# Performance of VC/PE-backed IPOs: New Insights from India

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## Abstract

This article explores long-term equity and operating performance of Indian firms issuing initial public offerings (IPOs) backed by venture capital/private equity (VC/PE) funding. Using data for 173 IPOs backed by VC/PE funding during 2000–2016, the article shows that equity market performance of VC/PE-backed IPOs is unimpressive post issue, compared to their peers. This is not only due to market perception but also associated with a declining operating performance. However, information asymmetry, mispricing and 'timing the market' by issuing firms do not seem to be the reasons for such long-term underperformance. We argue that it may be a case of too much money chasing too few winners for Indian IPOs and individual rent-seeking activities by managers. The observation raises the question of effectiveness of the monitoring role of venture capitalists or PE funders post the IPO in an Indian context. This is substantiated by our additional finding that sustained monitoring and hand-holding by venture capitalists and PE funders post the IPO cause an improvement in performance. The findings of this study can have significant implications for all stakeholders, particularly common investors in the Indian equity market.

## Keywords

Initial public offerings, operating performance, venture capital, private equity

## Introduction

This article examines the performance (measured by market-adjusted returns) of initial public offerings (IPOs) in India backed by venture capital (VC) and private equity (PE), over the last 15 years. We look at long-term performance of these IPOs over periods stretching as much as 5 years post issue. We specifically ask the following questions: (a) whether IPOs backed by VC and PEs outperform an average IPO or an average similar firm from the same industry; (b) whether the performance is contingent on the quantum of involvement (we quantify this in terms of a score) of the venture capitalists and PE funders

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during the pre-IPO process; and (c) whether the performance patterns, if any, have observable changes across IPOs issued during 'hot' and 'cold' IPO cycles. Our findings from data of 173 IPOs backed by VC and PEs between 2000 and 2016 provide a number of interesting insights into these issues.

Over the past three decades, several empirical studies (Beatty & Ritter, 1986; Ibbotson, 1975; Ibbotson & Jaffe, 1975; McDonald & Fisher, 1969; Ritter, 1984, 1991; Rock, 1986) have reported that IPOs achieve sizeable average returns over very short periods, followed by long-term underperformance. This suggests that these offerings might be underpriced initially. The degree of underpricing varies significantly across countries during different economic cycles. It is argued that the underpricing of IPOs is sometimes intentionally induced by the issuer and the underwriters to increase the probability of subscription of an IPO (Krigman et al., 1999; Loughran & Ritter, 2002). The involvement of various intermediaries in the process of IPO, such as auditors, venture capitalists, PE funders and underwriters, is also believed to have a significant impact on IPO underpricing and subsequent performance. This is referred to as the *certification effect* in IPO literature (Beatty, 1989; Carter et al., 1998; Marisetty & Subrahmanyam, 2010; and *monitoring hypothesis* (Barry et al., 1990). Under the 'certification' hypothesis, venture capitalists' or PE funders' concern for their reputation in the IPO market may influence their pricing of equity in the IPOs of firms backed by them. Venture capitalists and PE funders face a dynamic trade-off: on the one hand, they obtain short-term benefits from pricing equity in the IPO above intrinsic value; on the other hand, this may cause them long-term losses by substantially damaging their reputation with IPO investors and other financial market participants. Typically, the understanding is that the greater the reputation of the venture capitalist or PE funder, the greater his/her incentive to price equity in IPOs closer to their intrinsic value. Another argument is that since venture capitalists and PE funders fund only a small minority of firms, these firms are of better quality than non-VC-backed firms ('screening'). Further, since VC/PE funders devote considerable time to monitoring firm management (in the pre-IPO stage), the quality of firms brought public with VC/PE backing is likely to be higher than that of non-VC-backed firms, even if their quality at the time the VC/PE funders got involved with them was similar to that of non-VC-backed firms ('monitoring').

Some counterarguments are also proposed. The 'market power hypothesis' (Chemmanur & Loutskina, 2006) captures the notion that VC/PE funders are able to develop long-term relationships with various participants in the IPO market (underwriters, institutional investors and analysts) due to their role as powerful repeated players in that market. These relationships enable them to attract greater participation by these market players in the IPOs of firms backed by them and, thus, obtain a higher price for the equity of these firms, both in the IPO and in the secondary market (Brav & Gompers, 1997). The market power and certification hypotheses have dramatically different implications for the pricing of IPOs: while the certification hypothesis implies that VC/PE funders price IPOs of firms backed by them closer to their intrinsic value due to their concern for preserving their reputation in the IPO market, the market power hypothesis implies that venture capitalists' objective is to obtain the highest price possible for these IPOs (by taking advantage of their relationships with various market participants). The *grandstanding hypothesis* proposed by Gompers (1996) suggests that taking portfolio companies public is critical for establishing reputation as a VC or PE firm. In this set-up, less established VC firms need to signal quality by taking portfolio companies public. As a result, they are more than willing to bear the cost of higher underpricing. Consistent with this argument, Gompers (1996), finds that younger VC firms grandstand by taking younger companies public and allowing greater underpricing. It is observed in a large number of empirical studies that IPOs typically manifest superior performance in the short term, followed by long-term underperformance, hinting at possible underpricing. However, there is also empirical evidence showing that long-term performance of VC/PE-backed IPOs could be better than the ones without VC/PE backing. It is argued that VC or PE funders create value by partnering with a firm

and improving operations (Gompers et al., 2016). Although it is often assumed that such benefits normally accrue during the period that a company is under the VC or PE funder's control, it is not unreasonable to expect that management and financial practices put in place at that time would be maintained at least for some time after the exit. This added value, in turn, may lead to greater future firm performance. This article seeks to analyse how VC/PE-backed IPOs perform in comparison to IPOs not backed by VC or PE.

The number of IPOs issued and the quantum of money raised in India over our study period is quite significant (refer to endnote 3), and millions of common investors have already participated in these issues or are planning to do so in the future. VC/PE investors, with their experience and superior technical expertise, are supposed to play a certifying role for quality IPOs. Thus, knowing whether VC/PE-backed IPOs in India, post raising money, actually perform well and create value for their shareholders becomes an important question. Hence, we believe the findings of this study can have significant implications for all stakeholders, particularly common investors in the Indian equity market. Overall, our article contributes to the growing number of international studies in the field of VC and PE finance, as well as to the literature on the operating and market performance of IPOs.

The IPO market in India has been pretty vibrant since the global financial crisis. An amount of approximately INR 2,080 billion (or US$ 30 billion) was raised through 625 IPOs between 2000 and 2016. Close to 30 per cent of these IPOs are backed by either VCs or PEs (173 in all, 33 VC-backed and 140 PE-backed).[1] The Indian market is currently considered to be one of the *hot* destinations[2] for VC and PE investors globally. Buoyed by a vibrant economy and high returns, the PE and VC space in India is on track to record investments of US$28–29 billion in year 2018. Few recent media reports also claim that the euphoria is not without reason, as the performance of VC/PE-backed IPOs in the Indian context have significantly outperformed IPOs without VC/PE backing.[3] However, most of those performance measures are short-term in nature. The potential of raising further money through the IPO route looming large, an understanding of long-term performance and true value creation through investing in Indian IPOs, and more specifically VC/PE-backed IPOs, is important. The importance is not only from an investors' perspective but also from the point of view of underwriters and financial managers of many small, non-public firms, as they might need this market in the future. Currently, the Securities and Exchange Board of India (SEBI), the Indian capital market regulator, allows Indian firms to follow either a book building or a fixed pricing mechanism to issue IPOs. In addition, there are some prescribed fixed allocation percentages to various classes of investors. These features make the Indian IPO market different from that of other countries. Moreover, SEBI had introduced mandatory IPO grading between 2008 to 2014. This was also a feature unique to the Indian IPO market.[4]

The Indian corporate sector is characterized by the dominance of business groups and family-owned businesses. Literature has identified that business group–affiliated firms have differentiating characteristics, and hence their performance differs as compared to stand-alone firms. Khanna and Palepu (2000) report that firms that are affiliated to a business group outperform other firms. It is observed that PE investors invest 55 per cent of the funds in business group–affiliated firms (Kunal et al., 2018). Therefore, it is equally important to evaluate the performance of VC/PE funds in business group–affiliated IPOs.

