Impact of Firm Specific and Macro-Economic Factors on the Level of Underpricing of Initial Public Offerings (IPOs) : Evidence from the Indian Market

** Aprajita Pandey*
*** J. K. Pattanayak*

Abstract

The purpose of this paper was to examine the impact of firm specific and macro-economic factors on the level of underpricing of firms going for initial public offerings (IPOs) in the National Stock Exchange, India. We considered firms that went for IPOs on the National Stock Exchange during the period from 1999-2016, which was further segregated to quarterly observations. Both traditional method and market adjusted abnormal rate of returns *(MAAR)* methods were used to gauge underpricing. The study found that among the firm specific variables, issue price and firm age were significant in influencing the level of underpricing. Inflation, market volatility, market returns, and economic activity had greater explanatory power than other macro-economic variables on underpricing. The study contributes to the vast literature of determinants of underpricing as most of the study focused on firm-related factors only; this study has given some insights on the role of macro-economic factors to explain underpricing.

Key words : **IPO, underpricing, market adjusted abnormal rate of return, macro-economic factors, firm specific factors**

JEL Classification : G12, G14, G24, F62

Paper Submission Date : August 10, 2017 ; Paper sent back for Revision : December 16, 2017 ; Paper Acceptance Date : January 17, 2018

In the life of a company, a stage comes when it decides to go public. Going public means, a firm, to fulfil its financing needs, sells a part of its shares to the prospective investors. Going public or initial public offering (IPO) is an important turning point in a firm's life, as it publicizes its shares to the prospective investors and hence diluting the ownership. As per the pecking order theory, IPO is the source of financing for firms after internal financing and debt. There are many benefits of a firm going public; not only it acquires funds without exposing itself to risks, but also, it incorporates more transparency, accountability, and reputation in the market. In landmark studies, Pagano, Panetta, and Zingales (1998) found that Italian firms going public were not raising money for growth, but for rebalancing their accounts for investment and growth. They also observed that going public is an important decision, and firms should make a conscious choice between the decision to remain private or to go public. While going public, pricing of the issue is a major concern for the issuer.

Various researchers have investigated the performance of prices of initial public offerings and found the empirical evidence of a short-run underpricing. Underpricing is a situation where offer price of a share is less than

* *Junior Research Fellow,* Department of Management Studies, Indian Institute of Technology (Indian School of Mines), Dhanbad - 826 004, Jharkhand. E-mail : aprajita032014@gmail.com
** *Professor,* Department of Management Studies, Indian Institute of Technology (Indian School of Mines), Dhanbad - 826 004 , Jharkhand.

the closing price of the first trading day, which means shares are being offered to the public less for than their intrinsic value. Many studies have given several explanations for the IPO underpricing phenomenon. Rock (1986) differentiated the investors on the basis of being informed and uninformed, and according to him, uninformed investors usually suffered from the winner's curse problem, and hence, to compensate them, IPOs are underpriced.

In similar studies, Allen and Faulhaber (1989) and Grinblatt and Hwang (1989) identified that underpricing was used as a signalling mechanism through which firms used to signal their quality to investors. It has also been observed by many researchers that the level or degree of underpricing depends on many firm related factors. Studies like the ones conducted by Zouari, Boudriga, and Boulila (2011) examined the relationship between underpricing and its determinants and found that listing delay and offer price had greater impact on the level of underpricing than any other variable related to a firm. In the same way, Ghosh (2005) identified various firm related factors and evidenced that newly listed firms underpriced more, and firms that accumulated large amount of funds were less underpriced than those who collected less. Though the impact on underpricing has been studied from the perspective of firms' related factors, some light still needs to be shed on how this underpricing gets influenced by macro-economic factors. It has been evidenced by researchers that IPO activities vary according to the dynamic conditions of the economy, like Tran and Jeon (2011) examined the impact of macroeconomic conditions on initial public offerings and evidenced that stock market performance and volatility were the most important factors for the timing of IPOs. Hence, it needs to be seen how macro-economic conditions affect initial public offerings, which in turn determine the level of underpricing.

In consonance with these observations, the main objective of the study is to analyze the influence of some select macro-economic factors and firm specific factors on the level of underpricing. The study uses both traditional and market adjusted abnormal rate of return to measure underpricing. By using various time series econometric techniques, we find the evidence that firm specific and macroeconomic values significantly affect the level of underpricing.

Genesis of the Study

IPO underpricing is pervasive across countries. Underpricing refers to a situation where the offer price is lower than the closing price of the first trading day. Numerous researchers have developed various models and hypotheses to explain the phenomenon of underpricing. Among some important studies, Rock (1986) proposed the winner's curse hypothesis and differentiated the investors on the basis of being informed and uninformed. According to the hypothesis, uninformed investors are less aware than informed investors about the future performance of the shares sold, and therefore, are not able to differentiate between the underpriced or overpriced issues, due to which they fall into winner's curse problem. Winner's curse is a situation where the uninformed investors get all the shares they demanded, because informed investors do not want them and ,therefore, to compensate uninformed investors, IPOs are sufficiently underpriced.

Beatty and Ritter (1986) argued that investment bankers took advantage of their superior knowledge about market conditions to underprice the offerings to maximize their revenue. Tinic (1988) provided a different explanation for underpricing and observed that it helped in reducing the incidence of future law suits. However, Drake and Vetsuypens (1993) later disapproved of this hypothesis. Allen and Faulhaber (1989) and Grinblatt and Hwang (1989) argued that underpricing was another signal through which firms indicated their superior quality to investors. They explained that only firms, who were assured about the future prospects of their projects, could afford to underprice. However, firms which were not assured about the future would not imitate them and did not underprice. They also stated that those who wanted to come back to the market for future offerings with higher price would "leave a good taste" in the mouth of investors through underpriced issues.

Benveniste and Spindt (1989) and Jegadeesh, Weinstein, and Welch (1993) stated that issuers used to underprice the offer so as to gauge the demand from investors during the pre-selling period. Carter and Manaster (1990) argued that underwriters, to show their reputation and to sustain their supremacy, undertook offerings of high quality. Welch (1992) propounded the informational cascade model, which suggested that investors perceived the actions of their peer investors before buying any shares in the new issue. If they observed that no other investors wanted to take the issue, they may also change their decision to buy even if they have some quality information in favour of accepting the issue. So, in order to stir up the demand for the issue initially, issuers underpriced the offers.

Brennan and Franks (1997) explained that hostile takeovers can be reduced by underpricing as the process will result in oversubscription due to which liquidity of the stock can be increased, thus creating a large number of shareholders. Habib and Ljungvist (2001) asserted that extra money left on the table minimizes other marketing expenses or in other words, underpricing can be a replacement for costly marketing. Loughran and Ritter (2002) evolved prospect theory of underpricing, which stated that issuers were not worried about loss of wealth due to underpricing of IPOs because they were assured that they would be able to recover the loss in the initial days of listing.

The researchers also provided evidence on how the underpricing was affected by the factors related to firms. Jaitly (2004) investigated the pricing of new issues in the Indian equity market for a short duration following deregulation of the market for new issues and evaluated the importance of book value and market value estimates in determining issue prices as well as prices on the first trading day. The results showed that offer price was more sensitive to book value factors, while the market value factors had a comparatively greater impact on the listing price. Results also indicated that issues with larger promoters' stake and issues that represented a smaller increase in equity for the older issuing firms were priced higher at the time of the issue. Ghosh (2005) identified factors explaining underpricing of initial public offerings and the major factors which could influence the likelihood of subsequent offers. He found that issues which collected large amount of funds were less underpriced compared to smaller issues, and new listed firms were underpriced more. He also observed that underpricing was lower in the boom period compared to the slump period and companies which came back to the market underpriced more during the boom period. Darmadi and Gunawan (2013) examined the effect of board structure and corporate ownership on underpricing in the Indonesian equity market. They evidenced that a firm having a higher number of independent commissioners was likely to have higher underpricing. These are some important observations given by researchers to explain the occurrence of underpricing.

