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Study on the impact of finance leasing on corporate green innovation

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Abstract: Green technology innovation is a key path for our country to achieve carbon peak and carbon neutralization and promote high-quality economic development. Based on the theory of sustainable growth, this paper uses fixed-effect panel regression and takes financial leasing as the core explanatory variable to explain the influence of financial leasing, as a new financing channel, on enterprises' green innovation. This paper promotes the "green function" theory of financial leasing and demonstrates the promoting effect of financial leasing on green finance. The conclusion of this study can provide enlightenment for improving corporate governance structure, promoting corporate green innovation and achieving high-quality development.

1. Introduction

To address global issues such as massive greenhouse gas emissions, frequent climate extremes, increasing environmental risks, and energy and resource constraints, China has put forward the vision of a community with a shared future for mankind, followed the new development vision of innovative, coordinated, green, open and shared development, and advocated comprehensive green transformation of economic and social development. The G20 once again stressed the need to strengthen legal and policy guarantees for green development, develop green finance, and support green technological innovation. Capital is an important element of enterprise green innovation. In general, enterprises strengthen financial leasing can promote enterprise green innovation. This paper takes listed companies' green innovation patents as the main research body to discuss the impact of corporate financial leasing on green innovation.

2. Sample and Data

2.1. Study sample and data source

This paper takes the application and acquisition of green patents of Group companies from 2007 to 2019 as samples, combined with financial leasing data and other relevant financial data during this period. The data sources are as follows: (1) The data of green patent application and acquisition are from China Research Data Service Platform (CNRDS). After excluding enterprises with missing patent data, 870,436 sample companies were obtained. (2) Data related to financial leasing are

collected manually. (3) Other financial data are from CSMAR database. Using the fixed effects model, the data processing and analysis in this paper were completed by stata16.

2.2. Variable selection and interpretation

(1) Explained variable: number of green patent applications (ln_grein2). Referring to the existing research results [1], two indicators are adopted to measure: (1) the natural logarithm of the total number of green patents applied by the enterprise in the current year; (2) the natural logarithm of the total number of green patents authorized by the enterprise in the current year. Among them, green patent includes green invention patent and green utility model patent.

(2) Explanatory variable: finance lease. If the enterprise has financial lease in the current year, the value is 1, and the value is 0 without financial lease.

(3) Control variables. The following variables are controlled :① logarithm of asset size (lna); ② ROA (roa1); ③ Sales revenue growth rate (salesgrowratio); (4) Tobin's Q value (tobinq); ⑤ Leverage ratio (leverage); ⑥ Cash ratio (cashratio).

3. Empirical results and analysis

3.1. Descriptive statistical analysis

Table 1 shows the descriptive statistics of the main variables. The mean value of explained variable green patent applications (In grein2) was 0.4975 respectively, which was similar to the research conclusions of Xu Jia and Cui Jingbo. The mean value of lease dummy is 0.059, indicating that 5.9% of sample enterprises have green patents. The average value of the asset size pair of green patents is 21.9612, indicating that the average value of the asset size pair of green patents in the whole sample is 21.9612. The descriptive statistical results of each control variable are consistent with the results of previous studies[2].

Table 1: Descriptive statistics of variables

variable	N	mean	sd	min	p50	max
ln_grein2	16500	0.4975	0.9189	0.0000	0.0000	7.2313
lease_dummy	17000	0.0590	0.2356	0.0000	0.0000	1.0000
roa1	17000	0.0359	0.0584	-0.2243	0.0337	0.2001
salesgrowratio	16500	0.2021	0.5110	-0.6002	0.1208	3.6067
tobinq	16800	2.0512	1.7242	0.2374	1.5613	10.4157
leverage	17000	0.4771	0.2133	0.0569	0.4838	0.9886
cashratio	17000	0.1733	0.1233	0.0103	0.1403	0.6044

