Do Oversubscribed IPOs Perform Better in the Long Run? Evidence from the Emerging Economy of India

Anil Kumar [1]
Madhu Totla [2]

Abstract

Purpose : The study aimed to broaden and contextualize the emerging knowledge about the impact of initial public offerings (IPOs) on the operating performance and financial health of public firms in India and whether oversubscription and underpricing of the IPO firms determined the change in performance.

Design : It entailed the comparison of pre-IPO and post-IPO performance for 3 years by employing data from 95 IPO firms getting listed on the main board segment of NSE and BSE in India between April 2012 and March 2018.

Methodology : The methodology consisted of both univariate and multivariate data analysis techniques. Multivariate regression analysis determined whether underpricing and subscription levels determined IPO firms' post-issue long-run operating performance.

Findings : The study suggested that operating performance dropped significantly while financial health improved post-IPO. Both oversubscription and underpricing were not predicting factors of change in performance post-IPO. Rather, issue size, offer price, and post-issue promoter holding significantly and negatively impacted the change in performance ; whereas, age positively and significantly determined the change in performance after the IPOs.

Practical Implications : The study recommended that, with the indication of earnings management being done just before the IPOs, investors need to exercise caution in relying on the financials immediately before the IPO. The findings of the study will guide investors in making accurate investments in the primary and secondary equity markets.

Originality : Unlike previous research, this study examined the impact of IPOs on the firms' financial health post-issue and whether subscription to IPOs determined the change in performance of new listings on the main board segment in India.

Keywords : **initial public offering (IPO), emerging economy, post-IPO performance, India, oversubscription**

JEL Classification Codes : GI4, G19, G32, G38

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Post-initial public offering (IPO) operating performance deterioration is well-established and extensively documented both in developed and emerging economies (Bhatia & Singh, 2009; Cai & Wei, 1997; Clementi, 2002; Jain & Kini, 1994; Khurshed et al., 2005; Rangan, 1998). Jain and Kini (1994) documented a decline in the post-issue operating performance (return on assets (ROA)) of US IPO firms despite IPO firms exhibiting an increase in sales and capital expenditure. Similar was the research finding of Bhatia and

[1] *Professor*, Department of Commerce, University of Delhi, Delhi -110 007. (Email : profanilkumar@commerce.du.ac.in)
ORCID iD : https://orcid.org/0000-0003-3574-3050
[2] *Assistant Professor (Corresponding Author),* Shaheed Sukhdev College of Business Studies, University of Delhi, Sector - 16, Rohini, Delhi -110 089. (Email : madhumaheshwari@sscbsdu.ac.in)
ORCID iD : https://orcid.org/0000-0001-9665-097X

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Singh (2009), who reported a decline in the long-run operating performance of IPO firms in India. It is even more perplexing to learn that the companies whose future seems brightest at the time of this issue are experiencing declining earnings and profitability. The severe and persistent operating underperformance is resistant to the effects of mean reversion.

Several measures have been implemented in India by the Securities and Exchange Board of India (SEBI) to promote the entry and existence of firms with high credentials: promoters' contribution, lock-in period, track record, etc[1]. A research study to evaluate the post-issuance operating performance of the firms may shed some light on whether these reforms have resulted in any discernible improvement. The present study is undertaken to answer the research question of the impact of IPOs on firms operating performance and financial health post-IPO, and whether the operating performance relates to subscription levels and underpricing. To document these, the pre-IPO performance and financial health indicators are compared to the post-IPO indicators. Afterward, a regression model is used in the study to examine the link between underpricing and subscription levels with post-IPO operating performance.

The focus of most IPO-related research in India is on the long-run operating performance of IPOs and their relationship with ownership, and thus the gap is evident. This is probably the first study to analyze the financial health of an IPO firm post-IPO and the relationship between oversubscription with post-IPO operating performance. The study distinguishes itself by evaluating the influence of the IPO on the firm's financial health and the assessment of subscription level and underpricing being accountable for such degradation in performance. The study is in demand with its focus on whether the oversubscribed IPO firms perform better than the others in the long run; it guides investors in making the right investment.

While this section of the paper introduces the research, the succeeding sections contain a review of theoretical and empirical investigations, followed by a discussion of the data and methodology employed in the study. The last two sections contain the analysis of the results and the conclusion of the study.

Literature Review

Many researchers around the world have studied the post-issue operating performance of IPO firms, and varied premises have been developed to determine the attributes. The literature proposes the following three basic hypotheses for decreasing operating performance post-IPO: Windows of opportunity or market timing hypotheses (managers time the IPO when either the company is performing well or the stock market is booming, resulting in subsequent underperformance due to mean reversion, earnings management or window dressing before the IPO), and ownership issues (agency problems due to dilution of ownership).

Jain and Kini (1994) were pioneers in documenting a decline in operating performance post-issue. Rangan (1998) explained that earnings management at the time of offer explains the decline in performance in the post-issue years. Jain and Kini (2008) concluded that diversification and capital expenditure intensity have a positive impact on operating performance. Chipeta and Jardine (2014) concluded a significant negative relationship between IPO volume and long-term performance and supported the overoptimism hypothesis with a negative association between pre-IPO revenue projection and post-issue operating performance. Andriansyah and Messinis (2016), evidencing decline, concluded that investment in fixed assets and shares in subsidiaries had a positive relationship with operating performance; whereas, other usage of the IPO proceeds had a negative relationship with post-issue operating performance. Meles and Salerno (2020) evidenced a non-linear relationship between post-issue operating performance and the IPO firms' public float in European and Asian stock markets from 2007–2011.

