0.528
Model summary		
R^2	0.368	0.617
Adjusted R^2	0.329	0.597
Durbin–Watson	1.583	1.543
F-Statistics	9.493*	21.783*

Statistical significance for the variables are adjudged on using a two tailed test at 0.01(*), 0.05 (**), and 0.10 level (***).

First, market reaction to a given IPO is first reflected in an offerings subscription rate and that subscription rate provides sufficient hints as to how the shares will perform in the aftermarket. Second, heavily subscribed IPOs are generally considered as quality issues having attractive financial fundamentals i.e. good price-earnings ratio, high growth in sales, and better potential opportunities. Initial subscribers have higher expectation in terms of better returns in future. Once this information comes into the market (subscription rate as proxy for quality) in the form of subscription rate new investors is also put buying pressure for the IPO stocks, resulting larger volatility.

We also notice from Table 6, panel B that pre-issue analyst's recommendation reduces liquidity for IPO stocks. Variables i.e. AS, GRADE, and NOAC document significant negative impact on liquidity of IPO stocks on listing day. The results seem to be conceptually appealing, because any favorable coverage from the analysts had already reflected in the market at the time of subscription. Given to positive recommendation for an IPO firm the market captures all information leaving no room for speculation, hence reduce liquidity. Understanding negative correlation, a plausible explanation might be that superior pre-issue analyst's coverage trigger the issuing firm to set higher final offer price. Resulting in reduced scope for intraday return for initial day traders once the IPO got listed. Even those investors who failed to get allotment due to oversubscription might not enter into the listing day to buy shares assuming that the stocks are fairly priced and leaves no scope for any abnormal return. More pre-issue coverage creates awareness and increase knowledge of potential investors, resulting a larger investor base is activated, which reduces imperfections in the secondary market. We also find that matured IPO firms attract more liquidity on listing day. As expected larger the positive recommendation, more liquid is the IPO stocks. However the result is statistically insignificant. Further, affiliated analyst's recommendation fails to increase liquidity in the list day.

6. Conclusion

Using pre-issue analyst's coverage for a sample of 157 IPOs issued in India during the period 2007–2012, this paper investigates impact of analyst's pre-issue recommendation (and coverage) on performance i.e. underpricing, subscription rate, and volatility. Pre-issue analyst's recommendation is evaluated in a number of ways including capital market database rating score, ratio of favorable coverage to total number of coverage issued by analysts, number of analysts pre-issue coverage, IPO grading, and affiliation of analysts with investment banks. Empirical evidence indicate that analysts score (issued by capital market database) is positively influencing underpricing. Other aspects of analyst's recommendation i.e. dispersion in recommendation, number of analyst's coverage, and affiliated analysts significantly reduce underpricing. IPO grading, which is unique to Indian IPO market is also inversely associated with underpricing. These findings provide novel evidence on the role of qualitative aspects of analyst's recommendation. During pre-issue coverage process analysts disseminate a lot of information in the market which helps in reducing information asymmetry. Further, favorable coverage issued by a large number of analysts helps to increase the confidence of the investors and hence probability of getting success of the IPO in terms of oversubscription is more. However, in contrast to the international evidence it is documented that the frequency of analysts providing pre-issue coverage fails to incite the investors' interest rather it is the quality of coverage that plays an important role for attracting investors. We also find that matured firms are heavily subscribed by the investors than younger IPOs. Subject to the above it can be concluded that investors in a newly public firm take valuable inputs from analysts' coverage while bidding for subscription. If that is the case, then this study suggests that pre-issue analysts trigger larger subscription and also reduce underpricing and hence effect pricing efficiency in the market.

We also demonstrate that pre-issue analyst recommendation reduce volatility of IPO stocks on listing. Thus the incremental usefulness of pre-issue recommendation beyond underpricing is negatively related to volatility of IPO stocks. Our results underscores that favorable recommendation issued by analysts reflects unbending accuracy in pricing (reduced pricing error) and hence little scope being left to rig the price. Conceptually, analyst's recommendation for an IPO impounds all information (i.e. fundamental aspects) available at the time of issue. While studying analyst's ability in predicting liquidity for IPO stocks, we find that all forms of favorable recommendations reduce liquidity. These results suggest that favorable coverage from analysts impounds in the pre-market and the investors in the secondary market discounts any immediate benefit in near future.