Given these unique characteristics of the Indian regulatory framework for IPOs, combined with the burgeoning quantum of VC/PE investment in India, as highlighted earlier, we do expect that the performance of VC/PE-backed IPOs in the Indian market would show some interesting, as well as distinguished, results as opposed to those in developed countries.

The results of our study suggest that Indian IPOs backed by VC/PE funding, on average, exhibit relatively inferior long-term equity market performance, compared to their peers, in the post-issue

period. This is true over intermediate-to-longish periods ranging from 12 to 60 months post issue. Investing in an average VC/PE-backed IPO generates a return 1.22 per cent to 6.5 per cent lower than investing in its peers over holding periods ranging from 12 months to 60 months post issue. To check whether the inferior equity market performance is just a matter of perception or backed by operating performance, we also explore the operating performance of these VC/PE-backed IPOs vis-à-vis their industry peers and all IPOs in general. We find that poor equity market performance by VC/PE-backed IPOs is associated with poor operating performance as well.

Our study contributes to the existing literature in a number of ways. The performance per se of VC/PE-backed IPOs is extensively studied in the developed countries (Barry et al., 1990; Bergström et al., 2006; Gompers & Lerner, 1999; Hellmann & Puri, 2002; Kaplan & Strömberg, 2003; Megginson & Weiss, 1991). However, in India, such studies are inadequate (barring a few, e.g., Kunal et al. [2018]), although the IPO market and the quantum of funds poured in by VC and PE funders in Indian markets is growing at a fast rate. This study makes an attempt to fill this void. The principal contribution, though, is not merely exploring what the long-term performance of VC/PE-backed IPOs has been. Our principal contribution is to show that the quality of VC/PE funder involvement with IPO firms is a critical factor in determining the long-term performance of the firms. We assess the quality of VC/PE funder involvement with IPO firms through a score that we create as a function of a number of variables. There are some studies (Carter et.al 1998) that explore whether VC or PE reputation has an impact on post-IPO performance. However, in this study, we focus on the quality of involvement of the VC/PE funders rather than their reputation. Our findings provide some interesting insights on the issue. Second, some theories like signalling models (Allen & Faulhaber, 1989; Grinblatt & Hwang, 1989; Welch, 1989) suggest that IPO markets have *hot and cold* cycles and that hot cycles draw in better-quality firms, because offer prices are less affected by adverse selection costs. On the contrary, long-term performance literature views hot cycles as the result of overly bullish positioning by irrational investors (Lerner, 1994; Loughran & Ritter, 1993) and thus provides a chance for managers to take advantage of a 'window of opportunity' to make an IPO. In this study, we identify the hot and cold market cycles in IPO markets in India and look at the performance of VC/PE-backed IPOs during such cycles. We also compare the performance of non-VC/PE IPOs with that of VC/PE-backed IPOs during such cycles. Third, a large chunk of previous studies on IPO performance look only at the stock market performance of IPOs. This study looks into stock market performance and operating performance to get a holistic idea about the performance of IPO-issuing firms.

The remaining part of this article is organized as follows: the second section presents the literature review; the third section discusses the data and methodology; the fourth section presents the findings and discusses the empirical results; and the fifth section concludes our discussion, followed by references and tables.

## Literature Review

### Underpricing and Short-term Initial Public Offering Performance

As already highlighted, the issue of underpricing and the resultant high listing-day returns has been extensively reported in empirical studies all over the world during the last few decades. Among very early studies, McDonald and Fisher (1969) report an average excess return of 28.5 per cent for a sample of 142 issues in 1969. Ibbotson (1975), using risk-adjusted returns, finds average excess returns of a sample of IPOs occurring during the 1960s to be 11.4 per cent. Using a simpler model and a larger

sample, Ibbotson and Jaffe (1975) report average excess returns of 16.8 per cent. For over 5,000 IPOs occurring from 1960 to 1982, Ritter (1984) reports the initial average returns to be 18.8 per cent. Other early studies of IPOs, such as Block and Stanley (1980), Brown (1970), Logue (1973a, 1973b), Neuberger and Chapelle (1983), Reilley (1973, 1977), Reilley and Hatfield (1969) and Stoll and Curley (1970), are primarily concerned with examining the profit potential for investors in these issues. The results of these studies consistently indicate that, on average, IPOs offered significant positive excess returns in the short run, and it was generally agreed upon that this was attributable to the underpricing of these new issues by the underwriters. Many of these studies also explored the implications of these findings for efficient market hypotheses (EMHs). The general conclusion is that prices of the new-issue securities adjust very rapidly to underpricing, if any, and investors who purchase the new issues in the aftermarket (i.e., a week or a month after the initial issue) cannot get similar excess returns on average.

Some other works like Beatty and Ritter (1986), Ritter (1984), Rock (1986), etc. in the subsequent years explore beyond the empirical evidence of underpricing and set forth theoretical arguments that explain the underpricing in terms of information asymmetry among investors. They argue that for profitable issues, informed investors crowd out the uninformed investors, while for less/non-profitable issues, the uninformed investors suffer from a 'winner's curse' problem, having received the bulk of the allocation. Therefore, the average underpricing is considered to be the compensation required to induce the uninformed investors to participate in the IPO market. Of course, this argument is difficult to reconcile with the preferences of issuers, assuming rationality on their part. The motivation for issuers to underprice to attract uninformed investors is not obvious. The extensive oversubscription reported in several studies (Benveniste & Spindt, 1989; Ibbotson & Jaffe, 1975; Koh & Walter, 1989) suggests that underpricing to attract uninformed capital is unnecessary. Even if an issuer's desire to attract uninformed participation is taken as given, there is likely to be a *free-rider problem* among issuers; even if they knew that IPOs need to be underpriced, on average, no individual issuer would be willing to underprice his/her issue.

## Long-term Performance of Initial Public Offerings

Given the stupendous listing-day performance of IPOs, it has been natural to test how long the superior performance persists. Leleux (1993) analyses the performance of French IPOs for 48 months following their introduction and finds that these IPOs underperform in the long run. These results are similar to that found in the United States by Aggarwal and Rivoli (1990), Ritter (1991) and Loughran and Ritter (1993). It is also highlighted that other factors, such as the age of the IPO firm, the timing of the issue and whether the market is under a hot or cold cycle, play a role in their long-term performance (Ritter, 1991; Loughran & Ritter, 1993). Jain and Kini (1994), based on a sample of 682 IPOs in the United States, find that there is no relation between the level of initial underpricing and post-IPO performance for US IPOs. Gompers and Lerner (2003) examine the 5-year post-IPO performance of 3,661 US IPOs and discover that average abnormal returns from a buy-and-hold strategy reveal underpricing, which, however, disappears when cumulative abnormal returns are considered; interestingly, over the entire period, IPOs returned as much as the market did.