[1]SEBI ICDR Regulations 2018.

Bhatia and Singh (2013) suggested a decline in profitability post-issue compared to pre-IPO levels with empirical evidence of a decline in profitability ratios, efficiency ratios, and growth, and further suggested no significant relationship between post-issue ownership retention and a decline in operating performance. Mayur and Mittal (2014) concluded a significant decline in the overall performance of IPO firms post-issue and also commented that underpricing is not the determining factor of operating underperformance in India (similar to Bhatia and Singh (2009)). On the contrary, Valarmathi et al. (2018) also suggested no significant change in operating performance after the IPOs (for ROE, ROA, and asset turnover ratio (ATR)). Shukla and Shaw (2018) also concluded that there was no decline in operating performance measured by return on sales (ROS).

Simultaneously, there have been many studies on underpricing and the long-run performance of stocks in India. Singh et al. (2021), Singh and Nayyar (2017), and Pandey and Pattanayak (2018) suggested positive initial returns and long-run underperformance in India. The high initial returns were attributable to age, debt-equity ratio sales, and net asset value; whereas, the long-run performance was impacted by macroeconomic factors like inflation and market volatility. Similar results were reported by Gupta (2020), a study of another Asian country on underpricing anomalies, and also from the Indian SME segment study by Singh and Anand (2020). IPO grading emerged to be a significant factor determining underpricing in a study conducted by Mittal et al. (2012) and also in a study by Singh et al. (2018). IPO grading and market capitalization at the time of issue emerged as significant factors positively impacting long-run stock performance. Gupta and Maurya (2021) studied a different perspective on the influence of board characteristics on IPO underpricing and suggested an inverted U-shaped non-linear relationship between business experts and directors with political ties with underpricing. The presence of women directors had a positive impact on the underpricing of IPO firms. Thus, the existing literature on the post-issue operating performance of IPO firms has mostly documented a decline in the operating performance of IPO firms in the long run. Despite the lack of consensus on the cause of a decline in operating performance post-issue, the literature suggests earnings management and timing of the offer to be the most common reasons.

According to Chakraborty (2010), the capital structure of a firm is determined by its profitability (operating performance). The operating performance and the growth prospects theoretically (fundamental analysis for investment decisions) culminate in the stock performance of the firm. Therefore, we need to evaluate the long-term performance of IPOs in terms of both the operating and financial performance measures and their association with stock prices. There has been no existing study that shows the impact on the operating and financial health of IPO firms by comparing the pre-IPO performance with the post-IPO performance indicators. Singh et al. (2023) suggested that oversubscription was the major determinant of initial performance. Srivastava et al. (2022) studied the issue of oversubscription in India using quantile regression and concluded that firm size positively influenced oversubscription. But to our knowledge, no study has studied the impact of oversubscription on the long-run operating performance of IPO firms post-issue, and the current study aims to fill this gap.

Objectives and Hypotheses

To evaluate the impact of an IPO on the financial health and operating performance of firms, an analysis of the change in profitability ratios (margin ratios), efficiency ratios, liquidity ratios, leverage ratios, solvency ratios, valuation ratios, and growth ratios from the pre-IPO period to the post-IPO period is done, which ultimately aims to measure return for equity investors who invested in the stock and held it for a long period of time. Also, the study aims to determine if underpricing and oversubscription levels hint toward forecasting post-issue operating performance.

↳ **H_{01} :** There is no significant difference in the long-run operating performance of IPO firms between the pre-IPO period and the post-IPO period.

↳ **H_{a1} :** There is a significant difference in the long-run operating performance of IPO firms between the pre-IPO period and the post-IPO period.

↳ **H_{02} :** There is no significant difference in the long-run financial health of IPO firms between the pre-IPO period and the post-IPO period.

↳ **H_{a2} :** There is a significant difference in the long-run financial health of IPO firms between the pre-IPO period and the post-IPO period.

↳ **H_{03} :** There is no significant difference in the long-run operating performance ratios (ROA, ROS, ROE, ROCE, OCFTA, ATA, FATA, CATA, and WCTA ratios) of under and overpriced IPOs.

↳ **H_{a3} :** There is a significant difference in the long-run operating performance ratios (ROA, ROS, ROE, ROCE, OCFTA, ATA, FATA, CATA, and WCTA ratios) of under and overpriced IPOs.

↳ **H_{04} :** There is no significant relationship between the long-run operating performance and the long-run stock performance of IPO firms.

↳ **H_{a4} :** There is a significant relationship between the long-run operating performance and the long-run stock performance of IPO firms.

↳ **H_{05} :** Subscription level and underpricing do not impact IPO firms' long-run operating performance.

↳ **H_{a5} :** Subscription level and underpricing impact the IPO firms' long-run operating performance.

Data and Methodology

Data

The study was carried out using an exploratory research design, and the sampling framework is as follows:

↳ **Sample :** The sample consists of companies making equity IPO listings on the main board segment of the NSE and BSE in India from April 1, 2012 to March 31, 2018. For evaluating the long-run operating and financial performance, performance measures were taken for the three financial years preceding and following the IPO year. As post-IPO, three-year financials were not published for firms listed in the financial year 2018–2019, and thereafter, the data was restricted until March 31, 2018.