7. Implications for theory and practice

Our evidence is important to studies assuming that analysts' recommendation add value for the IPO firms. With an extension to existing studies on analyst coverage, this paper strongly advocates the usefulness of pre-issue analyst's coverage as an additional signal for attestation of quality of the IPO firm. Favorable recommendation from analysts can be assumed as a symbol of quality and hence assured success for issue in terms of subscription. Empirical relationship documented between analyst recommendations and underpricing would act as an important signal for initial day traders regarding listing day return. Evidence in this paper suggests that pre-issue analysts' recommendation reduce underpricing, and hence lend support for the widely used assumption that analyst's coverage reduce underpricing in IPO market. Evidence in this paper is potentially useful for issuing firm. Observed inverse association between pre-issue recommendation and underpricing served as an indication for the issuing firm to set the offer price. Similarly, potential investors might use this piece of information while trading the newly listed IPO stocks. Finally, the empirical evidence regarding pre-issue coverage in general and IPO grading in particular is potentially useful for market regulators and policy makers consistently making regulations to control analysts and grading agencies.

Appendix A.

See Table A.1.

Table A.1
Definition of variables and their impact on UP.

Variable	Measurement	
Dependent variable		
Underpricing (UP)	Estimated as market adjusted rate of return for IPOs at initial day. It is the difference between return for IPO security and market index with respect to listing day close price. Underpricing rate is calculated by using the equation: $UP_i = \left[\frac{(1+R_i)}{(1+R_m)} - 1 \right] \times 100$	
Subscription rate (SUB)	Indicates magnitude of investor's response for an IPO. Estimated as ratio of application size to issue size (in volume), popularly referred as over subscription rate.	
Volatility (VOLA)	Standard deviation of excess returns for IPOs over market benchmark (CNX Nifty) returns for initial twenty-one trading days i.e. inclusive of listing day (or initial one month from listing day) is used as proxy for aftermarket pricing risk or volatility.	
Realized intra-day (listing) volatility (VOLA-list)	Realized intra-day volatility for IPO stocks on listing day is estimated as difference between high price and low price scaled by sum of high price and low price. Both high price and low price are taken for listing day only.	
Liquidity of the IPO stock (liquidity)	Liquidity for IPO stocks is calculated as average number of shares traded for initial one month from listing scaled to volume of shares offered through IPO. This is also referred as turnover ratio for IPO stocks.	
Listing day liquidity (list-liquidity)	Listing day liquidity is estimated as proportion of quantity of shares traded (on listing day) to quantity of shares issued through IPO. It is the turnover ratio on listing day.	
Independent variable		Expected impact on UP/SUB
Analyst score (AS)	Estimated as rating score for an IPO by an independent analyst i.e. Capital Market Database (CMD). The CMD evaluates the prospects of the IPO and publishes a detailed report well before the issue open. Besides coverage, CMD also put a rating score in the scale of 1–100. Higher rating means strong indication for subscription and vice versa. Capital market database is the leading published (and online) database for Indian capital market. It is a research house cum analyst neither affiliated to any underwriter nor issuing firm.	−/+
Number of analysts coverage (NOAC)	Calculated as number of analysts including capital market database issue coverage and or coverage for IPOs before the issue closed. Information regarding NOAC is collected from a number of sources and finally cross refereed with CMD and http://www.chittorgarh.com.	−/+
IPO grading (GRADE)	IPO grading data for each issuing firm is directly taken from the red herring prospectus. We also verified the same with prime database. Measured in a scale of 1–5.	−/+
Dispersion in analyst's recommendation (DAR)	Dispersion in analyst's recommendation is estimated as ratio of total positive recommendation (i.e. subscribe) to total number of coverage provided by participating analysts (sum of both positive, negative and neutral recommendation). Precisely it is the convergence of analyst's opinion regarding favorable quality of IPO indicating prescription for subscription.	+/+

Table A.1 (*Continued*)

Variable	Measurement	
Analyst's affiliation (AA)	Dummy variable is coded as '1' if the analyst issuing recommendation is a subsidiary (wholly owned or partially owned) of any of the participating syndicate member or book running lead managers, and 0 otherwise. Subject to parent and subsidiary relationship these analyst firms have established commercial interest with the investment banks sponsoring IPOs. Though analyst firms does not have direct commercial relationship with IPO firm, they establish an indirect relationship with the issuing firm through book running lead managers, syndicate members, and registrar to the issue. We also extend the scope of affiliation to the analyst firms, which are jointly owned by any participating investment bank and an outside firm.	+/+
Offer size (OS)	Offer size is the amount of capital a company wants to raise through IPO. Offer capitalization is estimated as final offer price (price at which institutional investors are allotted) per share multiplied with number of shares floated in the market.	−/+
Age of the IPO firm (AGE)	Age is estimated as difference between date of incorporation and date at which company goes public and has been rounded to whole numbers in years.	−/+
Level of participation of venture capital firms (VCP)	This variable intends to capture the magnitude of influence or control being exercised by the venture capital firms on the issuing firms. The variable VCP is measured as the percentage of post issue ownership (equity) being held by the venture capitalist.	−/+

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