## Performance of VC/PE-backed IPOs

Bergström et al. (2006) posit that greater information diffusion in VC/PE-backed IPOs probably reduces the information asymmetry and lowers the *ex-ante* uncertainty about the true value of the issuing firm,

which in turn alleviates the adverse selection problem. Hence, one possibility is that the performance of VC/PE-backed IPOs should be superior to that of non-VC/PE-backed IPOs. VC and PE funders are specialized financial intermediaries who are believed to add value through pre-investment screening, monitoring and management support (Gompers & Lerner, 1999, 2001; Hellmann & Puri, 2002; Kaplan & Strömberg, 2003). They also typically tend to specialize and concentrate on particular industries and stages in the development of companies where the value-adding potential is the greatest, due to their expertise and monitoring ability (Rindermann, 2004). Venture capitalists are also frequent participants in the capital markets in order to strategize exiting their investments (Lerner, 1994). Empirical observations suggest that they choose the exit channel strategically and build up reputation primarily through successful IPOs (Gompers, 1996). Venture capitalists being involved with firms going public can also push the firm performance by building relationships with top-tier financial institutions that permit, at least partly, overcoming information asymmetries. Therefore, the investment behaviour of VC-backed firms can be expected to be less dependent upon internally generated cash flows. Since venture capitalists tend to hold significant ownership and board positions (Barry et al., 1990), and continue to be involved in the firm's investment activities even after the firm goes public (Megginson & Weiss, 1991), they might be able to provide access to capital even in the post-IPO period. Finally, VC/PE funders tend to put effective management structures in place, which help firms perform better in the long run (Brav & Gompers, 1997). Given these characteristics, VC/PE funders should be able to select comparatively high-quality firms. Accordingly, the involvement of VC/PE funding in IPO firms is conjectured to have a positive influence on their post-issue performance. Prior studies have focused on the conjecture that VC/PE-backed IPOs outperform non-VC/PE-backed IPOs (Barry et al., 1990; Lerner, 1994; Megginson & Weiss, 1991). Findings from the United States indicate that VC-backed IPOs outperform non-VC/PE-backed issues in terms of operating and long-term performance (Brav & Gompers, 1997; Jain & Kini, 1995). A counterargument also exists. It is also possible that VC/PE funders may be better able to time and take advantage of periods of high market valuations, resulting in inferior performance in the long run, particularly if those IPOs are issued in high-volume years. This indicates that issuers get influenced by VC/PE players in actively trying to take advantage of windows of opportunity (Bergström et al., 2006).

## Studies in the Indian Context

Most Indian studies on IPO performance focus on the underpricing phenomenon and short-term performance of IPOs. Madhusoodanan and Thiripalraju (1997) wrote one of the earliest papers on Indian IPOs that looks at the determinants of IPO pricing. Nandha and Sawyer (2002) studied 381 Indian IPOs during 1994–1995 and found that these IPOs provided 100 per cent initial returns, and that IPO size is negatively related to underpricing. Ghosh (2005), analysed 1,842 IPOs listed in the Bombay Stock Exchange during 1993–2001 and reported that larger IPOs have less underpricing problems. Agarwalla (2008) studied 110 Indian IPOs during 2002–2005 and found that the extent of oversubscription significantly affected the level of underpricing and the post-IPO returns. He found that the 180-day post-IPO period yielded a mean return of 17.36 per cent. Based on an analysis of Indian IPOs in 2000–2006, Garg, Arora, and Singla (2008) found that

> (a) there exists a significant level of underpricing in the short-run; (b) the IPOs are usually overpriced over long-period; (c) the opening price returns do not differ significantly from the closing price returns; (d) the level of underpricing does not differ much in the hot and cold IPO markets; and (e) the abnormal returns from the IPO underpricing differ significantly in the bearish and the bullish phases of the market.

Janakiramanan (2008) studied the medium-term performance of 116 IPOs issued in India in 2000 and 2001 and concluded that they gave a positive abnormal return (AR) by the end of 60 days. Pande and Vaidyanathan (2009) found that the demand generated for an issue during book building, as well as the delay in listing, positively affected day-0 absolute return and AR; like many other studies, they also found that post-IPO performance during 1 month after the listing was negative. Mayur and Kumar (2009) compared the pre-IPO performance of Indian public firms to their post-IPO performance and discovered that the performance of Indian public firms worsened significantly after going public, and, particularly, those with the lowest insider stake following the IPO had the greatest deterioration of values in their post-IPO performance. Deb (2009) found, using a sample of IPOs during 2001–2009, that there had been evidence of underpricing, but this had vanished within a month. The long-term performance of IPOs is addressed in only a few studies in the Indian context. Madhusoodanan and Thiripalraju (1997), for example, investigated the long-term performance of Indian IPOs issued during 1992–1995 and documented higher returns compared to the negative returns recorded in other international markets. Krishnamurti and Kumar (2002) concluded that investing in Indian IPOs is profitable in the long run. Performance of VC/PE-backed IPOs remains mostly unaddressed so far in the Indian context. Very recently, Kunal et al. (2018) evaluated the certification and grandstanding hypothesis associated with PE investors in the IPO market, and Katti and Raithatha (2018) examined the monitoring and certification hypothesis associated with VC investors. Both the studies' empirical results refuted the certification hypothesis but supported the grandstanding hypothesis for PE-backed Indian IPOs. However, their primary focuses remained underpricing and the short-term performance of IPOs.

## Data and Methodology

### Sample Construction

Our sample consists of a total of 173 VC/PE-backed IPOs issued from January 2000 to December 2016. All IPO data is collected is collected from Prime Database. The starting year is fixed at 2000, simply based on the consideration of data availability. The end date is fixed at 2016, as we wanted to study the performance of sample IPOs for at least a couple of years post IPO issue. Following that, we collected data on PE- and VC-backed IPOs from another exclusive primary market database—Venture Intelligence. Venture Intelligence provides all the relevant information on the PE and VC firms that were engaged in the IPO process. During the study period, there were a total of 627 successful IPOs in India. Out of these, we create a novel dataset of 140 PE-backed IPOs and 33 VC-backed IPOs. The firm-level data were collected from the Centre for Monitoring Indian Economy (CMIE) Prowess database. The year-wise break-up of the IPOs is given in Table 1.

**Table 1.** All IPOs During Our Study Period

Panel A: All IPOs

| Year | No. of IPOs | Total Issue Amount (total) | | Average Issue Amount | |
|---|---|---|---|---|---|
| | | (₹ lakh) | ($ Million) | (₹ lakh) | (US$ million) |
| 2000 | 123 | 295,310.85 | 657.35 | 2,400.90 | 5.34 |
| 2001 | 13 | 36,531.22 | 78.02 | 2,810.09 | 6.00 |
| 2002 | 6 | 198,147.35 | 408.94 | 33,024.56 | 68.16 |
| 2003 | 12 | 169,980.17 | 366.55 | 14,165.01 | 30.55 |