↳ **Sources :** A list of IPOs and relevant variables for IPO firms were sourced from the Prime database and the CMIE Prowess database.

↳ **Final Sample :** Out of a total of 115 IPOs listed on the main board segment of both NSE and BSE from April 1, 2012 to March 31, 2018, IPOs of insurance companies and banks were not included as a method of calculation of parameters of the financial and operating performance of these firms does not gel with firms from other sectors. After removing these firms and firms with missing data, finally, 95 IPO firms formed the sample set of the study.

The operating and financial health of IPO firms were measured using various operating and financial ratios broadly classified into profitability ratios (margin ratios), liquidity ratios, leverage ratios, efficiency ratios, valuation ratios, and growth ratios.

Existing studies used ROA (Jain & Kini, 1994; Khurshed et al., 2005), ROS (Ahmad-Zaluki, 2008), operating cash flow deflated to total assets (OCFTA) (Clementi, 2002; Coakley et al., 2007; Jain & Kini, 1994), return on equity (ROE) (Auret & Britten, 2008), growth rate of net sales (Cai & Wei, 1997), growth rate of operating income (Cai & Wei, 1997), growth rate of capital expenditures (Bhatia & Singh, 2013; Cai & Wei, 1997), growth rate of assets (Cai & Wei, 1997), market to book value (Chipeta, 2016) debt equity (DE) ratio (Dudley & James, 2013), net income to total assets (Andriansyah & Messinis, 2016), ATR (Andriansyah & Messinis, 2016; Bhatia & Singh, 2013; Shukla & Shaw, 2018) EPS (Gupta et al., 2020), current ratio (CR) (Gupta et al., 2020), quick ratio (QR), and interest coverage ratio (ICR).

A multiple variable strategy was adopted, as a single variable only provides limited performance information. The study employs ROA, ROS, ROE, return on capital employed (ROCE), and OCFTA to measure the overall profitability of the IPO firms. For a deeper understanding of the efficient utilization of resources – the ATR, fixed asset turnover ratio (FATR), current asset turnover ratio (CTR), and working capital turnover ratio (WCTR) have also been analyzed.

To ascertain the financial health of a firm, it was imperative to determine its short-term and long-term solvency. The short-term solvency (liquidity) was measured using the CR, QR, and ICR. To understand the utilization of IPO proceeds and to evaluate the impact of an IPO on a firm's capital structure – the DE ratio and the total outside liabilities to total net worth ratio (TOL/TNW) were studied. Furthermore, to understand the dilution of ownership on account of IPO, the proprietary ratio (shareholder fund to total assets) was also analyzed.

Whether operating performance translates into stock returns, valuation ratios were analyzed. Price to earnings ratio is used to determine whether the firm's earnings are being reflected in its stock price, and price to book value (P/B) ratio is used to determine the valuation the market gives the firm with its book value.

Univariate Analyses

Hypotheses 1 and 2 are tested using median values, as the mean of most ratios is skewed and vulnerable to outliers. A Wilcoxon matched pair signed rank test (Jain & Kini, 1994) was employed to determine the change in operating and financial indicators from the pre-IPO period (−1, −2, −3) to the post-IPO period (+1, +2, +3).

To determine if underpriced IPOs perform better than overpriced ones (hypothesis 3), a non-parametric test of independent sample median was performed on the average profitability and efficiency ratios of the three years post-IPO for firms coming with IPOs on NSE or BSE between April 1, 2012, and March 31, 2018.

Hypothesis 4 determines the relation between long-run operating performance and long-run stock performance of IPO firms and is tested using correlation coefficients.

Multivariate Analyses

Hypothesis 5 determines whether underpricing and subscription levels determine the post-issue long-run operating performance of IPO firms, and a multivariate regression analysis is undertaken for firms coming with an IPO on the NSE or BSE between April 1, 2012, and March 31, 2018.

The dependent variable is the change in ROA from one year before the IPO to three years post-IPO. The main variables of interest are underpricing and subscription levels. Under-priced: dummy variable taking value 1 if the IPO has positive initial returns on listing day and 0 otherwise. Subscription level is the number of times the issue gets subscribed overall. Firms with high subscription levels should yield positive long-run operating performance. Along with this, based on previous research, we accounted for control variables linked to the change in operating performance measured by ROA. The control variables identified are offer price, issue size, age, total asset (a proxy for size), promoter ownership, and growth in sales.

$$dROA_{-1to3} = \beta_0 + \beta_1 Offer\ price_i + \beta_2\ Issue\ size_i + \beta_3 Age_i + \beta_4 Total\ assets_i + \beta_5 Subscription\ level_i + \beta_6 Underpriced_i + \beta_7 Promoter\ holding_i + \beta_8 Growth\ in\ sales_i + \varepsilon_i \quad (1)$$

Following Jain and Kini (1994) and Maheshwari and Kumar (2022), issue size and offer price have been taken as the control variables. Issue size refers to the product of the issue price and the total number of shares offered, as specified in the prospectus. The high offer price shows that the firm commands a high premium and should have a higher ROA. The larger the issue size, the more the IPO proceeds and the higher the return. These two control variables are predicted to have a positive association with ROA. Following Meles and Salerno (2020), old established firms exhibit higher ROA as compared to young firms, and therefore, the variable age is believed to have a positive sign. Large firms tend to perform better after an IPO, and therefore, total assets (a proxy for size) following Wang (2005) has been taken as a control variable and expected to have a positive sign. Promoter holding, a measure of concentrated ownership, has been taken as a control variable (Kumar & Shukla, 2018). Ownership concentration impacts transparency, thereby reducing agency costs, which leads to better performance. High growth in sales leads to better performance (Chi & Padgett, 2006; Pereira & Sousa, 2017), and the variable is expected to have a positive sign.

