

The Influence Of Property Rights Structure On Technological Innovation——An Empirical Study Based On Panel Data Of Chinese Enterprises

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Abstract. This paper uses the panel data of 247 companies in A-share listed companies from 2008 to 2016 and the structure of property rights structure to empirically study the impact of changes in corporate property rights on technological innovation. The study found that the property rights structure, that is, the increase in the proportion of state-owned legal person shareholders (shareholders holding more than 5% of shares or the top 10 shareholders) has significantly promoted technological innovation in enterprises, and a certain degree of property rights structure changes contribute to technological innovation.

Introduction

In the Soro model, technological progress is regarded as an important factor in economic growth. Technological innovation is a long-term driving force for national economic growth. As a main body of technological innovation, enterprises' ability to enhance technological innovation will significantly enhance the existing strength of enterprises and promote the development of enterprises. At the same time, it will drive the development of the overall economy. In Schumpeter's theory, technological innovation is defined as creative destruction. It is believed that manufacturers with large market scales will have stronger creative ability because of the relative advantages of risk sharing and financing support, but the scale of a company cannot fully explain its The impact on technological innovation. In China, the innovation capabilities of different ownership enterprises vary widely. In the existing literature, the nature of enterprise ownership is an important factor affecting technological innovation of enterprises. The nature of ownership of enterprises is a deep reflection of the structure of property rights. The fundamental manifestation of the change in the nature of enterprise ownership, so the property rights structure may have an impact on technological innovation, and how does the trend of further property rights structure affect corporate?

The property rights structure referred to in this article is the shareholding ratio of state-owned legal person shareholders (shareholders holding more than 5% of shares or top 10 shareholders). It can be known from the existing research that the technological innovation efficiency and innovation output efficiency of state-owned enterprises are lower than those of foreign capital and joint ventures. It is only one aspect to explain the influence of state-owned enterprises on technological innovation by system and background; The change in the shareholding ratio of state-owned legal person shareholders can subdivide the impact of the nature of corporate ownership on technological innovation, and more clearly determine the impact of state-owned enterprises on technological innovation. With the change of the proportion of state-owned holdings, how will the innovation efficiency and output efficiency of enterprises change? Will the increase of state-owned holdings affect the efficiency of technological innovation of enterprises like state-owned enterprises? These are the issues to be explored in this article.

This paper uses the panel data of 247 listed companies in nine industries in China from 2008 to 2016 to examine the impact of changes in property rights structure on technological innovation of enterprises. The rest of the paper is organized as follows: the second part is literature review; the third part introduces the construction of the model and the processing of the data; the fourth part carries out the empirical test and the result analysis; the fifth part is the research conclusion.

Literature Review

In the existing literature, most scholars believe that the proportion of state-owned enterprises in the property right structure will have a negative impact on enterprise innovation. Xu Zirui, Lu Wei and Wang Zhe (2013) [1] argue that the average technological innovation ability of state-owned enterprises is low. Because of the complex property rights relationship, low management efficiency and more hierarchical structure, their response ability to the market is relatively slow, and the technological renewal is also slower. Gao (2013) [2] empirical test shows that the impact of state-owned control rights and state-owned property rights on enterprise innovation performance is significantly negative. The research of Li Houjian and Liu Siya (2015) [3] finds that the proportion of state-owned ownership will significantly inhibit enterprise innovation. Further, with the increase of the proportion of state-owned ownership, the positive impact of bank credit on enterprise innovation will gradually weaken. The research of Li Jian, Wei Ping and Zhang Lingyu (2017) [4] proves that the change of property right structure has a significant promoting effect on regional innovation investment, and further confirms the robustness of the above conclusions through the selection of panel model and the transformation of indicators. The proportion of non-state-owned property rights increased by 1 percentage point per upward change of property rights structure, and the R&D investment and personnel investment increased by 0.026 percentage points and 0.113 percentage points respectively. Scholars also find that the definition of property right structure of state-owned enterprises is generally not clear enough. Wu Yanbing (2007) [5] found that different property right structures have different incentive effects on R&D investment. A clear definition of property right structure is conducive to increasing R&D investment. Wang Kun, Ji Xuanming and Xu He (2018) [6] concluded that property right structure and region Regional innovation performance also shows a positive correlation, that is, the clearer the property rights in the region, the higher the innovation efficiency.