*(Table 1 Continued)*

*(Table 1 Continued)*

| Year | No. of IPOs | Total Issue Amount (total) | | Average Issue Amount | |
|---|---|---|---|---|---|
| | | (₹ lakh) | ($ Million) | (₹ lakh) | (US$ million) |
| 2004 | 25 | 1,312,147.28 | 2,855.96 | 52,485.89 | 114.24 |
| 2005 | 53 | 998,951.87 | 2,261.48 | 18,848.15 | 42.67 |
| 2006 | 73 | 1,986,245.89 | 4,415.52 | 27,208.85 | 60.49 |
| 2007 | 100 | 3,417,911.04 | 8,283.36 | 34,179.11 | 82.83 |
| 2008 | 37 | 1,690,441.61 | 4,250.98 | 45,687.61 | 114.89 |
| 2009 | 20 | 1,954,400.27 | 4,102.78 | 97,720.01 | 205.14 |
| 2010 | 64 | 3,753,465.31 | 8,340.49 | 58,647.90 | 130.32 |
| 2011 | 37 | 596,628.36 | 1,327.55 | 16,125.09 | 35.88 |
| 2012 | 11 | 683,528.21 | 1,274.49 | 62,138.93 | 115.86 |
| 2013 | 3 | 128,378.92 | 234.65 | 42,792.97 | 78.22 |
| 2014 | 5 | 120,093.94 | 197.15 | 24,018.79 | 39.43 |
| 2015 | 18 | 1,102,132.44 | 1,711.07 | 61,229.58 | 95.06 |
| 2016 | 25 | 2,352,660.00 | 3,382.52 | 94,106.40 | 135.30 |
| Panel B: VC-backed IPOs | | | | | |
| 2000 | | | | | |
| 2001 | | | | | |
| 2002 | | | | | |
| 2003 | | | | | |
| 2004 | 2 | 7,259.18 | 15.80 | 3,629.59 | 7.90 |
| 2005 | 4 | 4,947.32 | 11.20 | 1,236.83 | 2.80 |
| 2006 | 1 | 17,093.65 | 38.00 | 17,093.65 | 38.00 |
| 2007 | 2 | 73,034.40 | 177.00 | 36,517.20 | 88.50 |
| 2008 | 1 | 49,309.75 | 124.00 | 49,309.75 | 124.00 |
| 2009 | 9 | 4,620.69 | 9.70 | 513.41 | 1.08 |
| 2010 | 5 | 273,167.82 | 607.00 | 54,633.56 | 121.40 |
| 2011 | 2 | 45,975.73 | 102.30 | 22,987.87 | 51.15 |
| 2012 | 1 | 10,726.30 | 20.00 | 10,726.30 | 20.00 |
| 2013 | 1 | 91,427.24 | 167.11 | 91,427.24 | 167.11 |
| 2014 | 1 | 31,127.57 | 51.10 | 31,127.57 | 51.10 |
| 2015 | 1 | 15,130.35 | 23.49 | 15,130.35 | 23.49 |
| 2016 | 3 | 334,697.01 | 519.62 | 111,565.67 | 173.21 |
| Panel C: PE-backed IPOs | | | | | |
| 2000 | 1 | 4,492.44 | 10.00 | 4,492.44 | 10.00 |
| 2001 | 1 | 280.94 | 0.60 | 280.94 | 0.60 |

*(Table 1 Continued)*

*(Table 1 Continued)*

| Year | No. of IPOs | Total Issue Amount (total) | | Average Issue Amount | |
|---|---|---|---|---|---|
| | | (₹ lakh) | ($ Million) | (₹ lakh) | (US$ million) |
| 2002 | 1 | 82,856.16 | 171.00 | 82,856.16 | 171.00 |
| 2003 | 2 | 23,585.30 | 50.86 | 11,792.65 | 25.43 |
| 2004 | 7 | 241,758.25 | 526.20 | 34,536.89 | 75.17 |
| 2005 | 16 | 528,126.21 | 1,195.60 | 33,007.89 | 74.73 |
| 2006 | 10 | 329,457.57 | 732.40 | 32,945.76 | 73.24 |
| 2007 | 16 | 519,452.04 | 1,258.90 | 32,465.75 | 78.68 |
| 2008 | 8 | 128,324.65 | 322.70 | 16,040.58 | 40.34 |
| 2009 | 7 | 623,888.69 | 1,309.70 | 89,126.96 | 187.10 |
| 2010 | 24 | 988,399.47 | 2,196.30 | 41,183.31 | 91.51 |
| 2011 | 5 | 120,984.03 | 269.20 | 24,196.81 | 53.84 |
| 2012 | 5 | 554,549.80 | 1,034.00 | 110,909.96 | 206.80 |
| 2013 | 2 | 118,782.64 | 217.11 | 59,391.32 | 108.56 |
| 2014 | 4 | 105,297.68 | 172.86 | 26,324.42 | 43.22 |
| 2015 | 15 | 676,015.62 | 1,049.52 | 45,067.71 | 69.97 |
| 2016 | 16 | 1,244,894.85 | 1,932.71 | 77,805.93 | 120.79 |

**Source:** Prime Database and Venture Intelligence database.

**Note:** Panel A shows the distribution of all IPOs during the study period, while Panels B and C show the distribution of VC-backed and PE-backed IPOs, respectively, during our study period.

## Identifying the Hot and Cold Cycles

There are some interesting patterns visible in the distribution of IPOs across the various years in our study period. First, the number of IPOs issued during the years 2000, 2005, 2006, 2007 and 2010 far exceeds the number of IPOs issued during other years. A total of 413 IPOs were issued during these 5 years (about two-thirds of the total number of IPOs) and only 214 (one-third) were issued across the remaining 12 years. We identify these 5 years as the 'hot' years within our study period, while the remaining 12 years are categorized as 'cold' years. Second, although the number of IPOs issued during the hot years far exceeds that during the cold years, the average size of cold-year IPOs (₹4,111 millions) is significantly higher than that of hot-year IPOs (₹2,486 millions). Thus, it appears that Indian firms do 'time' the market while raising IPO money, and only the very large and reputed firms with big-ticket issues probably succeed in raising IPO money during market downturns. This further substantiates the necessity of studying IPO performances separately for hot years and cold years.

## Finding the Peer Group of Similar Firms

We create a peer group for each VC/PE-backed IPO for each year from the set of similar industry firms, which are 'comparable' in nature. By 'comparable', we imply that they belong to the same industry and

are similar to the IPO firms in terms of size, age and leverage of the firms. We posit that industry firms having a similar size (measured by book value of asset), similar period of existence since inception (age) and similar leverage (measured by the Debt–Equity ratio (D–E ratio)) should closely resemble our sample IPO firms. For mapping the nature of industry of the firms, we match the two-digit National Industrial Classification (NIC) code of the firms provided in Prowess.

We then estimate a deviation score, $S_i$, for each peer firm from the sample firm as the sum of absolute percentage deviations of size (asset), age and leverage, as shown below:

$$S_i = \left| \frac{Asset_p}{Asset_s} - 1 \right| + \left| \frac{Age_p}{Age_s} - 1 \right| + \left| \frac{Lev_p}{Lev_s} - 1 \right| \qquad \text{(i)}$$

where $Asset_i$, $p$ and $s$ represent the traits of the peer and sample firms, respectively. $Asset_t$ based on these scores, we sort all peer firms and consider the top three firms in the ascending order of deviation scores to form the 'peer group' for each sample firm. This ensures that firms with least deviation scores get included in the peer group. This method is a modification of the 'propensity score matching' technique previously used in the finance literature (Deb & Banerjee, 2018; Dehejia & Wahba, 2002; Titus, 2007; Tucker, 2010).

Table 2 below shows the variable definitions used in the study.

## Quantifying VC/PE Involvement in the Issue: IPO Score

We calculate the IPO scores based on the amount of involvement of the VC/PE firms during the IPO process. We consider the following four parameters that are provided by the Venture Intelligence database to compute the individual IPO scores. The IPO score is the composite score of these four individual parameters:

**Table 2.** Variable Definition

| Sl. No. | Variable Name | Definition and Measurement |
| --- | --- | --- |
| 1 | IPO size | Issue size of the IPO |
| 2 | Leverage | Debt-to-equity ratio of the firm as on 31 March of the year of issuing IPO |
| 3 | Age | Number of years since inception of the firm till the year of issuing IPO |
| 4 | Market share of firm | Sales of the firm as a proportion of sum of sales of all firms from the same industry |
| 5 | OCF | Operating cash flow of the firm as on 31 March |
| 6 | Sales | Total sales of the firm as on 31 March |
| 7 | TA | Total assets (book value of assets) as on 31 March |
| 08 | OCF/TA | Operating cash flow as on 31 March scaled by total assets as on 31 March |
| 09 | NI | Net income of the firm as on 31 March |
| 10 | ROE | Net income/TA |

1.  **Number of VC/PE firms involved**: In our sample, it has been observed that the number of VC/PE firms involved in the IPO process ranges from 1 to 11. Different VC/PE firms have different processes, and sometimes they have their own proprietary models to judge the future potential of IPO firms. The higher the number of VC/PE firms involved in the IPO process, the greater would be the due diligence of these IPO firms and, subsequently, the greater would be the probability of future success and corporate governance score. Here, we take the total number of VC/PE firms involved in an IPO process as the score for that IPO.