Univariate and multivariate analyses have been done using Statistical Software Packages – SPSS and E-Views 8, respectively.

Analysis and Results

Descriptive Statistics

To understand the data at a glance, Table 1 shows the descriptive statistics (mean and standard deviation), and Table 2 reports the median values of the aforementioned ratios from three years before the IPO to three years after the IPO.

Table 1. ***Descriptive Statistics of Ratios of Sample IPO Firms***

Ratios	IPO –3 Year		IPO –2 Year		IPO –1 Year		IPO +1 Year		IPO +2 Year		IPO +3 Year	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
ROA	13.35	9.34	13.38	8.80	14.27	8.34	12.63	7.60	12.71	10.32	10.61	8.07
ROE	21.66	28.19	22.05	27.09	21.51	39.53	13.79	10.44	11.93	10.83	–0.04	75.46
ROCE	12.49	13.85	12.19	11.95	12.90	13.67	11.21	9.00	9.92	9.64	5.81	21.08
OCFTA	11.38	16.50	7.13	10.69	8.29	10.29	4.82	9.56	7.91	8.48	8.47	8.47
Growth Rate of Sale	1.96	4.75	56.72	213.38	235.39	1997.91	16.03	29.92	15.02	55.21	7.99	34.64
Growth Rate Operating Income	3.04	5.16	709.32	6316.29	85.72	434.60	16.34	51.56	3.22	95.90	9.48	108.79
Growth Rate in CAPEX	39.08	20.41	144.52	818.94	250.60	1544.92	338.98	1150.33	17833.92	124609.84	2.54	59.55
Growth Rate in Assets	1.35	1.93	29.65	37.92	26.64	28.06	16.39	18.57	43.77	325.27	9.23	19.15
DE	0.98	1.82	1.98	6.01	1.36	2.89	0.52	0.74	0.52	0.73	0.67	1.64

TOL/TNW	85.44	379.79	3.52	8.01	3.19	12.06	1.07	0.94	1.10	0.98	1.11	1.06
Dilution of Ownership	249.44	1212.00	40.31	21.62	43.23	20.53	55.97	17.97	61.53	47.06	0.53	0.30
CR	1.17	0.97	1.42	1.70	1.28	0.84	1.77	1.33	1.72	1.38	1.90	1.73
QR	26.90	116.09	0.99	1.48	0.91	0.81	1.33	1.31	1.25	1.35	1.34	1.68
ICR	2.75	2.76	23.05	80.79	16.38	60.68	163.42	864.05	69.63	365.63	10.15	35.02
DSCR	3.84	45.40	3860.67	34353.75	64.90	192.27	115.43	727.66	164.46	799.25	26.76	72.21
ATR			1.17	1.02	1.12	0.98	0.90	0.72	0.97	1.26	0.80	0.64
FATR			17.39	55.40	21.13	84.40	17.51	60.57	35.80	203.58	33.06	195.67
CATR			2.69	2.50	2.53	2.10	2.00	1.75	2.21	2.06	2.06	2.01
WCTR			76.52	467.22	1.92	95.54	39.36	310.09	–0.78	83.05	1.32	39.58

Table 2. ***Median of Various Performance Measures of Different Years***

Performance Measures	IPO Year –3	IPO Year –2	IPO Year –1	IPO Year (0)	IPO Year +1	IPO Year +2	IPO Year +3
Profitability Ratios							
Return on assets (%)	13.36	12.55	14.53	13.85	12.55	11.24	10.01
Return on sales (%)	12.47	13.37	13.94	15.81	14.97	15.05	13.64
Return on equity (%)	16.97	17.93	19.88	16.19	12.87	11.45	10.6
Return on capital employed (%)	9.24	10.54	10.98	11.22	10.26	7.85	7.14
Operating cash flow to total assets (%)	9.47	5.93	8.26	7.69	5.39	7.78	7.72
Liquidity Ratios							
Current ratio (times)	1.08	1.11	1.06	1.44	1.395	1.43	1.48
Quick ratio (times)	0.65	0.69	0.67	1.04	0.94	0.89	0.9
Solvency Ratios							
Debt service coverage ratios (times)	0.745	0.67	0.65	1.2	1.27	1.41	1.36
Interest coverage ratio (times)	3.10	4.16	4.92	6.65	8.05	7.25	4.57
Capital Structure Ratios							
Debt equity ratio	0.79	0.74	0.64	0.33	0.34	0.34	0.25
Dilution of ownership (%)	37.13	40.66	41.51	55.68	55.75	54.55	54.76
TOL/TNW	1.625	1.495	1.33	0.82	0.8	0.85	0.85
Efficiency Ratios							
Asset turnover ratio (times)	0.94	0.93	0.93	0.77	0.69	0.69	0.71
Fixed asset turnover ratio (times)	3.85	3.83	4.48	3.81	4.13	3.59	3.36
Current assets turnover ratio (times)	2.04	2.06	1.93	1.51	1.60	1.66	1.52
Valuation Ratios							
Earnings per share				10.87	13.13	10.51	8.91
Price to book value (PB) ratio				3.36	3.05	2.79	2.25
Price-earnings ratio				30.97	28.49	22.9	22.45
Tobin's *Q*							
Book value per share				93.87	95.125	105.92	115.07

Growth Ratios							
Growth rate of sales (%)	–	18.51	15.73	15.95	13.43	9.89	5.87
Growth rate of operating income (%)	–	19.28	25.87	21.83	12.45	9.14	4.00
Growth rate of capital expenditures (%)	–	3.83	0.18	76.76	32.85	4.24	–2.79
Growth rate of assets (%)	–	18.10	18.42	30.04	15.32	9.69	6.28

Note. Table 2 reports the median for all the ratios for the total sample of IPOs for all 7 years (three years before the IPO year, the IPO year, and three years after the IPO year).

