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Bank equity connections, intellectual property protection and enterprise innovation – A bank ownership perspective

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ABSTRACT

This study investigates the effects of bank equity connections and intellectual property protection on enterprises' innovation behavior, and the regulating effect of intellectual property protection on the relationship between bank equity connections and innovation. In general, bank equity connections and intellectual property protection not only significantly increase innovation input, but also improve innovation performance. However, the efficiency of bank equity connections is influenced by the heterogeneity of enterprises and the value orientation of the subjects. Bank equity connections have a more significantly positive effect on innovation in private and central enterprises, whereas the principal-agent problem and government intervention may weaken the marginal contribution of bank equity connections to the innovation of local state-owned enterprises. Bank equity connections and intellectual property protection are complementary in promoting enterprise innovation. Not only are the combined effects of bank equity connections and intellectual property protection greater than the individual effects, but when the latter is relatively weak, the former's positive effect on innovation is obviously weakened and may even crowd out innovation.

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1. Introduction

Since the beginning of its economic reforms in 1978, China's market-orientation and property rights have created a "growth miracle." However, this growth has excessively relied on high input, high consumption and high emissions. The lack of independent innovation and technological progress has limited the intensive and efficient use of resources and sustainable economic growth (Wu and Mi, 2011; Chen and Hu, 2011). The rapid increase in labor costs, the increase in resource environment pressure and shrinking external demand have resulted in increasingly negative externalities in this low-end economic growth pattern. Therefore, strengthening technological progress, changing the mode of economic growth, and improving the ability to innovate and gradually shift from factor-driven economic growth to innovation-driven economic growth are urgent tasks. In fact, increasing innovation and building an innovative country were emphasized in China's 12th 5-year plan. But the current outlook for innovation development is not optimistic. Although the ratio of R&D expenses to sales revenue in large- and medium-sized industrial enterprises increased from 0.48% in 1996 to about 0.93% in 2010, the level of innovation input still fell behind that of developed countries. According to Hall and Oriani (2006), the ratio of R&D expenses to sales revenue in the United States, Britain, Germany and France is 4.9%, 2.9%, 4.5% and 4.2%, respectively. In 1992, R&D expenses reached 1.97% of GDP, a record; however, the ratio has reached 2.66%, 1.86%, 2.40% and 2.16%, respectively, in the United States, Britain, Germany and France, since the end of the 20th century.[2] Furthermore, the conversion rate for scientific and technological achievements in developed countries is more than 80%, whereas in China, the conversion rate is very low, only 20%, and the authentic industrialization rate is less than 5% (Xiao and Wang, 2014).

Accordingly, understanding why investment in innovation and the effects of such investment are so low in Chinese enterprises, and how to promote innovation are important issues both theoretically and practically. Enterprise innovation can be easily restricted by financing limitations due to its high risk, long incubation period and information asymmetry. Access to a steady stream of financial support may be a key factor in innovation decisions. Enterprises' financing channels include internal financing and external financing. Although internal financing provides higher autonomy and less risk, using internal financing to fund an innovation project may be difficult, not only due to the constraints imposed by corporate earnings and business fluctuations, but also because of ownership structure, management incentives, investor risk appetite, institutional investors governance, product market competition and so on (Lin et al., 2011a, 2011b, 2011c; Aghion et al., 2005, 2013; Li and Song, 2010; Becker-Blease, 2011; O'Connor and Rafferty, 2012; Lu and Dang, 2014; Sapra et al., 2014; Tian and Wang, 2014). Therefore, access to external capital is of paramount importance to ease the risk of investing in innovation. In fact, there are several studies of the relationship between external financing and innovation in China. Using an innovation resource acquisition research perspective, Brown et al. (2013), Chemmanur et al. (2014) and Cornaggia et al. (2015) investigate the relationships of enterprise innovation with stock financing, corporate venture capital and credit financing, respectively. Hsu et al. (2014) use the data of 32 developed countries and emerging markets and examine the effect of the securities and credit markets on enterprise innovation at the national level. Domestic scholars Xie and Fang (2011) find that banking reform and regional financial development promote investment in innovation in Chinese enterprises by expanding financing channels. Using the World Bank's survey data of more than 12,000 Chinese enterprises, Ma et al. (2014) find that the acquisition of bank credit can increase the probability of R&D and the intensity of innovation by 8.6% and 0.24%, respectively.

Although these scholars reveal the transmission mechanisms that transform external financing into enterprise innovation, these studies are mainly based on institutional environments in developed countries, such as the USA and Britain, and their basic assumptions and logical deductions may not be effectively migrated to emerging markets such as China. Therefore, their findings may not reasonably explain, forecast or guide innovation behavior in China. For instance, although with the rapid development of China's capital market, securities financing and credit financing have become the two most important external financing channels for

[2] *Source:* China Statistical Yearbook (1996–2013). Before 2011, this yearbook separately disclosed the R&D expenses and sales income of China's large- and medium-sized industrial enterprises. In 2011, the large and medium-sized industrial enterprises were grouped into the category of above-scale enterprises; this yearbook did not separate large- and middle-scale enterprises, nor did the financial reports reveal information about scientific or technological innovations. Therefore, the data are only for the fiscal year that ended in 2010.