Research Gap

In the past several decades, the researchers around the globe mainly focused on the relationship between firm specific variables and underpricing (Bansal & Khanna, 2013 ; Chaturvedi, Pandey, & Ghosh, 2006 ; Ghosh, 2005 ; Gupta, 2011 ; Jaitly, 2004; Jain & Padmavathi, 2012; Singh & Sastry, 2014; Pu & Wang, 2015). But we could not find any study undertaken in the Indian context that showed the relationship of macro-economic factors and underpricing of IPOs. The current study aims at analyzing the impact of macro-economic factors on the degree of underpricing. Previous studies have shown that macro-economic factors affect the level of IPO activity (Brau & Fawcett, 2006 ; Jovanovic & Rousseau, 2004) and it is also evidenced that IPO activity has a direct impact on the level of underpricing (Derrien & Kecskés, 2009 ; Lowry & Schwert, 2002). Therefore, we presume that macro-economic factors may have some indirect relationship with underpricing. The current study also analyzes the impact of some firm specific variables (issue size, issue price, issue timing, and firm age) on the level of underpricing. An attempt has also been made to study the combined effect of both firm specific and macro - economic factors on underpricing of IPOs.

Hypothesis Development

(1) Impact of Firm Specific Factors on IPO Underpricing : There is another group of researchers who examined the various determinants which affected the degree of underpricing. Krishnamurti and Kumar (2002) stated that it was important for issuers to gauge the investors' demand before pricing the issue as level of subscription was related to underpricing. They also found that issues with smaller offer price were more underpriced. Pandey and Vaidyanathan (2007) found that degree of underpricing had reduced over the years and listing delay drove the underpricing mechanism, while marketing did not help in reducing the underpricing. Walker (2008) studied the relationship between underwriter prestige, family control, and IPO underpricing in an international context. The study concluded that IPOs other than the ones in U.S. benefited from low level of underpricing if they were underwritten by prestigious investment bankers. Further, he also deduced that offers in countries with increased family control benefited from having highly reputed investment banks.

Engelen and van Essen (2010) examined the relationship between a country's legal framework and the level of underpricing of IPOs. They evidenced that firms going public in a country with a more developed legal system left less money on the table. Jones and Us Swaleheen (2010) examined the relationship between underwriter reputation and IPO returns and found that underwriter reputation had an inverse relationship with initial returns when taken as an exogenous variable. On the other hand, when underwriter reputation was taken as an endogenous variable, the reputation of the underwriter was positively related to the initial returns.

Zouari et al. (2011) examined determinants of IPO underpricing from the Tunisian market and found that oversubscription rate impacted more at the level of underpricing than other firm specific variables (firm age, firm size, and the size of the issue). Bansal and Khanna (2013) and Chaturvedi et al. (2006) studied the impact of factors related to market and firms on the level of underpricing and observed that factors related to a firm such as issue size, firm age, and pricing mechanism had a negative impact on underpricing. However, number of shares, subscription rate, and market capitalization were negatively related with underpricing.

Neneh and Smit (2013) examined the level of underpricing during hot and cold market periods in the South African Stock Exchange and found that IPOs in the hot market period were more underpriced than that of the cold market period. Pu and Wang (2015) and Trivedi and Soni (2012) examined the impact of change in pricing mechanism on the level of underpricing and evidenced that IPOs were highly underpriced after the introduction of the book building mechanism. They also found that the amount of proceeds was an important variable in explaining underpricing. Xu, Wang, and Long (2017) examined the impact of boardroom diversity on IPO underpricing. They found that boardroom diversity partially affected the firms' IPO underpricing. Features like functional, education, and age diversity of the boardroom guided prospective investors about the firm quality.

From the above discussion, we can deduce that firm specific factors affect the level of underpricing and we ,therefore, propose to test the following hypotheses :

- **$H0_1$:** There is no significant relationship between firm specific factors and level of underpricing.
- **HA_1:** There is a significant relationship between firm specific factors and level of underpricing.
- **$H0_{1a}$:** There is no significant relationship between issue price and level of underpricing.
- **HA_{1a} :** There is a significant relationship between issue price and level of underpricing.
- **$H0_{1b}$:** The age of the firm has no significant relationship with the level of under-pricing.
- **HA_{1b} :** The age of the firm has a significant relationship with the level of under-pricing.
- **$H0_{1c}$:** There is a no significant relationship between the issue size and the level of underpricing.

- **HA_{1c} :** There is a significant relationship between the issue size and the level of underpricing.
- **$H0_{1d}$:** There is no significant relationship between the offer timing and the level of underpricing.
- **HA_{1d} :** There is a significant relationship between the offer timing and the level of underpricing.

(2) Relationship of Macro - Economic Factors and IPO Underpricing : A sizeable amount of literature is available on the relationship between macro-economic factors and IPO activity. Loughran, Ritter, and Rydqvist (1994) examined the timing pattern of IPOs of 15 countries using macro-economic factors and found that stock price level and number of IPOs was positively related. In similar studies, Lowry (2003) found that investor sentiment, firm's capital demand, and information asymmetry were the important explanatory variables of IPO volume. Similarly, Jovanovic and Rousseau (2004) observed that negative relationship existed between IPO volume and interest rate. In case of higher interest rate, IPO volumes were reduced because future earnings were discounted more heavily. However, in case of low interest rates, firms in order to have gains waited till the interest rate increased.

According to firm's capital demand hypothesis, when firms anticipate higher economic growth, they want to have the greatest proceeds from the IPOs for financing their capital investments. In consonance with this hypothesis, Derrien and Kecskés (2009) evidenced that economic factors explained 40% of the variability in equity issues. While conducting a time series analysis, Tran and Jeon (2011) showed that stock market performance was an important macro-economic factor to explain IPO timing. Issuers tried to grab the opportunity of good market conditions, to bring their firm to public, for investors who expected higher stock returns. This shows that how macro-economic factors play an important role in the decision by the firm to go public. Lowry and Schwert (2002) established a strong negative relation existing between current initial return and past number of IPOs and a strong positive relation between current initial returns and future number of IPOs. They stated that positive information learned at the time of the registration period drove the positive relation between initial returns and IPO volume. Underwriters, during the marketing of IPOs, used to derive some information from the potential investors about the perspective of this new firm. The information so gained used to serve as a determinant for both the pricing of the IPOs as well as for the companies who wanted to issue equity in the near future. Positive information by investors resulted in higher valuation and higher underpricing, provoking other firms to go public.

With the above discussion, we presume that macro-economic factors and IPO underpricing have an indirect relationship and ,therefore, we propose to test the following hypotheses :

- **$H0_2$:** There is no significant relationship between macro-economic factors and level of under-pricing.
- **HA_2 :** There is a significant relationship between macro-economic factors and level of under-pricing.
- **$H0_{2a}$:** There is no significant relationship between stock market performance and level of under-pricing.
- **HA_{2a} :** There is a significant relationship between stock market performance and level of under-pricing.
- **$H0_{2b}$:** There is no significant relationship between market volatility and the level of under-pricing.
- **HA_{2b} :** There is a significant relationship between market volatility and the level of under-pricing.
- **$H0_{2c}$:** There is no significant relationship between level of inflation prevailing in the economy and the level of under-pricing.
- **HA_{2c} :** There is a significant relationship between the level of inflation prevailing in the economy and the level of under-pricing.