Table 3. ***Results of Hypothesis Testing Comparing Various Ratios of Pre and Post-IPO Years***

Variables	IPO Year –1 vs. IPO Year +1	IPO Year –2 vs. IPO Year +2	IPO Year –3 vs. IPO Year +3
Profitability Ratios			
Return on assets (%)	–3.161 (.000)***	–2.000 (.045)**	–3.021 (.000)***
Return on sales (%)	–1.923 (.054)*	–2.375 (.018)**	–.830 (.407)
Return on equity (%)	–4.487 (.000)***	–4.865 (.000)***	–4.187 (.000)***
Return on capital employed (%)	–1.795 (.073)*	–1.955 (.051)*	–2.397 (.017)**
Operating cash flow to total assets (%)	–3.417 (.001)***	–.279 (.780)	–.571 (.568)
Efficiency Ratios			
Asset turnover ratio (times)	–6.090 (.000)***	–5.117 (.000)***	–5.574 (.000)***
Fixed asset turnover ratio (times)	–.761 (.447)	–1.262 (.207)	–2.239 (.025)**
Current assets turnover ratio (times)	–5.312 (.000)***	–4.652 (.000)***	–3.337 (.001)***
Working capital turnover ratio	–.887 (.375)	–2.687 (.007)***	–.284 (.777)
Liquidity Ratios			
Current ratio (times)	–5.078(.000)***	–3.786 (.000)***	–4.637(.000)***
Quick ratio (times)	–4.984 (.000)***	–3.556 (.000)***	–3.612(.000)***
Capital Structure Ratios			
Debt equity ratio	–5.848(.000)***	–6.148 (.000)***	–4.860 (.000)***
Dilution of ownership	–6.196 (.000)***	–5.926 (.000)***	–5.071 (.000)***
TOL/TNW	–6.651 (.000)***	–6.164 (.000)***	–8.185 (.000)***
Solvency Ratios			
Debt service coverage ratio (DSCR)	–1.695 (.090)*	–2.946 (.003)***	–3.736 (.000)***
Interest coverage ratio	–3.499 (.000)***	–1.490 (.136)	–.123 (.902)

Note. Table 3 reports the *Z*-value and the probability value in brackets of the Wilcoxon matched pair signed rank test performed for the total sample of IPOs, comparing ratios for pre- and post-IPO for IPO –1 year vs. IPO +1 year, IPO –2 years vs. IPO +2 years, and IPO –3 years vs. IPO +1 years.

Note. ***Significant at 1%, **significant at 5%, and *significant at 10%.

Evaluating the long-run performance of IPOs at a glance, Table 3 shows the results of the Wilcoxon matched pair signed rank test performed between the pairs of aforementioned ratios of the financial years preceding the IPO year and the same number of years immediately following the IPO year.

The test results reveal a significant difference in all the profitability ratios when comparing one year before with one year after the IPO. Similarly, all the profitability ratios except the operating cash flow to total assets are significantly different for the two years before and the two years after the IPO. The operating performance of IPO

