R&D expenditures, ultimate ownership and future performance: Evidence from China

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**Abstract**

This study examines the relationship between R&D expenditures and future performance, as well as the moderating effects of ultimate ownership on the relationship. Using a sample of 772 Chinese listed firms from 2007 to 2012, this study shows that R&D expenditures are positively related to firms’ future performance and that the R&D expenditures of SOEs lead to better future performance than those of non-SOEs. In addition, the results also reveal that voting rights of ultimate owners positively moderate the R&D-performance relationship. We also adopt fuzzy-set Qualitative Comparative Analysis (fsQCA) to reveal the interdependent and interrelated nature of the explanatory predictors of future performance. The results of fsQCA further indicate that large-sized SOEs with concentrated ownership could attain higher future performance on R&D investments if there are more patent applications and capital and operating spending. These findings complement the R&D performance literature by simultaneously considering the combinatorial effect of ultimate ownership and control ability.

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1. Introduction

The effect of R&D spending on firms’ future performance is always a vital issue. With a growing recognition of the importance of R&D activities, Chinese firms allocate more towards R&D investments. Despite highlighting the importance of R&D investments to superior firm performance, empirical studies have produced mixed results. On the one hand, R&D activities facilitate economic rent, develop technological capabilities and acquire first-mover advantage, which all contribute to firms’ future performance (Bowen, Rostami, & Steel, 2010). On the other hand, R&D activities are risky and are not always a driver of superior future performance, and the innovative products and services may not actually satisfy market needs (Liao & Rice, 2010). It is also likely that the gains from R&D activities are appropriated by stakeholders (Bowen et al., 2010). In these cases, R&D expenditures exert negative effects on future performance.

Regarding the contrasting study results, current studies suggest that the relationship between R&D investment and future performance is highly contingent on exogenous environmental factors (Jiang, Waller, & Cai, 2013; Rosenbusch, Brinckmann, & Rausch, 2011; Zhang, Li, Hitt, & Cui, 2007). Especially in emerging economies, the institutional environment has an effect on firms’ performance by influencing firms’ decision-making mechanisms (Peng, 2002) and strategic choices (Peng, Sun, Pinkham, & Chen, 2009). Institutional factors such as ownership structure have aroused much scholarly attention from the research fields of technology innovation. China is an economy made up of various ownership types including state-owned enterprises (SOEs) and non-SOEs. SOEs are different from non-SOEs in terms of their strategy orientation (Jiang et al., 2013), how they deploy R&D resources and corporate governance system (Borisova, Brockman, Salas, & Zagorchev, 2012), which may eventually influence their financial performance. In this regard, we therefore analyze the question: whether ownership types moderate the relationship between R&D investments and firms’ future performance?

Corporations in East Asian countries often adopt a pyramid ownership structure to control their publicly listed companies (Claessens, Djankov, & Lang, 2000; Fan & Wong, 2002; La Porta, Lopez-De-Silanes, & Shleifer, 1999). Few studies, however, have sought to trace firms’ ownership to their ultimate owners and distinguish them by ultimate owner or controlling stake. We focus on ultimate ownership, which denotes that the shareholder has the determining voting rights and is free from anyone else’s control, to distinguish SOEs and non-SOEs by manual data collection. We use a sample of Chinese listed firms to further investigate the impact of ultimate ownership on the relationship between R&D expenditures and firm future performance.

This study also examines how the voting rights held by the ultimate owner influence the relationship between R&D expenditures and firms’ future performance. The greater the voting rights an ultimate owner has, the more controlling power he/she would have to influence a firm’s decision-making process (Chin, Chen, Kleinman, & Lee, 2009). In China, although the ownership concentration is a common phenomenon (Gunasekaran, Hess, & Hu, 2007), studies that investigate the impact of voting rights on firm future performance remain scarce.
More importantly, because the traditional multiple regression analysis has been challenged for its inability to identify causal combinations, we further discuss the prior questions by adopting fuzzy-set Qualitative Comparative Analysis (fsQCA), a new approach that combines complexity theory and configurational analysis, to overcome the limitations in regressions techniques (Woodside, 2014) and open the black box of the relationship between R&D expenditures and firms’ future performance. The causal paths to superior future performance and its absence complement our regression findings.

We test the hypotheses using a sample of Chinese listed firms from 2007 to 2012. The empirical results show that SOEs’ future performance is inferior to that of non-SOEs. The interaction term between ownership structure and R&D expenditures, however, is significantly positive, indicating that SOEs perform better in R&D investments. The voting rights held by the ultimate owner also positively moderate the relationship between R&D expenditures and firms’ future performance. The results of fsQCA additionally show that the superior future performance results from R&D expenditures is highly related to high voting rights, high capital and advertising expenditures, good past performance, more patent applications and large size when the ultimate controller is the government.

This paper contributes to the literature on R&D expenditures research in several ways. First, it addresses the current debate by examining the relationship between R&D expenditures and firms’ future performance. Second, this study also provides evidence on how ultimate ownership (the types and controlling ability of ultimate owner) moderate the impact of R&D expenditures on firms’ future operating performance. Third, the results from fsQCA could identify the configurations leading to different levels of firms’ future performance. Our results provide some implications for the improvement of firms’ future performance and competitive advantage through R&D activities.