↳ **$H0_{2d}$:** There is no significant relationship between short term and long term interest rates and the level of underpricing.

↳ **HA_{2d} :** There is a significant relationship between short term and long term interest rates and the level of underpricing.

Methodology

↳ **Data and Sample :** This study uses firm - level IPO data from National Stock Exchange, India for the period from July 1999 to December 2016. We segregated the whole period into a number of quarters and finally got 70 quarterly observations. For these 70 quarters, we measure the average underpricing using both traditional and modern approaches. In addition, we also take cognizance of issue specific variables (e.g. firm age, issue size, issue price, and issue timing) and macro-economic variables (e.g. Nifty 50 Index, GDP, market volatility, inflation, 91-day T-bill, and 10-year bond yield) to empirically examine the objective of the study. A brief description of these variables is given below:

(i) Description of Variables

↳ **Underpricing:** Measured as the percentage change from the offer price to the closing price of first trading day.

↳ **Market Adjusted Abnormal Return *(MAAR)* :** Used as another measure to gauge underpricing.

(ii) Firm Specific Factors

↳ **Firm Age :** Difference between the year firm went for IPO and the year of incorporation. Data Source: Prowess and National Stock Exchange.

↳ **Issue Size :** Total number of shares offered * offer price. Data Source: National Stock Exchange.

↳ **Issue Price :** Price at which the issue is offered to the bidders. Data Source: National Stock Exchange.

↳ **Offer Timing:** Difference between the closing of the issue and first trading day. Data Source: Prowess and National Stock Exchange.

(iii) Macro - Economic Factors

↳ **Nifty 50 Index :** To measure the stock market performance. Data Source: National Stock Exchange.

↳ **GDP :** Proxy for real economic activity. Data Source: OECD (Organisation for Economic Co-operation and Development).

↳ **Market Volatility :** To measure investment risk. Measured as *SD* of daily market return during each quarter. Data Source: National Stock Exchange.

↳ **Inflation :** Calculated as percentage change in consumer price index. Data Source: Federal Reserve Bank of St. Louis.

↳ **91-day T-bill :** Proxy for short term financing costs in the debt market. Data Source: Federal Reserve Bank of St. Louis.

↳ **10-year Bond Yield :** Proxy for long term financing costs in the debt market. Data Source: Federal Reserve Bank of St. Louis.

To measure the underpricing, we follow a commonly used traditional method as mentioned in Eq. (1) and the method used by Rock (1986) to measure the marginal adjusted abnormal return *(MAAR)* as mentioned in Eq. (2).

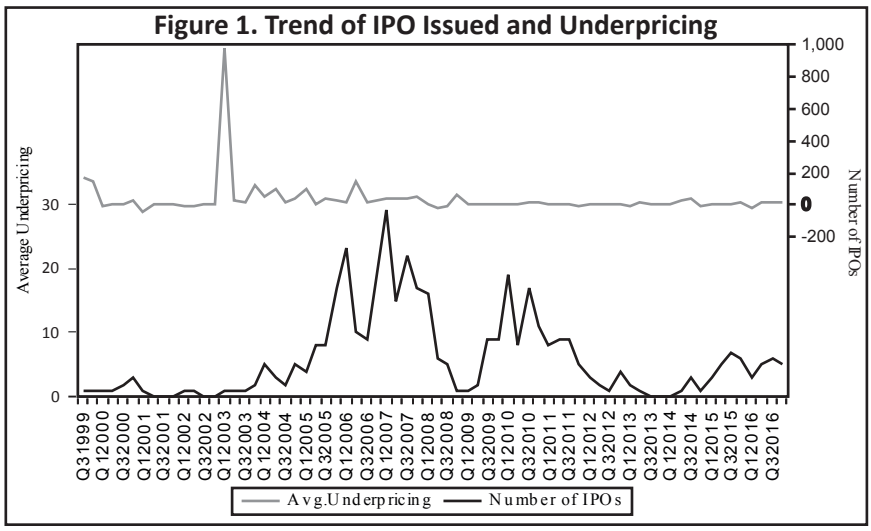
$$Under\ Pricing = \frac{CP_{1stTD} - IP}{IP} \quad (1)$$

$$MAAR = \left[\frac{1+R_i}{1+R_m} - 1\right] \times 100 \quad (2)$$

Table 1. Summary Statistics of Variables Under Consideration

Panel A: Summary Statistics of Level Data								
Variable	**Mean**	**Median**	**Maximum**	**Minimum**	**SD**	**Skewness**	**Kurtosis**	**JB test**
Underpricing	35.974	10.015	970.429	-37.428	119.689	6.981	54.685	8360.009*
MAAR	40.410	9.722	984.160	-81.410	129.17	5.928	42.448	4948.720*
No. of issue	5.800	3.000	29.000	0.000	6.493	1.551	4.903	38.651*
Offer time	32.238	18.437	261.400	-285.636	65.1667	-0.196	12.734	276.819*
Firm age	15.597	13.088	207.000	0.000	24.333	7.083	56.324	8878.842*
Issue price	209.09	175.86	645.000	0.000	169.685	0.950	3.113	10.560*
Issue size	731.04	184.82	4921.943	0.000	1098.29	2.068	6.892	94.100
Nifty50	2.509	2.172	35.097	-28.149	11.781	-0.033	3.393	0.464
GDP	1.725	1.746	5.803	-1.846	1.047	0.162	6.393	33.876*
MV	1.384	1.221	3.964	0.660	0.636	1.694	6.194	63.232*
Inflation	1.610	1.665	6.828	-1.245	1.365	0.698	4.780	14.930
91day T-bill	6.855	6.995	10.097	3.259	1.714	-0.202	2.240	2.160
10yr BY	7.903	7.827	11.805	5.137	1.441	0.646	3.878	7.125**
Panel A : Summary Statistics of Log Differenced Data								
Underpricing	2.077	2.304	6.878	-0.383	1.790	0.215	2.105	2.878
MAAR	2.025	2.274	6.891	-1.141	1.907	0.297	2.118	3.296
No. of issue	1.223	1.099	3.367	0.000	1.080	0.229	1.725	5.348**
Offer time	2.786	2.914	5.566	0.000	1.419	-0.521	3.142	3.221
Firm age	2.334	2.571	5.333	0.000	0.987	-1.015	5.069	24.507*
Issue price	4.622	5.169	6.469	0.000	1.819	-1.781	5.080	49.634*
Issue size	5.095	5.164	8.501	0.000	2.320	-0.886	3.233	9.308*
Nifty50	0.025	0.022	0.351	-0.281	0.118	-0.033	3.393	0.464
GDP	1.725	1.746	5.803	-1.846	1.047	0.162	6.392	33.876*
MV	0.241	0.199	1.377	-0.415	0.397	0.651	3.008	4.951***
Inflation	-0.009	0.006	2.300	-3.293	0.997	-0.307	3.831	3.113
91day T-bill	-0.005	-0.001	0.302	-0.588	0.122	-1.357	9.857	156.381*
10yr BY	-0.007	0.000	0.283	-0.497	0.089	-1.856	15.881	524.129*

Notes: In this table, summary statistics for both level and log differenced data are presented. The level data is the raw version of data used and the log differenced data shows the growth rate. *MAAR* stands for marginal abnormal rate of returns, *GDP* stands for gross domestic product, *MV* stands market volatility, and *10yr BY* denotes 10 year bond yield rate. *, **, and *** denote level of significance at 1%, 5% , and 10%, respectively.



where, $CP_{1st\ TD}$ is the closing price of the new issue on the first trading day and *IP* is the issue price. R_i and R_m denotes return of security *'i'* and market, respectively.