2.  **Investor type**: We find that there are three types of VC/PE investors—only India-dedicated VC/PE firms, only-foreign VC/PE firms and co-investment VC/PE firms. The co-investing VC/PE firms mean where both Indian VC/PE and Foreign VC/PE firms are involved in the IPO process. We assign the lowest score of 1 to the IPOs with which only India-dedicated VC/PE firms are involved and the highest score of 3 to the IPOs with which co-investment VC/PE firms are involved. We assign a score of 2 to the IPOs with which only foreign VC/PE firms are involved. The reason for this scoring is that when co-investment PE firms are involved, the level of due diligence goes up significantly, as both domestic and international VC/PE firms have their own metrics to check several parameters of these IPO firms as per their internal guidelines for selecting the IPO firms.

3.  **Exit status**: Here, we consider two categories—partial exit and complete exit during the IPO. We assign a score of 1 if the VC/PE firms exit partially during the IPO and assign a score of 0 if they make a complete exit during the IPO. The logic for assigning these scores is that if the VC/PE firms continue with an IPO firm, it means that they have a larger interest in the IPO firm in the long run and are optimistic about the future prospects of the firm. Moreover, when VC/PE firms continue with an IPO firm, it is possible that they also actively take part in the management of the firm. However, we do not consider the percentage of shares held after the IPO for the case of partial exit.

4.  **Investor sale**: Investor sale basically indicates the bulk deal during the IPO. A deal is qualified as an investor sale when more than 0.5 per cent of the shares are sold to a particular investor or institutions. Here, we assign a score of 1 if the investor sale takes place during the IPO, and assign 0 otherwise. The reasons for this are as follows: if large institutional sales take place during the IPO, then this implies that these large secondary institutions have done more active research on the IPO firms compared to the smaller institutions and individuals and that they have a larger stake in the future performance of the IPO firms. Moreover, the monitoring pressure would be more from these larger institutions post the IPO.

Based on these four parameters, we calculate the composite score of VC/PE-backed IPOs and categorize the sample VC/PE-backed IPOs into three categories: (a)those with a cumulative score less than or equal to 3; (b) those with a cumulative score between 4 and 7; and (c) those with a cumulative score more than or equal to 8.

## Measuring the Equity Performance of Initial Public Offerings and the Peer Group

For each sample VC/PE-backed IPO, peer firm and other IPO, we estimate monthly return (MR) as the total return (sum of the dividend yield and capital gains yield) from the first trading date of that month to the last trading date of the month, adjusted for stock dividends and stock splits. In other words, the estimate assumes that the investor buys the stock at the closing price of the first trading day of a month

and sells it at the closing price of the last trading day of the month. The dividends received during this period are considered without any adjustment for the time value of money. The long-term equity performances of sample IPOs and their peers are measured by the annualized buy-and-hold abnormal return (BAHR) as follows:

$$\text{BAHR}_{(i,N)} = \left[ \prod_{i=1}^{N} (1 + \text{MR}_i) \right]^{\frac{12}{N}} - 1$$

where $\text{MR}_i$ is the monthly return of the firm in the month $i$, and $N$ is chosen as 12, 24, 36, 48 and 60 to calculate BAHR for 1, 2, 3, 4 and 5 years, respectively. For each sample IPO, we consider the issue month as month zero and estimate its BAHR, as well as the BAHR of the peer firm, to estimate its excess BAHR over the peer firms for the respective periods. We choose a period of 5 years post issue to allow for new assets procured through IPO money to become productive.

## Measuring the Operating Performance of Sample Initial Public Offerings and Peer Firms

Apart from equity market performance, we also look at the peer-adjusted operating performance of the sample IPOs. This is to check whether the patterns visible in equity market performance, if any, are merely due to investor perceptions or whether there are actual significant changes in the firm's fundamentals post issue. We measure operating performance by the following proxies and do a peer adjustment just like that for equity performance discussed earlier.

(1) $\quad \dfrac{\text{OCF}}{\text{TA}} = \dfrac{\text{Operating cash flow}}{\text{Book value of total asset}}$

(2) $\quad \text{Asset turnover ratio(ATR)} = \dfrac{\text{Sales}}{\text{Book value of total asset}}$

The first ratio implies the operating cash flow generated per rupee of investments made in the book value of total assets, while the second ratio shows the sales value generated per rupee of the book value of total assets. Both ratios should provide a fair indication of the operational efficiency of a firm. If the IPO money is deployed in value-destroying activities, we can expect these ratios to decline across time in the post-issue period. All the values are considered at the end of accounting year in Indian context i.e. March, 31 (Table 2 above shows how the relevant variables are measured) and 'peer adjusted' exactly as in the case of equity market performance. Once again, we consider the year of issue as the '0' year and estimate both the ratios in the succeeding years 1, 2, 3, 4 and 5 to track the changes in operating performance around the issue year.

## Univariate Analysis: Measuring Performances Within Separate Categories

As explained earlier, we create two schemes of classification of the sample IPOs, one along the hot- and cold-year dimension and the other along the VC/PE involvement dimension. Accordingly, we estimate

all the performance measures explained earlier within each category separately. The findings are reported in the next section.

<B Level>*Multivariate Analysis*

We use the following regression models to test the impact of association of a VC/PE firm on the performance of an IPO.

$$\ddot{A}\left[\frac{OCF}{TA}\right]_{\text{year 0 to }j} = \alpha + \beta_1 \times DUMMY.VCPE + \beta_2 \times IPOSIZE + \beta_3 \times FIRMSIZE_{-1}$$

$$+ \beta_4 \times \left[\frac{D}{E}\right]_{-1} + \beta_5 \times MKTSHARE_{-1} + \beta_6 \times AGE_{-1} \tag{1}$$

$$\ddot{A}[ATR]_{\text{year 0 to }j} = \alpha + \beta_1 \times DUMMY.VCPE + \beta_2 \times IPOSIZE + \beta_3 \times FIRMSIZE_{-1}$$

$$+ \beta_4 \times \left[\frac{D}{E}\right]_{-1} + \beta_5 \times MKTSHARE_{-1} + \beta_6 \times AGE_{-1} \tag{2}$$

$$\ddot{A}[BAHR]_{\text{year 0 to }j} = \alpha + \beta_1 \times DUMMY.VCPE + \beta_2 \times IPOSIZE + \beta_3 \times FIRMSIZE_{-1}$$

$$+ \beta_4 \times \left[\frac{D}{E}\right]_{-1} + \beta_5 \times MKTSHARE_{-1} + \beta_6 \times AGE_{-1} \tag{3}$$

Here,

(i)   $\Delta\left[\dfrac{OCF}{TA}\right]_{\text{year }i\text{ to }j}$, $\ddot{A}ATR$ and $\Delta[BAHR]_{\text{year }i\text{ to }j}$ are, respectively, the changes in the OCF/TA, asset turnover ratios (ATRs) and BAHRs of 'all' IPOs during our study period, between years 0 (i.e., issue year) and $j$, with $j = 5$. For IPOs not having at least 5 years' data available post issue, $j = 4, 3, 2, 1$, etc. These are the main dependent variables in models (1)–(3) that try and capture the change in the performance of IPOs post issue.

(ii)  **DUMMY.VCPE** is a dummy variable taking the value 1 if the IPO is backed by a VC/PE and 0 otherwise. If VC/PE involvement has a positive impact on IPO performance, we expect a positive relation between this variable and the dependant variables.