Figure 1. ***Trend in Profitability Ratios***

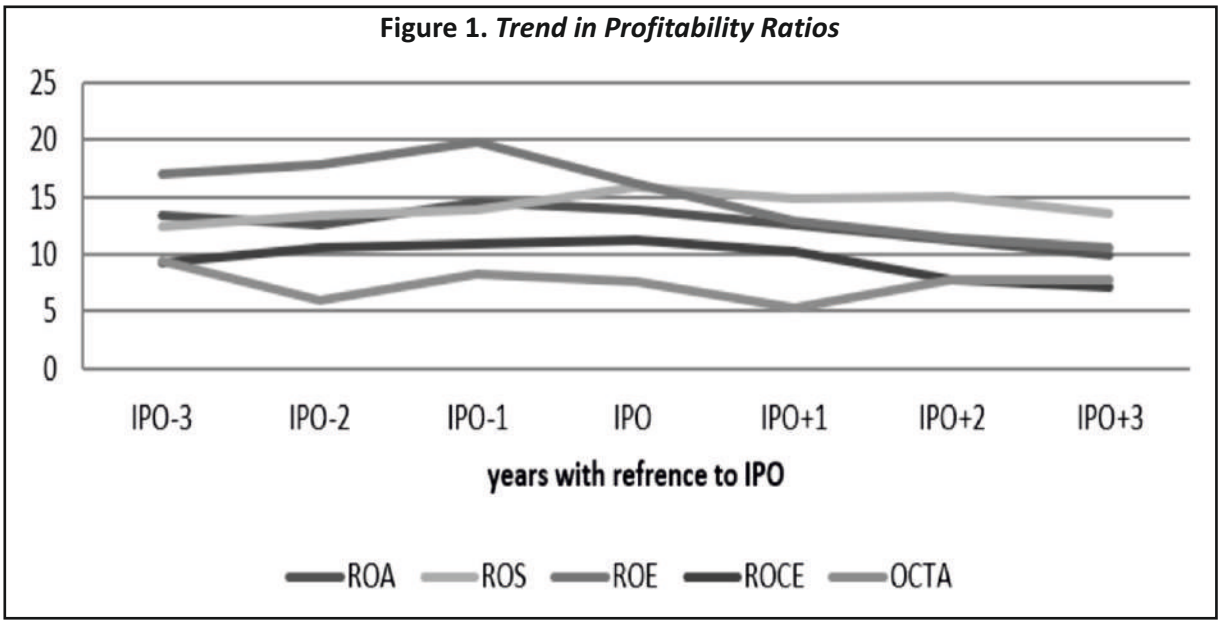
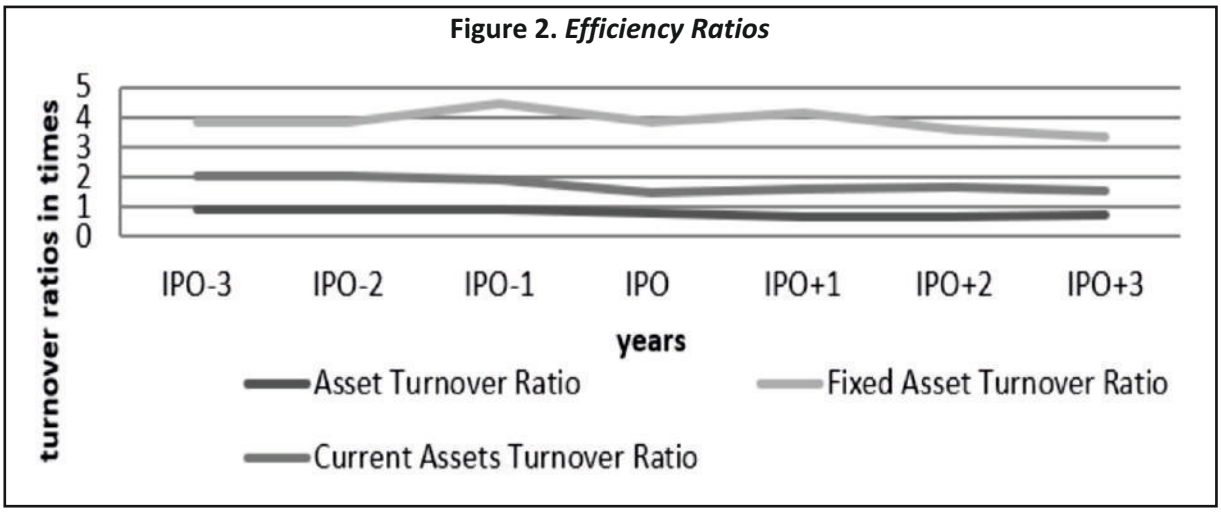


Figure 2. ***Efficiency Ratios***



firms has significantly declined in the two years after the IPO as compared to the two years before the IPO. For a three-year comparison period, the test results indicate significant differences in ROA, ROE, and ROCE ratios. Overall, the operating performance has significantly declined post-IPO as compared to pre-IPO. Except for operating cash flow to total assets, all profitability ratios exhibit a trend. Median operating cash to total assets is lowest for the IPO year, which indicates earnings management through discretionary accruals in the year immediately preceding the IPO. Figure 1 further corroborates the findings of the results with a declining trend in all profitability ratios except ROS.

There is a significant difference in the ATR and current asset turnover ratio for all three periods, indicating that the firms have been less efficient in utilizing their current assets, as substantiated by Figure 2 as well. Evaluating the financial health post-IPO, both the liquidity ratios used in the hypothesis testing show a significant increase in the liquidity of IPO firms, indicating better short-term solvency post-IPO.

The statistical test results indicate significant differences in the debt-equity ratio, the ratio of TOL/TNW, and the dilution of ownership. There is a significant decline in the debt-equity ratio and the ratio of TOL/TNW after the IPO as the IPO proceeds are used toward repayment of the debt, thereby reducing the amount of debt and outside liabilities and resulting in a lower debt-equity ratio. Dilution of ownership, which represents the proportion of total assets funded by shareholder funds, has increased as an outcome of the IPO.

Evaluating the impact of the IPO on the financial health of the IPO firms in terms of debt servicing and interest-paying capacity after the IPO, the results of the hypothesis test indicate a significant difference in debt service coverage ratio (DSCR) for all three paired comparisons and a significant difference in ICRs only for one-year pre- and post-IPO. The significant increase in DSCR is due to the repayment of debt after the IPO. There is a significant increase in the ICR, which may be the result of reduced interest expenses on account of debt repayment.

Thus, based on the test results, we fail to accept null hypothesis 1, that there is no significant difference in the long-run operating performance of IPO firms between the pre-IPO period and the post-IPO period. Also, we fail to accept null hypothesis 2, that there is no significant difference in the long-run financial health of IPO firms between the pre-IPO period and the post-IPO period. In a nutshell, the IPO firms' operating performance declined post-IPO compared to pre-IPO. But they have positively impacted the firms' financial health.