The Table 1 shows summary statistics of raw and log differenced data of the variable under considerations. In panel A of Table 1, the summary statistics of raw data shows that the average underpricing in the study period is almost 36%. The maximum underpricing recorded is 970.429 % in quarter 1 of 2003 ; whereas, the minimum is documented in the 1st quarter of 2001, that is, -37.428 %. The MAAR recorded for the period also fluctuates like underpricing. The average number of new issues per quarter is almost six and the maximum of 29 is evidenced from the 1st quarter of 2007. The Figure 1 shows the trend of average underpricing and number of new issues in the studied period. The mean issue size for the period is 731 lakh shares and the maximum spotted is 4922 lakh shares. The average issue price during the study period is ₹ 209 and the maximum is ₹ 645. The macro - economic variable considered in this paper also shows dynamic characteristics.

Methods

To understand the effect of changes in firm specific and macro-economic variables on the degree of underpricing, we have used two forms of regression model, that is, the multiple regression method and the vector auto regression (VAR) method. For estimation of these methods, we use two sets of exogenous variables (i.e. firm specific and macro-economic) and underpricing as endogenous variable.

(1) Multiple Regression Method : To measure the impact of changes or growth in firm specific and macro-economic variables on underpricing, we employ three regression models. The first model measures the impact of firm specific factors on underpricing, the second model measures the impact of macro-economic factors on underpricing, and the third model examines the combined effect of both set of variables. The regression equations are as under :

$$UP\ or\ MAAR = \alpha + \beta_1\ (issue\ size) + \beta_2\ (issue\ price) + \beta_3\ (issue\ timing) + \beta_4\ (firm\ age) + \varepsilon_t \quad (3)$$

$$UP\ or\ MAAR = \alpha + \beta_1\ (Nifty50) + \beta_2\ (GDP) + \beta_3\ (Market\ volatility) + \beta_4\ (inflation) + \beta_5\ (91\ day\ T\text{-}bill) + \beta_6\ (10\ yr\ bond\ yield) + \varepsilon_t \quad (4)$$

$$UP \text{ or } MAAR = \alpha + \beta_1 (issue\ size) + \beta_2 (issue\ price) + \beta_3 (issue\ timing) + \beta_4 (firm\ age) + \beta_5 (Nifty50) + \beta_6 (GDP) + \beta_7 (Market\ volatility) + \beta_8 (inflation) + \beta_9 (91\ day\ T\text{-}bill) + \beta_{10} (10\ yr\ bond\ yield) + \varepsilon_t \quad (5)$$

where, *UP* or *MAAR* is used as a dependent variable and measures of underpricing β is the coefficient and ε_t is the error term.

(2) Vector Auto Regression Method : The VAR method is employed to investigate the linear interdependencies among several time series. While using financial and economic time series data, the VAR Model is found to be useful for explaining dynamic behaviour (Zivot & Wang, 2006). This model has high flexibility for no restrictions. It also provides a system to delineate the evolution of variables over the period by taking into considerations lagged values of the all variables under considerations. The multivariate VAR (*p*) model used in this study is expressed as :

$$y_t = A_0 + \sum_{i=1}^{P} \beta_i y_{t-i} + u_t \quad (6)$$

where, y_t is the 11×1 vector of dependent variables, that is y_t = *[four firm specific and six macroeconomic variables]*, A_0 is the 11×1 vector of intercept term, β_i is the 11×11 matrices of auto regressive coefficient terms, and u_t is the 11×1 vector of white noise disturbance term and it is expected to have zero covariance.

Results and Discussion

To examine the effect of changes in firm specific and macro-economic factors on underpricing through our proposed regression models, we have first performed unit root tests for all the variables to ensure that our

Table 2. Results from Unit Root Tests

Variable	ADF test		PP test	
	Intercept	Intercept with trend	Intercept	Intercept with trend
Underpricing	-9.435*	-9.473*	-18.909*	-19.089*
MAAR	-9.269*	-9.310*	-18.615*	-18.528*
Panel A : Firm Specific Variable				
Offer time	-8.591*	-8.559*	-22.780*	-27.195*
Firm age	-8.621*	-6.896*	-19.663*	-19.155*
Issue price	-7.609*	-7.595*	-19.938*	-19.743*
Issue size	-7.510*	-7.453*	-21.829*	-21.751*
Panel B: Macro - Economic Variable				
Nifty50	-6.861*	-6.807*	-6.791*	-6.734*
GDP	-6.329*	-6.271*	-17.852*	-17.706*
Market Volatility	-8.935*	-8.868*	-11.619*	-11.538*
Inflation	-10.584*	-10.498*	-22.469*	-22.132*
91day T-bill	-7.226*	-7.174*	-7.347*	-7.299*
10yr Bond Yield	-10.151*	-10.137*	-10.137*	-10.142*

Note: This table shows the unit root test statistics for log differenced issue specific variable in Panel A and macro-economic variable in Panel B. We run both Augmented Dickey Fuller (ADF) and Phillips - Perron (PP) test for both intercept and intercept and trend. For ADF test, we follow Schwarz Information Criterion (SIC) to select the number of lags. *, ** , and *** denote level of significance at 1%, 5%, and 10%, respectively.

regression results are not falsified. If the variables reject unit root, we run multiple regression, VAR, and impulse response function (IRF) analysis to check the adjustment of underpricing to various macro-economic shocks and firm related factors.

To test the existence of unit roots, we have conducted the Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1981) and Phillips-Perron (PP) tests with trend and intercept. The null hypothesis for ADF and PP tests is that variable has got unit root. We run both the tests by transmuting all variables into their natural logarithm differences. The Schwarz information criterion (SIC) is followed for ADF test to select the lag length. The results reported in the Table 2 show that the null hypothesis of non-stationarity or unit roots can be rejected at 1% level of significance for all the variables. Therefore, these variables do not have unit roots at the first difference. In other words, all variables are integrated of order one $I(1)$.

(1) Results from Multiple Regression : The Panel A of Table 3 exhibits the results of three regression models where underpricing is taken as the dependent variable.

(i) Model I : The Model I shows the impact of firm - specific factors on underpricing. The first column of panel A reveals that among the firm specific variables, issue price is found to be significant (at 5 % level of significance) and shows a positive relationship with the level of underpricing, which is in line with Hypothesis A_{1a} (Table 5). This is also consistent with the findings of Daily, Certo, Dalton, and Roengpitya (2003) and Flagg and Margetis (2008) and contrary to the findings of Zouari et al. (2011) and Pu and Wang (2015). One reason for the positive relationship between issue price and underpricing could be that firms want to attract more institutional investors (to discourage retail investors and ensure faster decision making and less floating stock) and therefore keep the offer price high, as institutional investors do not prefer low priced issues. Other firm specific variables (issue size, issue timing, and firm age) are found to be insignificant, which basically implies the rejection of Hypothesis A_{1b}, Hypothesis A_{1c} , and Hypothesis A_{1d} (Table 5). This is in line with the findings of other studies conducted by Bansal and Khanna (2013) and Zouari et al. (2011), who also found these variables to be insignificant. Although, issue size and issue timing is not a significant variable, but it shows a negative relationship with underpricing which was also supported by Beatty and Ritter (1986) and Daily et al. (2003). They stated that small size issues were more uncertain than large size issues, and therefore, lower the issue size, the higher the underpricing.