However, some scholars have concluded that the increase of the proportion of state-owned enterprises in the property right structure is helpful to enhance technological innovation. In recent years, the efficiency of technological innovation of state-owned enterprises has been increasing. With the increase of the proportion of state-owned enterprises, the efficiency of technological innovation has gradually improved. The results of Li Jian (2018) [7] show that the change of property right structure (the increase of the proportion of non-state-owned economy) has significantly inhibited China's innovation ability, and the number of patent authorizations in China will decrease by 0.140-0.181 percentage points for every upward change of property right structure (the increase of the proportion of non-state-owned economy). Liao Hongwei and Zheng Huo-ao (2018) [8] Through empirical tests, it is concluded that both property right structure and market structure influence innovation behavior of state-owned enterprises. When the proportion of state-owned property rights is less than 20%, market concentration and enterprise scale have incentive effect on innovation behavior of state-owned enterprises.

Model Construction and Data Processing

Data sources. Based on the investigation and analysis of A-share market in China, this paper finds that most of the enterprises reporting innovation activities in all A-share listed companies belong to small and medium-sized boards, and only a few enterprises listed on the main board report on their innovation activities. In addition, the time dimension of each enterprise's statistics on innovation activities is also different. Therefore, considering the availability of other indicators, in order to expand the sample size as much as possible, this paper finally screened out 247 enterprises from 2008 to 2016, including 171 enterprises from the SME market, 73 enterprises from the GEM market, and only 3 enterprises from the main board market. These 247 enterprises belong to food and beverage industry, light industry manufacturing industry, household appliances industry, electronic industry, transportation equipment industry, textile and clothing industry, chemical industry, information equipment industry and pharmaceutical and biological industry. Sample data all come from public disclosure information such as prospectus and annual report of listed companies.

Model Construction. The R&D density of firms with explanatory variables. Indicators to measure innovation activities usually include two aspects: innovation input and innovation output. Innovation input index mainly reflects the motive force of technological innovation activities, while innovation output mainly reflects the ability of technological innovation and its impact on business performance. This paper mainly discusses the impact of property structure and other factors on enterprise innovation activities, so innovation investment can better reflect our research purposes, so R&D density is selected as the explanatory variable of this paper. The measurement of R&D density is the ratio of R&D investment and sales. The higher R&D density is, the more active R&D activities are.

The core explanatory variable is the industrial structure of enterprises. In this paper, the proportion of shareholders of state-owned legal person (more than 5% shareholders or the top 10 shareholders) is used to reflect the impact of property right structure on enterprise innovation activities. In addition to the core variables mentioned above, there are other control variables that affect the technological innovation of enterprises.

Enterprise Size. This paper chooses sales to measure the size of the enterprise. Because the other variables in the model are dimensionless, this paper normalizes the variables to eliminate their dimensions, so that the values of variables are in between, which enhances the explanatory power of variables.

Industry Characteristics. In order to illustrate the difference of innovation activities among different industries, we classify the selected enterprises. In this paper, 247 enterprises are divided into nine industries according to the industry classification standard of the National Bureau of Statistics.

Gross Margin. The impact of enterprise profit on innovation is very complex. Gross profit rate reflects the value-added part of a commodity after the production transformation of the internal system. The source of R&D funds may be the accumulation of funds. Gross profit rate represents the value-added part brought about by enterprise technological innovation.

To sum up the above factors and draw lessons from the existing research, this paper sets up a model as follows:

$$INNOV_{it} = \beta_0 + \beta_1 PROP_{it} + \beta_2 SALE_{it} + \lambda_1 X + \delta_{it}$$

INNOV represents technological innovation, reflects the activity of R&D, and is the explanatory variable. PROP represents the structure of property rights, reflects the proportion of state-owned shareholders, and is the core explanatory variable. X is the control variable, including SP and IND. SP is the gross profit rate of enterprises and IND is the industry characteristic variable, which is used to explain the influence of property right structure change on technological innovation among different industries. I is the number of variables, t is the year, is the error term.

Table 1 illustrates the definition of variables and their symbols.

