

R&D Management during Initial Public Offerings

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Abstract

In this paper we demonstrate that IPO firms engage in research and development (R&D) expense management during the initial public offerings (IPO). We find both types of R&D management during the IPO: R&D underinvestment and R&D overinvestment. R&D underinvestment is present mostly for firms that would report losses in the absence of R&D management and firms with reduced accruals management flexibility. R&D overinvestment is present mostly for firms at the growth stage of their life-cycle, non-profitable firms and firms that belong to science-driven industry. We show that firms overinvesting in R&D have more severe decline in post-IPO performance than firms underinvesting in R&D. Future performance analysis reveals that firms overinvesting in R&D experience significant long-term operating underperformance, lower future innovation quality, higher rate of delisting due to poor performance, and higher abnormal volume around the unlock date.

Executive Summary

In this paper we examine one component of real earnings management activities – R&D expense – during initial public offerings (IPOs). We document a presence of both types of R&D management, i.e., R&D underinvestment and R&D overinvestment during the IPO; study ex-ante firm's characteristics associated with over- and under- investment in R&D; and demonstrate that R&D overinvestment is associated with more severe decline in long-term post-IPO performance than R&D underinvestment.

Our study of firms' investment strategy in R&D at the time of IPOs is motivated by three primary reasons. First, we are puzzled by the lack of evidence of real activities management around IPOs in the extant literature. Second, a commonly used proxy for real activities management comprises multiple components (i.e., abnormal sales, abnormal production costs, and abnormal discretionary expenses). However, due to distinct operating and valuation models, different IPO firms might have different objectives in managing each of these components. Therefore, by concentrating on a specific component of real activities management, we can avoid compounding effects from other components, and better understand whether IPO firms involve in real activities manipulation. Finally, R&D management during IPOs can come in two opposite forms: R&D underinvestment to increase earnings, and to R&D overinvestment to increase R&D. Which form is present and dominates during the IPOs is an open empirical question.

R&D expense is a special component of discretionary spending that is a subject of two opposite forces. First, as demonstrated by prior literature, R&D expense can be managed downward (R&D underinvestment) as part of the REM strategy to report higher earnings (Roychowdhury, 2006; Gunny, 2010; Cohen and Zarowin, 2010). Second, R&D is an important accounting item that is highly valued by investors (Lev and Sougiannis, 1996; Guo et al., Zhou, 2004; Lev et al., 2005).¹ As a result, R&D can be managed upward (R&D overinvestment) to have a positive impact on firm's valuation (Guo et al., 2005; Amir and Lev, 1996; Lev et al., 2005; Andre et al., 2007; Joos and Zhdanov, 2008), which is crucial in the IPO event. Moreover, high information uncertainty associated with R&D activities and its future profitability creates difficulties for investors in determining an optimal level of R&D spending making it attractive tool for managers who wish to engage in real activities manipulations.

As a first step, following Roychowdhury (2006), Cohen and Zarowin (2010), and Zang (2012) we check whether IPO firms engage in real activities management. We find that aggregated real earnings management measure is insignificant during the IPO. This finding is inconsistent with the REM story suggesting that IPO firms do not engage in REM. However, analysis of the specific REM components unveils more diverse story: the abnormal level of cash flow from operations component and abnormal production cost are consistent with real earnings management, but all discretionary expenses (R&D, advertising and SG&A expense) are significantly positive, what is not consistent with real earnings management. In our further analysis, to better understand real activities manipulation during the IPO, we concentrate on discretionary expense, the only component of REM that is inconsistent with real earnings

¹ Lev (2001) and Curtis et al. (2015) report that R&D expenditures have become an increasingly important element of the US and global economies over the past 30 years.

management. Specifically, we consider discretionary R&D - the largest component of discretionary expenses.^{2,3}

Following prior studies (Berger, 1993; Gunny 2010; Fedyk et al., 2014) we augment the basic model of Roychowdhury (2006) with lagged R&D expenses, average level of cash holdings, change in sales and Tobin's Q.^{4,5} In addition, we perform a performance matching suggested by Cohen et al. (2014).⁶ We find that discretionary R&D expenses are still on average positive (but smaller in magnitude than discretionary R&D from the Roychowdhury (2006) model) at the year IPO year and one year after the IPO, and become insignificantly different from zero thereafter. Positive discretionary R&D at the IPO year suggests that firms on average overinvest in R&D during the IPO, and that R&D management incentives on average dominates earnings management incentives.