The significant F- statistics and adjusted R -square value 0.166 convey that these variables better explain the underpricing. The same result is also evidenced from Model 1 of Panel B where *MAAR* (an advance form of measure of underpricing) is used as a dependent variable. The results of Model 2 reported in Panel A show no significant influence of macro-economic activity on underpricing. This model would help in linking various firm specific factors with the overall firm performance and thereby taking an appropriate decision for investment in the select firms. Thus, the result of this model would provide some guidance to an investor as to what performance parameters related to the economy in general and the firm, in particular, must be considered before investing in an IPO. The result implies that investors should consider the issue price of the firm before investing. However, macro-economic factors did not show any impact on the underpricing.

(ii) Model II : The results of Model 2 are shown in the panel B. The results show that inflation positively affects underpricing (at 5 % level of significance) which implies the acceptance of Hypothesis A_{2c} (Table 5). Inflation is also an important determinant to explain IPO proceeds (Tran & Jeon, 2011).

In previous studies (Ameer, 2012 ; Bayless & Chaplinsky, 1996 ; Brau & Fawcett, 2006 ; Derrien &Kecskés, 2009 ; Jovanovic & Rousseau, 2004 ; Loughran, et al., 1994 ; Lowry, 2003 ; Persons & Warther, 1997 ; Pagano et al.,1998 ; Stoughton, Wong, & Zechner, 2001; Tran & Jeon, 2011), it was observed that macro-economic-factors (viz ; market volatility, stock market performance, market liquidity, capital demand, interest rate, stock market

Table 3 . Results from Multiple Regressions

	Panel A: Underpricing			Panel B: MAAR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Constant	-0.035	-0.016	-0.117	-0.038	0.013	0.009
	(-0.153)	(-0.029)	(-0.267)	(-0.154)	(0.022)	-0.019
Issue size	-0.045		-0.005	-0.101		-0.059
	(-0.360)		(-0.048)	(-0.764)		(-0.511)
Issue price	0.460**		0.395*	0.446**		0.362**
	(2.456)		(2.550)	(2.243)		(2.219)
Issue timing	-0.102		-0.024	-0.061		0.043
	(-0.581)		(-0.163)	(-0.325)		(0.275)
Firm age	0.363		0.305	0.447		0.354
	(1.208)		(1.168)	(1.402)		(1.286)
Nifty50		0.013	-0.030		0.023	-0.016
		(0.461)	(-1.370)		(0.802)	(-0.693)
ΔGDP		-0.043	0.073		-0.077	-0.022
		(-0.138)	(0.295)		(-0.243)	(-0.085)
ΔMV		0.749	0.375		1.143	0.719
		(0.997)	(0.648)		(1.499)	(1.176)
ΔInflation		0.366	0.239		0528***	0.428**
		(1.342)	(1.163)		(1.906)	(1.974)
91day T-bill		-2.536	-0.901		-2.769	-0.966
		(-0.927)	(-0.414)		(-0.997)	(-0.420)
10yr BY		-2.773	-3.323		-3.392	-4.081
		(-0.742)	(-1.144)		(-0.894)	(-1.330)
Δ No. of issue			0.724*			0.703***
			(1.990)			(1.830)
% MC on TD			-0.250			-0.211
			(-0.997)			(-0.800)
Crisis			-0.378			-0.363
			(-0.596)			(-0.544)
AR(1)			-0.523*			-0.494*
			(-5.594)			(-5.254)
R-square	0.215	0.115	0.574	0.201	0.176	0.571
Adj. R^2	0.166	0.029	0.463	0.152	0.096	0.460
F-statistics	4.439*	1.343	5.197*	4.095*	2.206**	5.146*
Observation	70	70	70	70	70	70

Notes: This table shows the results of three multiple regressions expressed in Eq. (3)-(5) and denoted as model 1-3, respectively. In these models, we regressed underpricing and marginal abnormal rate of returns *(MAAR)* on issue specific and macro-economic variables. *MC* and *TD* stand for market change on first trading day. *GDP* and *MV* are abbreviated as gross domestic product and market volatility. *AR (1)* is the first order lag of dependent variable. *, ** , and *** denote level of significance at 1%, 5% , and 10% , respectively.

index, industrial production index, 10-year TB yields rate) were important in determining the IPO activities but they did not show any influence on underpricing, which leads to the rejection of Hypothesis A_{2a} , Hypothesis A_{2b}, and Hypothesis A_{2d} (Table 5). The results suggest that investors should take into consideration the level of inflation prevailing in the economy while estimating the offer price. It also shows that although macro-economic factors play a vital role in determining the IPO volume, but they do not have any relationship with the underpricing (except inflation).

(iii) Model III : Finally, the Model 3 is estimated to examine the combined effect of the variables (firm specific and macro-economic) reported in Model 1 and Model 2 on underpricing and *MAAR*. The results identified in Model 3 in both panels A and B indicate that they are in consonance with our results reported in Models 1 and 2, which do not change substantially. Overall, issue price is the dominant firm-specific factor, and inflation is the most influencing macro-economic factor that leads to changes in underpricing. This finding conveys that investors should consider issue price and inflation rate as the initial returns or underpricing of IPOs in Indian capital market is inflation adjusted and mostly dependent on issue price.

(2) Results from VAR Method : The VAR model is estimated to measure the long-range dependencies between issue specific and macro-economic factors. We check stationarity of the variables under consideration. The ADF and PP tests report that all variables are stationary as reported in the Table 2. We use AIC to fix the order of the VAR. The AIC suggests a second order VAR model.

Unlike the outcomes of the regression models that ignore lagged values of variables and bidirectional relationship, the VAR model indicates evidence of significant effect of past values of issue specific and macro-economic factors on underpricing. The Table 4 presents estimates of VAR (2) model for the endogenous variable underpricing and *MAAR* only. The estimates show that among firm specific factors, the past value of the age of the firms going for IPO significantly (at 5%) affects underpricing, which implies the acceptance of Hypothesis A_{1b} (Table 5).

We find a negative association existing between underpricing and firm age, which is in consonance with the results obtained by Singh and Van der Zahn (2007), Flagg and Margetis (2008), and Engelen and van Essen (2010), who also supported this hypothesis, that the more the firm gets old, the less is the underpricing. Therefore, it can be said here that as the age of the firm increases, its creditability improves, and it can attract investors with normal expectation of returns (less underpricing).

Our observation from VAR estimates in Table 4 indicates that the immediate market return significantly (at 1%) affects the current underpricing positively, which signifies the acceptance of Hypothesis A_{2a} (Table 5). Acedo Ramírez and Ruiz - Cabestre (2017) also evidenced similar kind of result. They found that previous IPO numbers and market returns positively affected IPO underpricing. This finding tells us that the market adjusts the price of a new issue immediately to reach at an equilibrium point where the trend of market returns is adjusted with the underpricing. It also seems from the VAR estimation that historical market volatilities have notable impacts on underpricing.