(iii) **IPOSIZE** is the size of the IPO measured by natural logarithm of the IPO size in ₹ millions.

(iv)  **FIRMSIZE** is the size of the firm, measured in terms of latest reported gross revenues at the point of analysis.

(v)   $[D/E]_{-1}$ is used as a proxy of leverage just before the issue year, which represents the previously existing risk of the firm.

(vi)  **MKTSHARE** is the estimated market share of the firm in its industry.

(vii) **AGE** represents the number of years the firm has been existing in business prior to the IPO launch.

Variables (iii), (iv), (v), (vi) and (vii) are used as control variables in models (1)–(3), while DUMMY.VCPE is the main independent variable. Larger, stronger and older firms are expected to have less information asymmetry, with a lot of analysts following them and stronger monitoring. Hence, we use FIRMSIZE as a proxy for the stand-alone firm size and MARKET SHARE as a proxy for the relative size of the firm. We expect both these variables to exhibit a positive relationship with change in the

post-issue performance measures, as information asymmetry should be relatively less for larger firms with a lot of analysts following them. Table 9 reports the regression results.

## Robustness Tests

We carry out a couple of robustness tests to validate the results that we obtain in the main analysis.

### Robustness Test 1: Using an Alternate Measure of Performance

To check the robustness of the results from the above approaches, we use an alternative measure of performance of sample IPOs, namely, return on equity (ROE), which is defined as follows:

$$ROE = \frac{\text{Net income}}{\text{Book value of equity}}$$

We use the univariate analysis, as well as the multivariate analysis, with this alternate performance measure.

### Robustness Test 2: Re-estimating the Measures After Removing the Outliers

It is possible that our results are driven by a small number of very high or very low performances and that the overall patterns visible may not reflect the generic trend. To control for that, we use a winsorized sample and then repeat all the approaches. We sort the sample IPOs based on their post-issue performance and drop all sample IPO firms within the top 5 per cent or bottom 5 per cent of the entire range, based on post-issue equity market performance, and replace them with the 95th percentile and 5th percentile values, respectively. We carry out the univariate and multivariate analyses within the winsorized sample.

## Empirical Results and Discussion of Results

### Equity Market Performance of VC/PE-backed IPOs and Theoretical Arguments

Panel A of Table 3 shows the return performance (BAHR) of PE/VC-backed IPOs (PEBs) along with three benchmarks:

**Table 3.** Panel A: Return Performance of IPOs of Firms and Their Peer Group

|          | I year | 2 years | 3 years | 4 years | 5 years |
| -------- | ------ | ------- | ------- | ------- | ------- |
| PEBs     | 1.71%  | 3.65%*  | 5.77%   | 7.81%*  | 9.84%*  |
| PEERs    | 2.93%  | 6.22%*  | 9.46%*  | 12.76%* | 16.33%* |
| NPEBs    | 2.11%  | 4.65%*  | 7.74%*  | 11.35%* | 15.99%* |
| All IPOs | 2.00%  | 4.37%*  | 7.19%*  | 10.36%* | 14.27%* |

*(Table 3 Continued)*

*(Table 3 Continued)*

|  | 1 year | 2 years | 3 years | 4 years | 5 years |
|---|---|---|---|---|---|
| **Panel B: Mean Difference of BAHR** | | | | | |
| PEBs–PEERs | −1.22%* | −2.56%* | −3.69%* | −4.95% | −6.49%* |
| PEBs–NPEBs | −0.40%* | −1.00%* | −1.97%* | −3.54%* | −6.15%* |
| PEBs–all IPOs | −0.29% | −0.72% | −1.42%* | −2.56%* | −4.43%* |

**Source:** The authors.

**Note:** The results of table show the results of buy-and-hold abnormal return (BAHR) for 1–5 years from the year the IPOs were launched in the market for all the PE/VC-backed IPOs (PEBs), the peer group of firms (PEERs), non-PE/VC-backed IPOs (NPEBs) and all IPOs. The firm-level BAHRs are calculated, and then the pooled mean is estimated across all the years. Panel B of the table presents the mean difference of return performance between the PEERs and PEBs and also the mean difference of return performance between all the listed firms and PEBs for the same period. * indicates statistical significance at 10%.

1. PEER firms;
2. non-PE/VC-backed IPOs; and
3. all IPOs over the 5-year period from the launch of the IPOs.

We find that the BAHRs of PEBs is positive for all the years from year 1 to year 5, but they are lower than those of PEERs and NPEBs and also those of all IPO firms. Panel B highlights the differential BAHRs of PEBs and PEERs, PEBs and NPEBs and PEBs and all IPOs. Most of these differentials are negative and also statistically significant. This tells us that the long-term equity market performance of PEBs in India has not been very promising. As mentioned earlier, a large number of studies over the past three decades (Beatty & Ritter, 1986; Ibbotson, 1975; Ibbotson & Jaffe, 1975; McDonald & Fisher, 1969; Ritter, 1984, 1991; Rock, 1986) have reported long-term underperformance of IPOs following periods of high initial returns. Some arguments put forward as explanations to this observation are as follows: Jensen's (1986) 'free cash flow theory' argues that agency problems and conflict of interest between managers and shareholders might induce managers to raise IPO money and squander that in value-destroying activities. This moral hazard gets manifested in the declining operating and equity performance of IPOs in the post-issue period. The information asymmetry and mispricing hypothesis of Myers and Majluf (1984) argues that firms are able to determine whether the market is willing to overpay for their securities, and take advantage of such opportunities to 'time' their IPOs. Inability of the market to assess such motives at the time of IPO announcement causes investors to wait for additional evidence to be revealed over time before re-evaluating the firm, resulting in subsequent underperformance of these firms.

However, as far as the performance of VC/PE-backed IPOs is concerned, both empirical evidence and theoretical arguments point to a different direction. There is empirical evidence, as well as theoretical arguments (Gompers et al., 2016), suggesting that the long-term performance of VC/PE-backed IPOs could be better than that of IPOs without VC/PE backing. The principal arguments made involve close monitoring, improvement of operations and creation of additional values through expertise, experience and contacts of the VC/PE funders in the parent firm. To this extent, our findings from Table 3 suggest that the experience in India is somewhat different and there seems to be no difference between non-VC/PE-backed IPOs and VC/PE-backed IPOs. In fact, the performance of VC/PE-backed IPOs seems to be worse. We posit that this must be a case of too much VC/PE money chasing too few winners. However, to further ratify our hunch, we next proceed to check the actual operating performance of sample IPOs, post IPO launch.

## *Operating Performance of VC/PE-backed IPOs*

If theories of IPO underperformance in the long run post issue (Beatty & Ritter, 1986; Ritter, 1984, 1991; Rock, 1986) hold in Indian markets, then we expect the actual operating performance of IPOs to also decline during post-issue periods, which could lead to reduced equity performance. Panel A of Table 4 reports the operating performance of PE/VC-backed IPOs (PEBs), non-PE/VC-backed IPOs (NPEBs), the peer firms (PEERs) and all IPO firms over the next 5 years from the launch of the IPOs. We find that the operating performances of all three categories of IPO firms are positive, and most of them are statistically significant. Panel B of Table 4 reports the differential operating performances of the PEBs and PEERs and PEBs and all IPOs. We find that the operating performance of PEBs cannot be said to be any superior to that of either PEERs or all IPOs. In fact, some of the differential performances are negative and statistically significant.

Panel B of the table presents the mean difference of operating performance between the PEBs, NPEBs, PEERs and all IPOs. ** Indicates statistical significance at 5% or less, while * indicates statistical significance at 10%.