The Long-Run Operating Performance of Under and Overpriced IPOs

The independent sample median test determines if the under and overpriced IPOs significantly differ in their median performance ratios. The results of the test in Table 4 indicate that there is no difference in the post-IPO operating performance of firms based on underpricing. Thus, we fail to reject the third null hypothesis (hypothesis no. 3) and conclude that there is no significant difference in the long-run operating performance of underpriced and over-priced IPOs.

Relationship Between Operating and Market Performance

To determine whether the post-issue operating performance of IPO firms transforms into the market performance of IPO firms' shares, we study and determine if there exists any correlation between the operating performance

Table 4. ***Results of Hypothesis Testing Comparing the Performance of Underpriced and Overpriced IPOs***

Ratio	Significance level (*p*-value)	Result
Average return on asset	1.000	No significant difference
Average return on sales	0.658	
Average return on equity	0.658	
Average return on capital employed	1.000	
Average operating cash flow to total assets ratio	0.658	
Asset turnover ratio	0.658	
Fixed asset turnover ratio	0.376	
Current asset turnover ratio	1.000	
Working capital turnover ratio	1.000	

Note. Table 4 reports the probability value of the independent sample median test performed for the total sample of IPOs' testing average profitability and efficiency ratios three years post-IPO between underpriced/over-priced IPOs.

Table 5. ***Correlation Coefficients of the Performance Ratios with P/E Ratio and P/B Ratio for IPO Year***

Performance Ratio	Price Earnings (P/E) Ratio				Price to Book Value (P/B) Ratio			
	IPO Year	IPO +1 Year	IPO +2 Year	IPO +3 Year	IPO Year	IPO +1 Year	IPO +2 Year	IPO +3 Year
ROA	–.163	.196	–.078	–.240	.277	.346	.447	.326
	(.113)	(.054)*	(.475)	(.032)**	(.007)***	(.000)***	(.000)***	(.001)***
ROS	.005	.028	.071	.026	–.005	.027	.024	–.007
	(.964)	(.794)	(.516)	(.817)	(.963)	(.98)	(.818)	(.945)
ROE	–.140	–.311	–.328	–.230	.347	.522	.481	.360
	(.172)	(.002)***	(.002)***	(.040)**	(.001)***	(.000)***	(.000)***	(.000)***
ROCE	–.157	–.261	–.233	–.201	.363	.552	.540	.458
	(.127)	(.009)***	(.032)**	(.073)*	(.000)***	(.000)***	(.000)***	(.000)***
OCF/TA	–.249	–.153	–.037	–.085	.186	.481	.196	.266
	(.014)**	(.133)	(.737)	(.455)	(.071)*	(.000)***	(.055)*	(.000)***

Note. ***Significant at 1%, **significant at 5%, and *significant at 10%.

variables (ROA, ROS, ROE, ROCE, operating cash flow to total assets ratio) with market ratios (P/E and P/B ratio).

With the correlation coefficients given in Table 5, it becomes clear that the performance (except ROS) ratios have a negative correlation with the price-earnings ratio and a positive correlation with the price-to-book ratio, and we fail to reject hypothesis 4 that long-run operating performance measures (except ROS) significantly determine long-run stock performance. This implies that the better the performance, the lower the price-earning multiple. From the investor's point of view, a lower P/E ratio makes the share attractive for investment. A positive sign in the P/B ratio shows that the book value and market value move in the same direction.

Multivariate Regression

A multiple regression analysis was undertaken, with a change in ROA from one year before IPO to three years post-IPO as a dependent variable. The models were tested to ensure that they are free from multicollinearity, heteroscedasticity, and autocorrelation problems among the residuals. Table 6 reports the results of multiple regressions on these variables with the earlier stated independent variables.

The results indicate that offer price, issue size, and promoter holding are the variables negatively and significantly determining the change in ROA from one year to three years post-IPO. Age significantly and positively impacts changes in ROA. The variables of our interest – subscription levels and underpricing – do not significantly (p-value more than the significance level of 0.05) determine the long-run operating performance. Thus, the results reject hypothesis no.5, leading to the result that the subscription levels and underpricing do not significantly determine the long-run operating performance of IPO firms.

Analysis

The profitability ratios employed – ROA, ROS, ROE, and ROCE – to show a downward trend post-IPO as compared to pre-IPO years are significantly different. However, the ratio of operating cash flow to total assets dips in the year immediately following the IPO and then bounces back. The movement in these ratios indicates

Table 6. ***Regression of Change in ROA*** $_{-1\ to\ +3}$

Variables	$dROA_{-1\ to\ +3}$	*t*-Statistics (*p*-value)	$dROA_{-1\ to\ +3}$	*t*-Statistics (*p*-value)
Constant	9.043	2.1859 (.0315)**	9.2027	2.249032 (.0270)**
Offer Price	–.006951	–1.9920 (.0495)**	–.006627	–1.9778 (0.0511)*
Issue Size	2.8e–05	1.8195 (.0723)*	2.47e05	2.020631 (.0464)**
Age	0.1123	1.8029 (.0749)*	.105865	1.7859 (.0776)*
Total Assets	–6.86e–05	–0.3546 (.7238)	–	–
Promoter Holding	–.1125	–2.2936 (.0242)**	–0.112497	–2.3047 (.0236)**
Subscription Levels	–.0088	–0.4424 (06593)	–0.009347	–0.47057 (0.6391)
Underpriced	2.5630	1.0413 (.3007)	2.459396	1.0113 (0.3146)
Growth in Sales	–8.06e–06	–1.5687 (.1204)	–8.01e–06	–1.5678 (0.1206)
R^2	0.196440		0.195625	
Adj. R^2	0.12691		0.130517	
Number of Observations	95		95	
F-statistic	2.6279	(.0126)**	3.0157	(0.0069)***