Increase in market volatility leads to an increase in market risk, and at the same time, reduces the degree of underpricing in new issue. Apart from these two, the economic activity proxied through GDP and the lagged value of dependent variable appears significant in explaining underpricing (in case of *MAAR* as the dependent variable). Except these two variables, all other variables under consideration are found to be insignificant. However, the adjusted R - square reported (0.372 and 0.371) and significant F-statistics show effectiveness of our estimated model. The diagnostic test of the model also confirms that the estimated VAR (2) Model does not have autocorrelation and heteroscedasticity issues as reported by the autocorrelation LM test and White heteroscedasticity test. The result of the VAR Model suggests that investors before investing into an IPO should

Table 4. Estimates of VAR Model

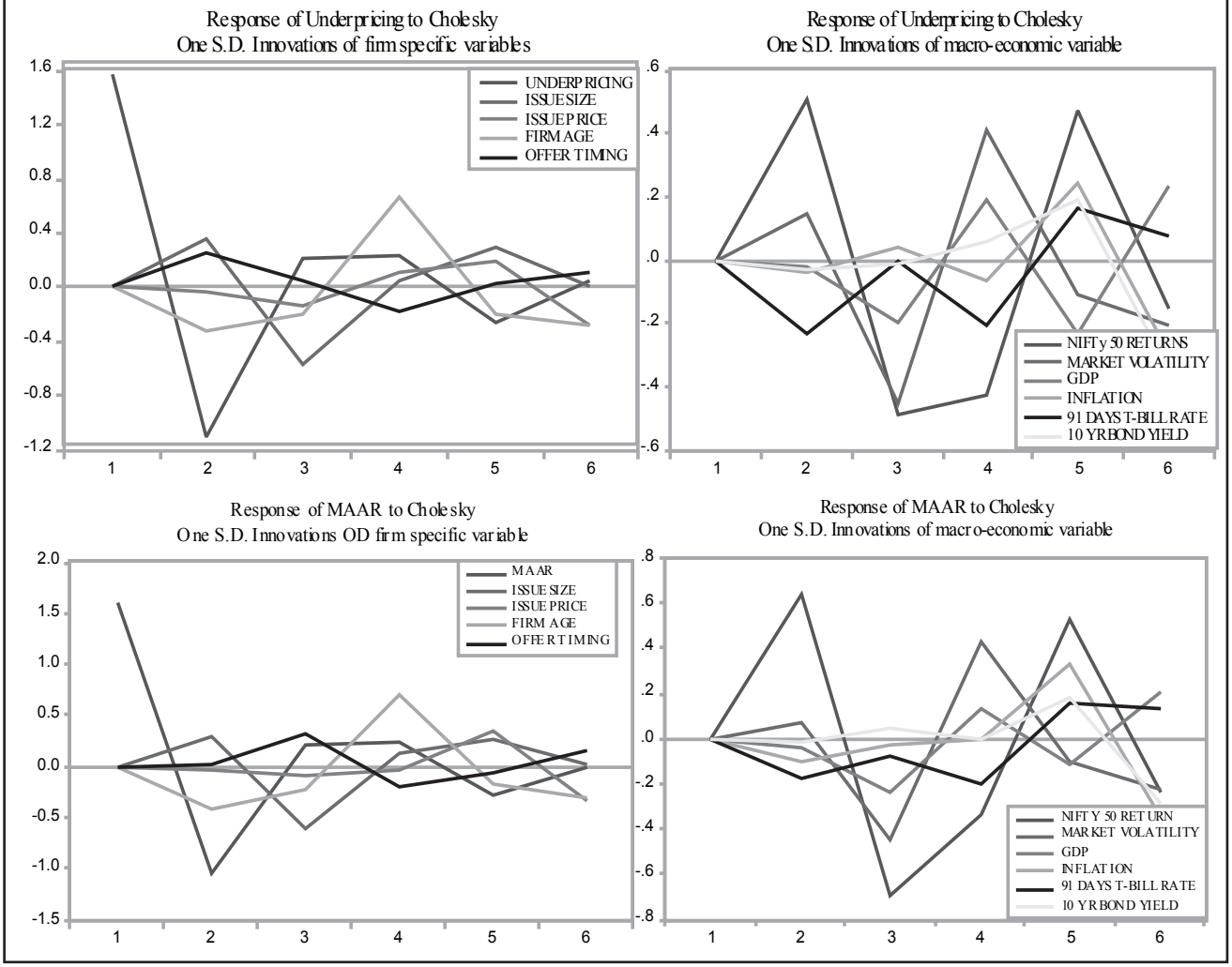
Variable	Dependent variable : Underpricing			Dependent variable: *MAAR*		
	Coefficient	*SE*	*t* - stat	Coefficient	*SE*	*t*-stat
UP/MAAR(-1)	-0.630*	0.149	-4.230	-0.579*	0.147	-3.953
UP/MAAR(-2)	-0.189	0.144	-1.308	-0.172	0.141	-1.219
Firm age(-1)	-0.601	0.393	-1.529	-0.608	0.401	-1.514
Firm age(-2)	-1.116**	0.494	-2.260	-1.074**	0.509	-2.110
Issue price(-1)	0.054	0.216	0.250	0.103	0.223	0.460
Issue price(-2)	0.116	0.238	0.487	0.172	0.243	0.709
Issue size(-1)	0.076	0.152	0.499	0.094	0.158	0.593
Issue size(-2)	0.063	0.151	0.416	0.035	0.155	0.226
Issue timing(-1)	0.225	0.226	0.992	0.032	0.234	0.137
Issue timing(-2)	0.229	0.252	0.907	0.159	0.258	0.617
Nifty 50(-1)	0.057**	0.024	2.312	0.064*	0.025	2.500
Nifty 50(-2)	-0.048***	0.026	-1.798	-0.059**	0.027	-2.133
MV(-1)	0.502	0.791	0.635	0.193	0.814	0.237
MV(-2)	-1.945*	0.731	-2.660	-2.051*	0.780	-2.628
GDP(-1)	0.054	0.286	0.189	0.040	0.294	0.137
GDP(-2)	-0.417	0.286	-1.457	-0.503***	0.295	-1.708
Inflation(-1)	0.004	0.276	0.016	-0.119	0.291	-0.411
Inflation(-2)	0.085	0.267	0.317	-0.198	0.277	-0.714
91-day T-bill(-1)	-1.815	2.891	-0.628	-1.579	3.002	-0.526
91-day T-bill(-2)	-0.220	2.927	-0.075	-1.121	3.034	-0.370
10yr. BY (-1)	-0.597	5.224	-0.114	-0.243	5.418	-0.045
10yr. BY (-2)	-2.498	4.847	-0.515	-1.153	4.994	-0.231
Constant	0.084	0.236	0.356	0.103	0.244	0.422
R-square	0.610			0.609		
Adj. *R*-square	0.372			0.371		
F - statistics	2.560*			2.555*		

Notes : This table reports estimated results of the VAR(2) model for the endogenous variable underpricing and *MAAR* only. In particular, in this table, we report coefficient, standard error, and *t*-statistics for the lagged exogenous variable. *, **, and *** denote level of significance at 1%, 5%, and 10% , respectively.

investigate about the past performance of the market and consider the age of the firm while judging about the firm's quality. The higher the firm age, the lower will be the underpricing. It also suggests that level of economic activity, which is measured through GDP and previous market volatility, also impacts level of underpricing and should be taken into consideration.

Further, we perform an IRF analysis to investigate how underpricing reacts to changes in firm specific and macro-economic variables. We conduct IRF analysis for both underpricing and *MAAR* to examine how they react to one standard deviation innovation to firm specific and macro-economic variable separately in Figure 2. The response of underpricing to firm-specific changes continues till one period. The graph presented in the upper left

Figure 2. Impulse Response Function Analysis on the Effect of Issue - Specific and Macro - Economic Variables on Underpricing



corner of Figure 2 shows that issue price, issue size, and firm age play a pivotal role in influencing underpricing ; whereas, in case of macro - economic factors, the upper-right corner of Figure 2 shows significant influence of changes in market return and volatility of stock returns on underpricing. The influence continues till one and a half year period. Similarly, the lower part of Figure 2, which shows the reaction of *MAAR* to one standard deviation shocks in issue-specific and macro-economic factors also evidence the same results.