## *Performance Within Initial Public Offering Score Categories*

As explained in the previous section, it is possible that the performance of a firm post IPO launch depends on the involvement of the VC/PE funder before the IPO, on its monitoring and mentoring role. Accordingly, we score our sample IPOs and divide them into three categories: those with a score ≤3, those with a score in the range 4–7 and those with a score ≥8. Tables 5 and 6 show the category-wise performance of PEBs. We observe a clear pattern here. The more the involvement of the VC/PE funder in the monitoring, and/or mentoring, of the primary firm, the better is the post-IPO performance of the firm. This is visible clearly in terms of both equity market performance (Table 5) and operating performance (Table 6).

**Table 4.** Operating Performance of PE/VC-backed IPOs and Other Firms

| Panel A | | | | |
|---|---|---|---|---|
| | PEBs | PEERs | NPEBs | All IPOs |
| Sales/TA | 0.778* | 0.777 | 0.963* | 0.911** |
| OCF/TA | 0.033 | 0.046* | 0.043* | 0.040** |
| Panel B | | | | |
| | PEBs–PEERs | | PEBs–NPEBs | PEBs–All IPOs |
| Sales/TA | 0.001* | | −0.185* | −0.133* |
| OCF/TA | −0.013 | | −0.010 | 0.007 |

**Source:** The authors.

**Note:** Panel A of the table presents the statistics for the operating performance of the PE/VC-backed IPOs and other firms. PEBs represent the PE/VC-backed IPOs, NPEBs represent the non-PE/VC-backed IPOs, and PEERs represent similar firms as the sample IPOs from the same industry. Operating performance is measured by ratio of the asset turnover and operating cash flows to the book value of assets. The ratios are estimated at the firm level, from IPO issue year till the end of the study period, and then their pooled mean is estimated over all the years. ** Indicates statistical significance at 5% or less, while * indicates statistical significance at 10%.

**Table 5.** Rank-wise Return Performance

|  | I year | 2 years | 3 years | 4 years | 5 years |
|---|---|---|---|---|---|
| PEB with score ≤3 | 1.55% | 3.33% | 5.30% | 7.20% | 9.05% |
| PEB with score 4–7 | 1.83% | 3.85% | 5.95% | 7.87% | 9.77% |
| PEB with score ≥8 | 2.02% | 4.43% | 7.27% | 10.32% | 13.77% |

**Source:** The authors.

**Note:** The table presents the BAHRs for 1–5 years from the year the IPOs were launched in the market for all the PEBs. The PEBs are ranked and segregated into three categories based on the overall ranks. The firm-level BAHRs are calculated, and then the pooled mean is estimated over all the years.

**Table 6.** Rank-wise Operating Performance

|  | PEBs with Score ≤3 | PEBs with Score 4–7 | PEBs with Score ≥8 |
|---|---|---|---|
| Sales/TA | 0.508* | 0.523** | 0.796** |
| OCF/TA | 0.033* | 0.034** | 0.121* |

**Source:** The authors.

**Note:** The table presents the statistics for the operating performance of PEB firms vis-à-vis other firms in terms of the ratio of the asset turnover and operating cash flows to the book value of assets. First, we calculate these ratios at the firm level from the immediate next year of the IPO's launch till the end of our study period, then estimate the pooled mean over all the years. We segregate the IPOs based on their overall ranks and divide them into three categories. **\*\*** Indicates statistical significance at 5% or less, while * indicates statistical significance at 10%.

## Performance of Initial Public Offerings During Hot Years and Cold Years

As mentioned in the previous section, IPO literature (Ibbotson & Jaffe, 1975; Loughran et al., 1994; Ritter, 1984) highlights that IPO markets are subject to 'hot' and 'cold' market cycles. It is typically argued that hot markets are the result of overly bullish positioning due to irrational exuberance by investors (Lerner, 1994; Loughran & Ritter, 1993) and thus provide a chance for managers to take advantage of a 'window of opportunity' to make an IPO. Conversely, signalling models (Allen & Faulhaber, 1989; Grinblatt & Hwang, 1989; Welch, 1989) suggest that hot markets draw in better-quality firms, because offer prices are less affected by adverse selection costs. To explore what exactly is the scenario in India, in this study, we identify the hot and cold market cycles in IPO markets in India and look at the performance of VC/PE-backed IPOs during such cycles. Tables 7 and 8 below show the results.

**Table 7.** Return Performance for Hot and Cold Years

| BAHRs | PEBs Hot | PEBs Cold | PEBs Hot–Cold | PEERs Hot | PEERs Cold | PEERs Hot–Cold | All IPOs Hot | All IPOs Cold | All IPOs Hot–Cold |
|---|---|---|---|---|---|---|---|---|---|
| I year | 0.020 | 0.015 | 0.005 | 0.036 | 0.043 | −0.007* | 0.020 | 0.029 | −0.009** |
| 2 years | 0.042 | 0.033 | 0.009 | 0.076 | 0.080 | −0.004 | 0.043 | 0.045 | −0.002** |
| 3 years | 0.067 | 0.051 | 0.016 | 0.019 | 0.074 | −0.055* | 0.066 | 0.084 | −0.018** |
| 4 years | 0.092 | 0.068 | 0.024 | 0.163 | 0.097 | 0.066 | 0.089 | 0.136 | −0.047* |
| 5 years | 0.118 | 0.085 | 0.033 | 0.212 | 0.222 | −0.010* | 0.111 | 0.209 | −0.098** |

**Source:** The authors.

**Note:** The table presents the statistics of BAHR performance for hot and cold years. The hot years are considered the years where more than 50 IPOs were launched, and the cold years are considered the years where less than 50 IPOs were launched. The number 50 represents 8 per cent of the total IPOs during our study period. **\*\*** Indicates statistical significance at 5% or less, while * indicates statistical significance at 10%.

**Table 8.** Operating Performance for Hot and Cold Years

| | PEBs | PEBs | PEBs | All IPOs | All IPOs | All IPOs |
|---|---|---|---|---|---|---|
| | Hot | Cold | Hot–cold | Hot | Cold | Hot–cold |
| Sales/TA | 0.876 | 0.741 | 0.135 | 0.910 | 1.403 | −0.494* |
| OCF/TA | 0.023 | 0.037 | −0.015 | 0.023 | 0.051 | −0.028* |
| NP/TA | 0.063 | 0.027 | 0.036 | 0.059 | 0.066 | −0.007* |

**Source:** The authors.

**Note:** The table presents the statistics for the operating performance of PEBs vis-à-vis other firms in terms of the ratio of the asset turnover and operating cash flows to the book value of assets and that of net profit to total assets. We divide the entire period into hot and cold IPO periods and calculate these ratios at the firm level from the immediate next year of the IPO's launch till the end of our study period, then estimated the pooled mean over all the years. * Indicates statistical significance at 5%

We find some interesting patterns. First, the performance of all IPOs, in general, is much worse when they are issued in hot years. This substantiates the long-term-performance findings of IPO literature and suggests that Indian firms might also be indulging in 'timing' the market and utilizing the window of opportunities to overprice their IPOs. This is also ratified by our previous observation that the number of IPOs during hot years is much higher, on average, than that during the cold years, but the average sizes of the IPOs are much smaller. This suggests that only the very-big-ticket issues from genuine issuers having good prospects get subscribed to during cold years. Second, this pattern for all IPOs in general is not visible for the IPOs backed by VC/PE funders (PEBs). Here, the performances (both in terms of BAHR as well as operating measures) during the hot and cold years are not much different from each other. This could suggest that PEBs, at least, are not engaged in timing the market in the Indian set-up. This further reinforces our alternate explanation for the underperformance of PEBs: too much money chasing too few winners.