The remainder of this paper is organized as follows. Section 2 reviews the previous literature and develops our hypotheses. Section 3 presents the data sources and the empirical models. Section 4 illustrates our econometric results. Section 5 analyzes the fsQCA findings, and concluding remarks follow in Section 6.

2. Theoretical background and hypotheses

Although there are some empirical studies on the relationship between R&D expenditures and firms’ value, very little is known about the role of ownership structure in the relationship between R&D expenditures and firms’ future performance. China is a good setting in which firms are generally characterized by diverse types of ultimate ownership, providing a laboratory to explore the moderating effect of ownership structure on the extent of R&D expenditures and firms’ future performance generated from R&D expenditures.

2.1. R&D expenditures and firms’ future performance

R&D activities are becoming increasingly important in sustaining firms’ competitive advantage. Prior studies pay more attention to the value relevance of R&D expenditures. Because the future benefit derived from R&D investment is uncertain, however, the empirical studies have produced inconsistent findings (Eberhart, Maxwell, & Siddique, 2004; Kotrath, Laguerre, & Leone, 2002; Lev & Sougiannis, 1996; Pandit, Wasley, & Zach, 2011). Although there has been a debate on whether R&D expenditures contribute to firms’ future performance, we argue that R&D expenditures can enhance firm performance by reducing production cost and launching new products, which are essential for firms to survive, especially when faced with fierce competition. R&D activities will not only generate new knowledge and widen the scope of firms’ knowledge base but also improve firms’ capability to absorb and integrate existing knowledge, both of which will enhance firms’ long-term performance (Cohen & Levinthal, 1989). Based on the above analysis, we hypothesize:

Hypothesis 1. R&D expenditures are positively associated with firms’ future operating performance.

2.2. The effect of R&D expenditures on firms’ future performance under different ultimate ownerships

Ownership structure is a primary determinant of corporate resource allocation, the availability of R&D resources (Jefferson, Huamao, Xiaoqing, & Xiaoyun, 2006) and corporate governance structure, which has important implications for firms’ R&D activities and firm value. While there is some empirical evidence regarding the moderating effect of R&D expenditures and firm performance, they produce mixed results. Some studies have shown that SOEs are inefficient in R&D activities because of the conflict of interest between shareholders and governments, with a higher likelihood for the latter to pursue social objectives and political objectives rather than profit maximization (Le & O’Brien, 2010; Young, Peng, Ahlstrom, Bruton, & Jiang, 2008). In this regard, state ownership may negatively moderate the relationship between R&D expenditures and firms’ value. Several other studies, however, have shown conflicting results. Some scholars posit that R&D productivity varies across industries. SOEs are less efficient in R&D activities because the majority of them belong to industries that have low R&D productivity (Jefferson et al., 2006), while non-SOEs perform better than SOEs because most of them belong to the high-tech industry. Therefore, there is no significant difference between SOEs and non-SOEs in return on R&D investment (Guan, Yam, Tang, & Lau, 2009; Jiang et al., 2013). Moreover, Choi, Lee, and Williams (2011) have reported a lagged positive relationship between state ownership and firm innovation performance in China.

Although previous studies have yielded some mixed results, we argue that R&D expenditures of SOEs will produce superior future performance for two reasons. First, Chinese SOEs have substantial advantages in terms of R&D resources. Due to strong political connections, SOEs have priority access to R&D resources such as public subsidies, and easier access to government financing and distribution channels and tax credits compared with non-SOEs (Boeing, Mueller, & Sandner, 2016; Wang, Yi, Kafouros, & Yan, 2015). For example, Chinese firms enjoy an additional 50% tax-reduction when their R&D inputs on new products or technology are recognized as periodic expenses. Furthermore, if the investment has formed intangible assets, the firms can enjoy the amortization of 150% of the cost of the intangible asset. Companies can enjoy these tax benefits only after the examination and approval of the tax authorities. Compared with non-SOEs, SOEs are more likely to receive tax credits for R&D at a lower cost because of their naturally tight links with government. R&D tax credits will greatly reduce the cost of innovation for SOEs and enhance their profit. Meanwhile, the availability of abundant resources and preferential treatment from government could reduce the controlling shareholders’ risk aversion in R&D investment and encourage SOEs to spend more efforts and money to generate new knowledge. Most key research projects at the national and provincial level are carried out by SOEs, universities or both. Government can conveniently monitor the implementation of these research projects and evaluate innovation outcomes and economic benefits, which we expect is helpful for SOEs to obtain high future performance. Hence, we argue that SOEs outperform non-SOEs in R&D performance.

Second, most Chinese universities and research institutes are controlled and managed by the state, so they have some natural linkages with SOEs. More than 30% of SOEs under investigation are active in outsourcing S&T activities to universities and public research institutes (Motohashi & Yun, 2007). SOEs can gain access to complementary capabilities through university–industry collaboration, which can reduce the risk of R&D, boost innovation performance and yield economic returns in the future (Eom & Lee, 2010; George, Zahra, & Wood, 2002). Based on the above analysis, we propose the following hypothesis:
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