3.2. Test of correlation coefficient

Table 2: Panel data

	ln_grein2	lease_dummy	lna	roa1	salesgrowratio	tobinq	leverage
ln_grein2	1.0000						
lease_dummy	0.0936	1.0000					
lna	0.3873	0.1729	1.0000				
roa1	0.0547	-0.0701	0.0372	1.0000			
salesgrowratio	0.0189	0.0125	0.0595	0.1998	1.0000		
tobinq	-0.0667	-0.0900	-0.4358	0.2033	0.0618	1.0000	
leverage	0.0428	0.1481	0.3899	-0.4052	0.0424	-0.3398	1.0000
cashratio	-0.0006	-0.0951	-0.1721	0.2724	0.0097	0.1838	-0.3945

Table 2 shows the test results of correlation coefficient, which prove that finance lease is correlated with green innovation, and finance lease has a positive correlation with green innovation.

3.3. Regression result

The core interpretation of the regression changes to lease dummy, meaning that if the enterprise obtains funds through finance lease in the current year, the value is 1; otherwise, the value is 0. It can be seen from Table 3 that the coefficient of core explanatory variable is 0.1071, which is significant at the 1% level and positive. This shows that financial leasing promotes enterprises to carry out green financial innovation.

The coefficient of asset size of the control variable is 0.3602, which is significant at 1% level and positive. This shows that the larger the asset scale of the enterprise, the more green finance innovation.

The ROA coefficient of the control variable is 0.3206, which is significant at the 1% level and positive. It means that the higher the return on assets, the more green finance innovation.

It can be seen from the table that the growth rate of sales revenue, Tobin's Q value, leverage ratio and cash ratio are all significant at the 1% level, and the coefficient is positive. This indicates that the higher the growth rate of the enterprise's sales revenue, the asset replacement cost ratio of the stock market value, the equity capital ratio and the cash ratio, the more green finance innovation of the enterprise.

Table 3: Regression results

	(1)
VARIABLES	ln_grein2
lease_dummy	0.1071***
	(3.5546)
lna	0.3602***
	(20.1958)
roa1	-0.3206***
	(-2.7122)
salesgrowratio	-0.0364***
	(-3.7405)
tobinq	0.0372***
	(8.3458)
leverage	-0.2843***
	(-3.7364)
cashratio	-0.2772***
	(-3.7927)
Constant	-7.3013***
	(-18.6232)
Observations	15,963
Number of company_id	2,178
R-squared	0.1469

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4. Conclusions

4.1. Main Conclusions

Based on the green patent application and acquisition data of group companies from 2007 to 2019, combined with manually collected financial leasing data and relevant financial data from CSMAR, this paper empirically tests the impact of corporate financial leasing on corporate green innovation level. From 2007 to 2019, the financing scale of listed companies gradually increased[3]. This paper verifies the significant impact of financial leasing on enterprises' green innovation through empirical analysis. The larger the enterprise financing scale, the higher the return on assets, the higher the total number of green patent applications and the total number of green innovation output.

4.2. Economic Implications

For enterprises, green innovation is the source of improving the core competitiveness of enterprises, but at the same time, enterprises are faced with financing constraints. From 1991 to 2021, the scale of financial leasing of listed companies gradually expanded, but overall, there is still a huge room for growth in the future. In response to the national call for green finance innovation, enterprises can continue to expand the scale of financial leasing to increase the application of green patents. The lower the financing cost, the higher the use efficiency of funds, the higher the financing efficiency of enterprises, and the higher the output and efficiency of green innovation of enterprises. Based on this, this paper puts forward the following three suggestions.

(1) Listed enterprises should reasonably choose financing channels, allocate financing structure according to the company's own conditions, and find a balance between expanding financing scale and reducing financing costs that is suitable for their own development[4];

(2) Enterprises can improve the financing efficiency by improving the use efficiency of funds, thus increasing the output of green innovation and improving the efficiency of green innovation. Enterprises should strictly manage the outflow direction of capital, guide the capital to flow to business activities with high value and great potential, and control the waste caused in the flow process.

(3) For enterprises, improving their credit rating can help them obtain more financing at a lower cost in the credit market and stock market; For state-owned enterprises, managers need to improve their awareness of risk and return, change their overly conservative investment preferences, avoid large amount of redundant capital, and make green innovation the pillar of sustainable development of state-owned enterprises.

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