Conclusion

The objective of this paper is to examine the impact of selected firm-specific (issue price, firm age, issue size, offer timing) and macro-economic factors (Nifty50 index, GDP, market volatility, inflation) on underpricing in the Indian context during the period from 1999 to 2016. Adopting various time-series econometric tools, this study evidences that, among firm specific variables, only issue price is found to have greater explanatory power than other firm specific variables. So far as macro-economic variables are concerned, inflation is found to be an

Table 5. Results of Hypotheses Testing

Hypotheses	Results
$H0_1$: There is no significant relationship between the firm specific factors and the level of underpricing.	
HA_1 : There is a significant relationship between the firm specific factors and the level of underpricing.	
$H0_{1a}$: There is no significant relationship between the issue price and the level of underpricing.	Rejected
HA_{1a} : There is a significant relationship between the issue price and the level of underpricing.	Accepted
$H0_{1b}$: The age of the firm has no significant relationship with the level of under-pricing.	Accepted
HA_{1b} : The age of the firm has a significant relationship with the level of under-pricing.	Rejected
$H0_{1c}$: There is a no significant relationship between the issue size and the level of underpricing.	Accepted
HA_{1c} : There is a significant relationship between the issue size and the level of underpricing.	Rejected
$H0_{1d}$: There is no significant relationship between the offer timing and the level of underpricing.	Accepted
HA_{1d} : There is a significant relationship between the offer timing and the level of underpricing.	Rejected
$H0_2$: There is no significant relationship between the macro-economic factors and the level of under-pricing.	
HA_2 : There is a significant relationship between the macro-economic factors and the level of under-pricing.	
$H0_{2a}$: There is no significant relationship between the stock market performance and the level of under-pricing.	Rejected
HA_{2a} : There is a significant relationship between the stock market performance and the level of under-pricing.	Accepted
$H0_{2b}$: There is no significant relationship between the market volatility and the level of under-pricing.	Accepted
HA_{2b}: There is a significant relationship between the market volatility and the level of under-pricing.	Rejected
$H0_{2C}$: There is no significant relationship between the level of inflation prevailing in the economy and the level of under - pricing.	Accepted
HA_{2c}: There is a significant relationship between the level of inflation prevailing in the economy and the level of under-pricing.	Rejected
$H0_{2d}$: There is no significant relationship between short term and long term interest rates and the level of under-pricing.	Accepted
Ha_{2d}: There is a significant relationship between short term and long term interest rates and the level of under-pricing.	Rejected

important explanatory variable ; rest of the variables do not seem to have any influence on underpricing. The study also indicates that VAR model predicts the long-run relationship between underpricing and firm specific and macro-economic variables reasonably well. The study shows that immediate market return affects the current underpricing positively. Similarly, historical values of market volatility have a notable impact on underpricing. It has also been observed that increase in market volatilities leads to increase in market risk and at the same time reduces the degrees of underpricing. Similarly, GDP has a greater explanatory power on lagged values of underpricing. Firm age is negatively correlated with underpricing, which means higher the firm age, lesser will be the underpricing. Unlike previous studies identifying the impact of only firm specific factors on underpricing, this study evidences the impact of macro-economic factors on underpricing and shows that there exists a long run relationship between underpricing and macro-economic factors. It infers that while investing in new issues, investors should analyze the contribution of the macro-economic factors in the past. This observation is the main contribution of the present study. However, exploring the relationship existing between industry-level determinants and underpricing is left out for future research.

Research Implications

The study provides useful insights to investors and identifies the important firm specific as well as macro-

economic factors that investors should consider while formulating the strategy for investing in new issues. The study evidences that in firm specific variables, issue price is found to have a greater explanatory power and in macro-economic factors, inflation is found to be an important determinant of underpricing. The study also evidences that there is a long run relationship between underpricing and macro-economic factors, which means investors should consider the past contribution of the macro-economic factors before formulating their strategy.

Limitations of the Study and Scope for Future Research

Limited numbers of firm specific and macro-economic variables are included in the study. There are other important firm specific and macro - economic variables which may also influence the level of underpricing. Industry wise classification and the role of industry specific variables in determining the level of underpricing are left out for further research.

References

Acedo Ramírez, M.Á., & Ruiz - Cabestre, F.J. (2017). IPO characteristics and underpricing in the alternative investment market. *Applied Economics Letters, 24*(7), 485 - 489.DOI: 10.1080/13504851.2016.1205713

Allen, F., & Faulhaber, G.R. (1989).Signalling by underpricing in the IPO market. *Journal of Financial Economics, 23*(2), 303 - 332. DOI: 10.1016/0304-405X (89)90060-3

Ameer, R. (2012). Macro-economic factors and initial public offerings (IPOs) in Malaysia. *Asian Academy of Management Journal of Accounting & Finance, 8* (1), 41- 67.

Bansal, R., & Khanna, A. (2013). Vector auto-regressive analysis of determinants of IPO underpricing: Empirical evidence from Bombay stock exchange. *Global Business Review, 14* (4), 651- 689. DOI: 10.1177/0972150913501609

Bayless, M., & Chaplinsky, S.(1996). Is there a window of opportunity for seasoned equity issuance? *The Journal of Finance, 51*(1), 253 - 278. DOI: 10.1111/j.1540-6261.1996.tb05209.x

Beatty, R.P., & Ritter, J.R. (1986).Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics, 15* (1- 2), 213 - 232. DOI: 10.1016/0304-405X (86)90055-3

Benveniste, L.M., & Spindt, P.A. (1989). How investment bankers determine the offer price and allocation of new issues. *Journal of Financial Economics, 24* (2), 343 - 361.DOI: 10.1016/0304-405X (89)90051-2

Brau, J.C., & Fawcett, S.E. (2006).Evidence on what CFOs think about the IPO process: Practice, theory, and managerial implications. *Journal of Applied Corporate Finance, 18*(3), 107 - 117. DOI: 10.1111/j.1745-6622.2006.00103.x

Brennan, M. J., & Franks, J. (1997).Underpricing, ownership and control in initial public offerings of equity securities in the UK. *Journal of Financial Economics, 45* (3), 391 - 413. DOI: 10.1016/S0304-405X (97)00022-6

Carter, R., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *The Journal of Finance, 45* (4), 1045 - 1067. DOI:10.1111/j.1540-6261.1990.tb02426.x

Chaturvedi, A., Pandey, A., & Ghosh, S.K. (2006). Firm financing through IPOs: A study of causal variables responsible for underpricing. *Vision: The Journal of Business Perspective, 10*(3), 23 - 33.DOI: 10.1177/097226290601000303

Daily, C. M., Certo, S. T., Dalton, D. R., & Roengpitya, R. (2003). IPO underpricing: A meta - analysis and research synthesis. *Entrepreneurship Theory and Practice, 27*(3), 271 - 295. DOI:10.1111/1540-8520.t01-1-00004

Darmadi, S., & Gunawan, R. (2013).Underpricing, board structure, and ownership: An empirical examination of Indonesian IPO firms. *Managerial Finance, 39* (2), 181- 200. DOI: 10.1108/03074351311294016

Derrien, F., & Kecskés, A.(2009). How much does investor sentiment really matter for equity issuance activity? *European Financial Management, 15* (4), 787 - 813.DOI: 10.1111/j.1468-036X.2008.00476.x

Drake, P.D., & Vetsuypens, M.R.(1993). IPO underpricing and insurance against legal liability. *Financial Management, 22* (1), 64 - 73.