Next, we estimate a multinomial logit model to determine ex-ante cross-sectional characteristics associated with the firms' decision to over- or under-invest in R&D. We predict and find that probability of R&D under-investment (i.e., earnings management) increases for firms that would have to report losses in the absence of R&D management and for firms with reduced accruals management flexibility (as captured by net operating assets, NOA). The probability of R&D over-investment (R&D management) is higher for growth firms, firms that experience substantial losses, firms with zero sales, or for the firms that belong to science-driven industries.

Finally, we examine the consequences of R&D under- and over-investment on future performance of IPO firms. Both, R&D under- or over-investment are suboptimal investment choices. Therefore, abnormal R&D expenses, if used opportunistically, should be associated with inferior post-IPO performance. Alternatively, over-investment in R&D can be used by management to signal investors about the quality of the firm and its future prospects. We find strong evidence in support of opportunistic hypothesis for R&D overinvestment. Thus, R&D overinvestment has significant negative long-term effect on future number of patents and patents' quality, frequency of delisting due to poor performance and operating ROA for up to five years after the IPO. Additionally, we find that trading volume for the 3-day period around

² In this paper, we concentrate on R&D discretionary expense and not on SG&A or advertising expenses for three main reasons: 1) it is the largest discretionary expense; 2) a well-established in the literature link between current R&D expense and future firm value provides support for R&D overinvestment (R&D management) hypothesis as opposite to R&D underinvestment (earnings management) hypothesis; 3) availability of patents data that can be used as a non-operating proxy for future performance.

³ Most of the existing evidence on real activities management centers on the opportunistic reduction of R&D expenses. Dechow and Sloan (1991) find that CEOs reduce spending on R&D toward the end of their tenure to increase earnings. Baber et al. (1991) and Bushee (1998) also find evidence consistent with reduction of R&D expenditures to meet positive or previous year's earnings benchmarks. Bens et al. (2002) report that managers repurchase stock to avoid EPS dilution, and further demonstrate that managers partially finance these repurchases by reducing R&D expenses.

⁴ Tobin (1969).

⁵ We recognize that the basic model in Roychowdhury (2006) might be not appropriate for the estimation of the expected level of R&D expenses for IPO firms. The errors in the expectation model might attribute to the findings of positive discretionary R&D expenses around IPO event in the first step of our analysis. One specific concern is controlling for cash (Ball and Shivakumar, 2008), and another one is controlling for performance (Cohen et al. 2014). Therefore, we modified Roychowdhury (2006) model to address those concerns.

⁶ We recognize that even improved performance-matched discretionary R&D model with an additional control for cash might still be misspecified. Therefore, we repeat all our analysis without using discretionary models, but using changes in R&D expenses. All results hold.

the unlock day is significantly higher for the firms that over-invest in R&D than for firms that invest at the expected level. As for the R&D underinvestment, we find a negative association of discretionary R&D with future long-term operating ROA, but not with frequency of delisting due poor performance, and number of patents and patents' quality. We also do not find that trading volume for underinvesting firms is significantly different from that for the firms investing at the expected level.

We make following contributions to the literature. First, we contribute to the real activities manipulation literature by presenting evidence that aggregate real earnings management measure might lead to conflicting results in the IPO setting, while disaggregated measures allow us to detect different types of real activities manipulation. Second, we document two distinct strategies regarding R&D expenses for IPO firms: under-investment associated with earnings management and over-investment associated with R&D management, and demonstrate that firm's cross-sectional characteristics associated with each strategy vary in a predictable manner. Third, we present novel evidence on the decline in the post-IPO performance for up to five years after the IPO for firms overinvesting in R&D. While prior literature documents negative effect of R&D underinvestment (Cohen and Zarowin, 2010), we are the first to document long-term negative effects of R&D overinvestment on future operating and innovation performance.

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