Variable	Units	Observed Value	Mean Value	The Standard Deviation	Least Value	Maximum Value
INNOV	%	2223	0.517009	0.0491552	0	0.7275
SP	%	2223	0.3399927	0.1626013	0	0.921
SALE	%	2223	0.0412511	0.0576032	0	1
PROP	%	2223	0.0502866	0.1320586	0	0.7548

Empirical Test and Analysis

The regression results show that the value of p is 0.0000, and the fixed effect model should be used to reject the original hypothesis of the random effect model at the 1% significant level. In addition, we also need to test whether there is heteroscedasticity and autocorrelation in panel data. We use LR test (likelihood ratio test) to test heteroscedasticity. At 1% significance level, the results of LR test

strongly reject the original hypothesis of "inter-group homoscedasticity", and we should consider heteroscedasticity. For the existence of intra-group autocorrelation, we strongly reject it at 1% significance level. The original hypothesis that there is no first-order intra-group autocorrelation should be considered. For the existence of inter-group cross-section correlation, the test results show that the original hypothesis of "no cross-section correlation" is strongly rejected at the level of 1% significance, and the inter-group correlation should be considered. From the above tests, we can see that there are heteroscedasticity and autocorrelation problems in the panel data. In order to overcome this problem, the panel-Corrected Standard Error (PCSE) method is used to regression the panel data.

The regression results are as follows:

From the figure1, we can see that the effect of property right structure on technological innovation is significantly positive, which indicates that the increase of the proportion of state-owned shares contributes to technological innovation of enterprises. This can be explained as: the increase of the proportion of state-owned holding increases the financing capacity of enterprises, the increase of state support for enterprises, and the increase of R&D investment. For enterprises with high state-owned components, their R&D activities will receive more R&D subsidies and tax preferential policies from the government, which will encourage enterprises to actively invest in R&D. At the same time, due to the inertia of the traditional system and the difficulty in evaluating R&D performance, it is often difficult for state-owned enterprises to adjust their R&D investment in time according to market feedback. This rigidity of R&D budget will also lead to the increase of R&D investment.

After controlling industry characteristics, we find that the coefficients of virtual variables of industry characteristics are significantly positive, which shows that industry characteristics do not affect the impact of enterprise property right structure on technological innovation. From the time point of view, the technological innovation of enterprises shows an upward trend with time, and with the change of time, the coefficient increases more and more obviously, which indicates that the R&D investment of enterprises is increasing with the increase of time. Enterprise size is negatively correlated with enterprise technological innovation, which is inconsistent with Schumpeter's theory. It may be that in China, large-scale enterprises do not use their own advantages to make more investment in innovation, on the contrary, smaller enterprises enhance their competitiveness through more investment in innovation.

innov	Panel-corrected					[95% Conf. Interval]
	Coef.	Std. Err.	z	P> z		
prop	.0342593	.0034192	10.02	0.000	.0275579	.0409607
sale	-.1266446	.0164755	-7.69	0.000	-.158936	-.0943533
ind2	.0076461	.0008169	9.36	0.000	.0060451	.0092472
ind3	.0232593	.0020345	11.43	0.000	.0192718	.0272468
ind4	.0415412	.0039079	10.63	0.000	.0338819	.0492005
ind5	.0266713	.0009464	28.18	0.000	.0248165	.0285262
ind6	.0049349	.001062	4.65	0.000	.0028533	.0070164
ind7	.0138129	.0014828	9.32	0.000	.0109066	.0167193
ind8	.0575625	.0029037	19.82	0.000	.0518713	.0632537
ind9	.0306995	.0027689	11.09	0.000	.0252726	.0361264
year	.0029613	.0002377	12.46	0.000	.0024953	.0034273
_cons	-5.933344	.4773633	-12.43	0.000	-6.868959	-4.997729

Figure. 1

Conclusion

Through empirical research, this paper finds that the change of property right structure, that is, the increase of the proportion of state-owned legal person shareholders (more than 5% shareholders or the top 10 shareholders) will significantly promote technological innovation of enterprises. This paper shows that in the process of property right structure change, the increase of state-owned

holding proportion is not the same as the existing research results on the nature of ownership. It is believed that state-owned enterprises will inhibit technological innovation, and the increase of shareholder proportion of state-owned legal persons will promote technological innovation of enterprises. On the one hand, for enterprises with high state-owned components, their R&D activities will receive more R&D subsidies and tax preferential policies from the government, which will encourage enterprises to actively invest in R&D. On the other hand, due to the inertia of the traditional system and the difficulty in evaluating R&D performance, it is often difficult for state-owned enterprises to adjust their R&D investment timely according to market feedback. This rigidity of R&D budget will also lead to the increase of R&D investment.

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