Engelen, P.J., & van Essen, M. (2010). Underpricing of IPOs: Firm-, issue-and country-specific characteristics. *Journal of Banking & Finance, 34* (8), 1958 - 1969.DOI: 10.1016/j.jbankfin.2010.01.002

Flagg, D., & Margetis, S.(2008). What characteristics of underwriters influence underpricing ? *The Journal of Private Equity, 11* (2), 49 - 59.

Ghosh, S. (2005). Underpricing of initial public offerings: The Indian experience. *Emerging Markets Finance and Trade, 41* (6), 45 - 57.DOI: 10.1080/1540496X.2005.11052625

Grinblatt, M., & Hwang, C.Y. (1989).Signalling and the pricing of new issues. *The Journal of Finance, 44* (2), 393 - 420.

Gupta, K. (2011). Effect of market conditions, oversubscription and market efficiency on IPO underpricing. *Indian Journal of Finance, 5*(2), 15 - 23.

Habib, M.A., & Ljungqvist, A.P. (2001). Underpricing and entrepreneurial wealth losses in IPOs : Theory and evidence. *Review of Financial Studies, 14* (2), 433 - 458.DOI: 10.1093/rfs/14.2.433

Jain, N., & Padmavathi, C. (2012).Underpricing of initial public offerings in Indian capital market. *Vikalpa, 37*(1), 83 - 96. DOI: 10.1177/0256090920120107

Jaitly, S. (2004).Pricing of IPOs and their after-issue performance in the Indian equity market. *Managerial Finance, 30* (1), 29 - 45.DOI: 10.1108/03074350410768822

Jegadeesh, N., Weinstein, M., & Welch, I.(1993). An empirical investigation of IPO returns and subsequent equity offerings. *Journal of Financial Economics, 34* (2),153 - 175.DOI: 10.1016/0304-405X (93)90016-5

Jones, T. L., & Us Swaleheen, M. (2010). Endogenous examination of underwriter reputation and IPO returns. *Managerial Finance, 36* (4), 284 - 293.DOI: 10.1108/03074351011027501

Jovanovic, B., & Rousseau, P. L. (2004). *Interest rates and initial public offerings* (NBER Working Paper No. 10298). DOI: 10.3386/w10298

Krishnamurti, C., & Kumar, P. (2002).The initial listing performance of Indian IPOs. *Managerial Finance, 28* (2), 39 - 51.DOI: 10.1108/03074350210767681

Loughran, T., & Ritter, J. R. (2002).W hy don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies,15* (2), 413 - 444.DOI: 10.1093/rfs/15.2.413

Loughran, T., Ritter, J.R., & Rydqvist, K. (1994).Initial public offerings: International insights. *Pacific-Basin Finance Journal, 2* (2), 165 -199.DOI: 10.1016/0927-538X (94)90016-7

Lowry, M., & Schwert, G.W. (2002). IPO market cycles: Bubbles or sequential learning? *The Journal of Finance, 57*(3), 1171 - 1200.DOI: 10.1111/1540-6261.00458

Lowry, M. (2003).Why does IPO volume fluctuate so much ? *Journal of Financial Economics, 67* (1), 3 - 40. DOI: 10.1016/S0304-405X (02)00230-1

Neneh, B.N., & Smit, A.V.A. (2013).Underpricing of IPOs during hot and cold market periods on the South African Stock Exchange (JSE). *International Journal of Economics and Management Engineering, 7*(7), 2021 - 2028.

Pagano, M., Panetta, F., & Zingales, L. (1998).Why do companies go public? An empirical analysis. *The Journal of Finance, 53*(1), 27 - 64. DOI: 10.1111/0022-1082.25448

Pande, A., & Vaidyanathan, R. (2007). Determinants of IPO underpricing in the National Stock Exchange of India. *The ICFAI Journal of Applied Finance, 15*(1), 14 - 30.

Persons, J.C., & Warther, V.A. (1997).Boom and bust patterns in the adoption of financial innovations. *The Review of Financial Studies, 10* (4), 939 - 967. DOI: 10.1093/rfs/10.4.939

Pu, D., & Wang, S. (2015). The impact of pricing mechanism reform on underpricing of initial public offerings in China. *Applied Economics Letters, 22* (14), 1144 -1149.DOI: 10.1080/13504851.2015.1011303

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics, 15*(1 - 2), 187 - 212. DOI: 10.1016/0304-405X (86)90054-1

Singh, I., & Van der Zahn, M. J. L. (2007). Does intellectual capital disclosure reduce an IPO's cost of capital? The case of underpricing. *Journal of Intellectual Capital, 8* (3), 494 - 516. DOI: 10.1108/14691930710774885

Singh, H., & Sastry, C. G. (2014).Grading and risk-adjusted performance of Indian IPOs. *Indian Journal of Finance, 8*(8), 57 - 65. doi:10.17010/ijf/2014/v8i8/71856

Stoughton, N.M., Wong, K.P., & Zechner, J. (2001).IPOs and product quality. *The Journal of Business, 74*(3), 375 - 408. DOI:10.1086/321931

Tinic, S.M. (1988).Anatomy of initial public offerings of common stock. *The Journal of Finance, 43*(4), 789 - 822. DOI: 10.1111/j.1540-6261.1988.tb02606.x

Tran, A.L., & Jeon, B.N.(2011). The dynamic impact of macroeconomic factors on initial public offerings: Evidence from time-series analysis. *Applied Economics, 43*(23), 3187-3201.DOI: 10.1080/00036840903493267

Trivedi, J. C., & Soni, B. K. (2012). Initial public offerings (IPOs) - A boon or bane? *Indian Journal of Finance, 6* (12), 26 - 36.

Walker, T. (2008). Family control, underwriter prestige, and IPO underpricing: A cross country analysis. *Multinational Business Review, 16* (2), 1 - 42.DOI: 10.1108/1525383X200800006

Welch, I.(1992). Sequential sales, learning, and cascades. *The Journal of Finance, 47* (2), 695 - 732. DOI: 10.1111/j.1540-6261.1992.tb04406.x

Xu, Z., Wang, L., & Long, J. (2017).The impact of directors' heterogeneity on IPO underpricing. *Chinese Management Studies, 11*(2), 230 - 247. DOI: 10.1108/CMS-05-2016-0095

Zivot, E., & Wang, J. (2006). *Modeling financial time series with S-Plus®* (2nd ed.).New York : Springer.

Zouari, S.B. S., Boudriga, A., & Boulila, N.T. (2011). Determinants of IPO underpricing: Evidence from Tunisia. *The International Journal of Business and Finance Research, 5* (1), 13 - 32.

About the Authors

Aprajita Pandey is a Doctoral Student in the area of Financial Accounting and Management in the Department of Management Studies, Indian Institute of Technology (ISM), Dhanbad. She holds an MBA degree in Management Science. She has attended several national and international conferences and her current areas of research are : Primary Market, Earnings Management, and other related aspects.

J.K. Pattanayak is presently working as Professor in the Department of Management Studies, Indian Institute of Technology (ISM), Dhanbad. He has 32 years of academic and research experience. He has contributed articles to many national and international journals and his current areas of research include Corporate Finance, Earnings Management, Behavioural Finance, and Financial Economics.