Note. Significant at *** 1%, **5%, and *10%.

earnings management. It seems that earnings management is being done before the IPO, and because of the reversal of accruals after the IPO, the other profitability ratios decline. Overall, the IPO firms' efficiency in asset utilization decreases after the IPO. The firms seem to be less efficient in utilizing their current assets. An increase in liquidity after the IPO makes firms inefficient. The IPO firm's leverage reduces after the IPO, and their solvency improves as a result of the IPO. IPOs change the firms' trajectory and take them on the path of investment, as depicted by the growth rate of capex and assets. The IPO firms' P/E ratio and P/B ratio declined after the IPO, indicating a decline in their stock prices. Overall, IPO firms' operating performance declined three years after the IPO. However, leverage reduces, and solvency improves as a result of the IPOs.

The results of this study are similar to those of Bhatia and Singh (2009), Cai and Wei (1997), and Jain and Kini (1994). The finding of a stable or insignificant difference in ROS is also similar to the findings of Kumar and Shaw (2018), who suggested that the right variable for measuring operating performance is ROS rather than ROA. However, for operating cash flow to total assets, there is no significant difference in performance, and this is in contradiction with the findings of Bhatia and Singh (2009) and Jain and Kini (1994). The decline in efficiency ratios, similar to those of Bhatia and Singh (2009), indicates that firms are not able to exploit the investment efficiently and effectively, and hence, the operating performance declines. The decline in leverage ratios is in line with the findings of Chipeta (2016). Also, the decline in the price-earnings ratio and price-to-book value ratio is similar to the findings of Jain and Kini (1994).

Further, underpricing and subscription levels do not significantly impact an IPO firm's post-issue operating performance, similar to the findings of Jain and Kini (1994) and Mayur and Mittal (2014). Firms with large issue sizes and high offer prices show a greater decline in the return of assets in the three years post-IPO. Firms with large ownership retention by promoters after the issue experience a greater decrease in ROA in three years, which contradicts the findings of Pereira and Sousa (2017) and Wang (2005). The finding that young firms perform worse in the long run is consistent with the findings of Pereira and Sousa (2017).

Conclusion

This paper is a first-of-its-kind study to examine the financial health and impact of subscription levels on the long-run operating performance of IPO firms in India. The long-run operating performance of 95 IPO firms listed on the main board segment of stock exchanges in India between April 2012 and March 2018 was investigated and analyzed using the Wilcoxon sign rank test, independent sample median test, and multivariate regression. The paper documents the evidence supporting the decline in post-issue long-run operating performance of IPO firms. Empirical testing suggests improved financial health for IPO firms with lower leverage levels and better debt service ratios. Furthermore, it appears that the declining trend is not unique to the stock markets of developed nations; rather, it is also apparent in other stock exchanges in emerging economies. Also, with a sharp dip in operating cash flow relative to total assets in the first year following the IPO, it strongly hints toward earnings management being done by the issuing firms. Multiple regression studies reveal that ROA, a measure of operating success post-issue, is not affected by underpricing and subscription levels. Rather, age, issue size, offer price, and post-issue promoter holding significantly determine the change in post-issue operating performance.

Managerial and Practical Implications

The findings of the study are useful for retail investors making long-term investments in IPO firms both in the primary and secondary equity markets, as the investors will now have more clarity regarding the various factors that impact the long-run operating performance of firms post-IPO. It also suggests that investors exercise caution, as the analysis indicates instances of earnings management being done immediately before the IPO. As the study of financial health post-IPO and the impact of subscription level on operating performance is a new area in IPO performance research, it will motivate further deep studies in IPO performance.

Limitations of the Study and Scope for Future Research

The major limitation of the study pertains to the measurement of the operating performance and financial health of firms for which the ratios have been utilized. Ratios have their inherent limitations, and these limitations of ratio analysis creep into this research as well. In the study, the impact of the decline in operating performance on the long-run stock performance is not very evident and can be taken further for a detailed study. Additional research may be undertaken with a larger sample period and by analyzing performance over a longer period. Along with these, modeling for predicting performance can be taken up using machine learning. Investors can boost their returns on IPOs through intelligent and active investing, taking advantage of careful selections using aspects from this study.

Authors' Contribution

Dr. Madhu Totla conceived the idea and developed the design to undertake the empirical study, extracted research papers of high repute, filtered these based on keywords, and generated concepts and codes relevant to the study design. Prof. Anil Kumar verified the analytical methods and supervised the study. The statistical tests were done by Dr. Madhu Totla using SPSS, and the manuscript was written in consultation with Prof. Anil Kumar.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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About the Authors

Prof. Anil Kumar is currently working as a Professor at the Department of Commerce, Delhi School of Economics, University of Delhi. An alumnus of Shri Ram College of Commerce and Harvard Business School, he also serves as an Independent Director at LIC of India.

Dr. (CA) Madhu Totla is an Assistant Professor at the Department of Management Studies, Shaheed Sukhdev College of Business Studies, University of Delhi. She has published numerous research papers on contemporary issues with a specialization in the performance of IPOs in India.