## Multivariate Analysis Results

Table 9 reports the results of the pooled regression results for models (1)–(3). We make the following significant observations here: (a) The coefficient of DUMMY.VCPE is negative and significant for all three models. This implies that VC/PE-backed IPOs have not done particularly well post raising IPO money. In fact, the performance, in terms of OCF, ATR and BAHR, has declined in the case of VC/PE-backed IPOs. This ratifies our observations from the univariate analysis; and (b) The coefficients of IPO size and firm size are mildly positive and strongly positive, respectively, for market share, which means that the effect is marginally lower for larger IPOs and larger firms with bigger market shares. Firm age apparently has no impact on post-IPO performance.

## Robustness Test Results

Table 10 presents the robustness test results. Panels A and B present the robustness test results using alternative performance measure (ROE), while panels C and D present the results using the winsorized sample. We find that our observations from the primary analysis are strongly ratified by the robustness tests, that is, the performance of PEBs is less impressive than that of NPEBs and PEERs.

**Table 9.** Multivariate Regression Results

|  | Const. | DUMMY.VCPE | IPOSIZE | FIRMSIZE | D–E | MKTSHARE | AGE | $R^2$ |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | (−1) |  |  |
| Δ OCF/TA from year 0 to +5 | −0.017 | −0.143** | 0.102* | 0.002 | −0.051 | 0.014* | 0.007 | 33.13% |
| Δ ATR from year 0 to +5 | −0.013 | −0.113** | 0.116 | 0.04 | −0.137 | 0.023* | 0.011 | 29.18% |
| Δ BAHR from year 0 to +5 | 0.123* | −0.052* | 0.002 | 0.062* | −0.001 | 0.014* | 0.014 | 35.17% |

**Source:** The authors.

**Note:** The table presents the results of the multivariate regression results for the models (1), (2) and (3). We use pooled data for the firms across all the years. **\*\* Indicates statistical significance at 5%. \* indicates staistical significance at 10%.**

**Table 10.** Robustness Test Results

| Panel A: Alternate Performance Measures: Univariate | | | |
|---|---|---|---|
|  | PEBs–PEERs | PEBs–NPEBs | PEBs–All IPOs |
| ROE | −0.002* | −0.132 | −0.105* |

| Panel B: Alternate Performance Measures: Multivariate Models | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | Const. | DUMMY.VCPE | IPOSIZE | FIRMSIZE | D–E | MKTSHARE | AGE | $R^2$ |
| ROE | −0.017 | −0.136 | 0.098 | 0.002 | −0.052 | 0.014 | 0.007 | 0.338 |

| Panel C: Winsorized Sample: Univariate Analysis | | | |
|---|---|---|---|
|  | PEBs–PEERs | PEBs–NPEBs | PEBs–All IPOs |
| Sales/TA | −0.001* | −0.185* | −0.133* |
| OCF/TA | −0.013 | −0.01 | 0.007 |

| Panel D: Winsorized Sample: Multivariate Models | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | Const. | DUMMY.VCPE | IPOSIZE | FIRMSIZE | D–E | MKTSHARE | AGE | $R^2$ |
|  |  |  |  |  |  | (−1) |  |  |
| Δ OCF/TA from year 0 to +5 | −0.015 | −0.129* | 0.092* | 0.002 | −0.046 | 0.013* | 0.006 | 30.3% |
| Δ ATR from year 0 to +5 | −0.012 | −0.103** | 0.105* | 0.036 | −0.125 | 0.021 | 0.010 | 26.7% |
| Δ BAHR from year 0 to +5 | 0.111 | −0.047* | 0.002 | 0.056 | −0.001 | 0.013 | 0.013 | 31.7% |

**Source:** The authors.

**Note:** This table presents the results of the robustness tests. Panels A and B present the robustness test results using alternative performance measure (ROE), while panels C and D present the results using the winsorized sample. \*\* and \* Indicate statistical significance at 1%, 5% and 10%, respectively.

## Summary and Conclusion

Over the past three decades, several empirical studies (Beatty & Ritter, 1986; Ibbotson, 1975; Ibbotson & Jaffe, 1975; McDonald & Fisher, 1969; Ritter, 1984, 1991; Rock, 1986) have reported that IPOs achieve significant intiail returns over very short periods, followed by longterm underperformance. The previously championed explanation for this observation was the information asymmetry and mispricing hypothesis of Myers and Majluf (1984), which argues that firms are able to determine whether the market is willing to overpay for their securities and take advantage of such opportunities to 'time' their IPOs. The inability of the market to assess such motives at the time of IPO announcement causes investors to wait for additional evidence to be revealed over time before re-evaluating the firm, resulting in the subsequent underperformance of these firms. However, this does not seem to be the case in India for VC/PE-backed IPOs, although this hypothesis finds significant ratification for Indian IPOs in general. We substantiate this statement by our finding that there is no significant difference in performance between VC/PE-backed IPOs issued during hot cycles and those issued during cold IPO cycles. If timing and utilizing overly bullish sentiments in the market is a cause, we would expect worse performance of VC/PE-backed IPOs issued during 'hot' periods compared to those issued during 'cold' periods. We argue that, given the exponential rise in VC/PE funding for start-ups in India over the last decade, it may be a case of too much money chasing too few winners that leads to the long-term underperformance of VC/PE-backed IPOs in India. Another likely explanation could be Jensen's (1986) 'free cash flow theory', which argues that agency problems and conflict of interest between managers and shareholders might induce managers to raise IPO money and squander that in value-destroying activities for their own benefits. This managerial moral hazard gets manifested in the declining operating and equity performance of IPO firms in the post-issue period, which raises the question of the monitoring role of VC/PE funders post the IPO launch in the Indian context. This is fully substantiated by our finding that with continued monitoring and hand-holding post the IPO launch, performance improves. We find evidence that the quality of VC/PE backing and involvement in a firm plays a crucial role in influencing the long-term performance of the issuing firm. The more the involvement of the VC/PE funder in its monitoring and mentoring role (we quantify this by creating a score), the better the long-term equity and operating performance of the firm.

The findings of this study could have significant implications for all stakeholders, particularly common investors in the Indian equity market. A significant implication of the findings is that the typically championed 'monitoring' and 'certification' hypotheses for VC/PE-backed IPOs might not be true in the Indian context. On the contrary, the observations of this study seem to be in sync with the 'market power' (Chemmanur & Loutskina, 2006) and 'grandstanding' hypotheses (Gompers, 1996). Given the enormous amounts of funds invested by VC/PE firms in India during the past few years, perhaps it is time for the VC/PE firms to be a little more cautious and enhance their involvement in the management of their portfolio companies. Our additional observation about the positive impact of greater VC/PE involvement and hand-holding during the pre-IPO stage substantiates this conjecture. Regulators can also take notice of these findings and determine a way to ensure more involvement of VC/PE firms in their portfolio companies. This is necessary because, as the equity market performance of VC/PE-backed IPOs gets adversely affected by managerial rent-seeking activities, the investment of millions of common equity holders also gets adversely affected. Overall, we hope that our article emerges as a timely contribution to the growing number of international studies in the field of VC and PE finance, as well as to the literature on operating and market performance of IPOs.

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## Declaration of Conflicting Interests

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## Notes

1. These are authors' estimates based on raw data obtained from Prime Database.
2. https://www.financialexpress.com/industry/big-deal-pe-investments-in-india-surge-20-this-year-to-11-5-billion-in-jan-jul-driven-by-large-deals/1283842/
3. https://economictimes.indiatimes.com/markets/ipos/fpos/pe-backed-ipos-outperform-non-pe-issues-2017-best-in-terms-of-proceeds/articleshow/64657805.cms
4. Dhamija and Arora (2017) compare the IPO underpricing between graded and non-graded IPOs and show that the graded IPOs are more fairly priced as compared to non-graded IPOs.

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