Economic Policy Uncertainty and Corporate Green Innovation

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Abstract: This paper mainly discusses how economic policy uncertainty affects enterprise green innovation. This paper uses the data of China's A-share listed companies from 2010 to 2021 for empirical research. The results show that economic policy uncertainty positively affects green innovation. In addition, the relationship between economic policy uncertainty and green innovation activities is influenced by ownership concentration. Combined with the theoretical analysis and empirical research, this paper puts forward relevant policy suggestions from the two levels of government and enterprise respectively. On the one hand, the government should introduce policies to encourage enterprises to make green innovations. On the other hand, enterprises should also actively respond to the challenges brought by uncertainty.

1. Introduction

Economic policy uncertainty refers to the inability of economic agents to predict with certainty whether, when, and how the government will change current economic policies[1] .Since the global financial crisis in 2008, the Chinese government has adopted a series of policies to promote economic growth and avoid a severe economic recession. Although these policies have eased the plight of economic recession to a certain extent, they have increased the uncertainty of economic policies in our country.

With the continuous deepening of reform, the national economy has developed rapidly. However, the disadvantages of the traditional extensive and quantitative economic growth mode are increasingly apparent, and China's economic development has entered a bottleneck period. In order to achieve high-quality development of China's economy, it is necessary to transform to intensification and quality. Therefore, it is of great significance to study the impact of economic policy uncertainty on enterprises' green innovation activities. The degree of ownership concentration has an important influence on the relationship between the two. Based on the above problems, this paper studies the relationship between economic policy uncertainty and corporate green innovation, as well as the moderating effect of ownership concentration on both.

2. Literature Review

Domestic and foreign scholars have conducted research on relevant contents. Some scholars have found that environmental policy uncertainty can promote green innovation[2] by increasing enterprises' investment in environmental protection, and can also influence the environmental protection experience of enterprise managers, and then influence the environmental protection investment behavior of enterprise managers to stimulate green innovation. From the perspective of government official replacement, some scholars believe that policy discontinuity caused by the change of local officials will inhibit enterprises' green innovation, while some scholars take a new approach to measure policy uncertainty by the stability of local government personnel, and believe that policy uncertainty will affect enterprises' strategic plans and thus affect green innovation. In addition, the uncertainty caused by government regulation can effectively solve the problem of information disclosure and increase the willingness of enterprises to make green innovation.

Based on previous studies, although some studies have paid attention to the relationship between policy uncertainty and green innovation, few have taken ownership concentration as a standard to analyze its regulatory effect. Therefore, based on the consideration of the particularity of green innovation, the literature that puts economic policy uncertainty and green innovation in the same research framework needs to be expanded.

3. Theoretical analysis and research hypothesis

3.1 Economic policy uncertainty and green innovation

Economic policy uncertainty may affect future profit returns[3] by causing uncertainty in the future price of products. Therefore, as market players with strong adaptability to the environment, enterprises are more inclined to actively carry out green innovation activities under the incentive of greater change in the potential income of green innovation and possible increase in the total income. Moreover, the uncertainty of economic policy will strengthen the management's expectation of enterprise development opportunities and enhance the enterprise's risk bearing ability. When enterprises weigh whether to carry out green innovation, they ignore the financial cost of green innovation failure, pay more attention to the "unlimited benefits "brought by the success of green innovation, and actively pursue high risks. In addition, when the leading strategy is better than the waiting and abandoning the strategy, the economic policy uncertainty will prompt enterprises to implement the investment plan as soon as possible[4].According to the above analysis, economic policy uncertainty may also promote corporate green innovation through channels such as increasing profit volatility, enhancing risk bearing capacity and seizing leading advantages. Based on this, this paper proposes hypotheses 1.

H1: Economic policy uncertainty promotes corporate green innovation.

3.2 Economic policy uncertainty and green innovation

Ownership concentration is an important quantitative indicator of ownership structure, which determines the quality of supervision and the ownership of actual control rights of enterprises. When the uncertainty of economic policy is high, the future profit return fluctuates greatly. The profits that a successful green innovation technology can bring to an enterprise are huge. Minority shareholders are more likely to be short-term investors and pay more attention to the short-term profits of enterprises, which is contrary to the long output cycle of green innovation. Compared with minority shareholders, major shareholders closely related to corporate interests are more likely to ignore the financial cost of green innovation failure and pay more attention to the "unlimited

benefits" brought by the success of green innovation, thus promoting corporate green innovation. Based on the above analysis, this paper proposes the following hypothesis 2:

H2: Ownership concentration plays a positive moderating role between economic policy uncertainty and corporate green innovation.

4. Research Design

4.1 Sample selection and data sources

All the listed companies in Shanghai and Shenzhen A-share markets from 2010 to 2021 are selected for this paper. The company financial data in this paper are mainly from the National Tai'an Database (CSMAR),and the China Economic Policy Uncertainty Index is from the official website of the Economic Policy Uncertainty Index. The data of green patents are from China Research Data Service Platform (CNRDS). And after excluding the samples with PT, ST, financial industry and key variable data missing seriously, the final result is 3,271 companies, with a total sample size of 18,542. Data were processed by Excel2010 and Stata15.0.

4.2 Definition and measurement of variables

4.2.1 Interpreted variables

In this paper, the number of authorized green patents of sample enterprises is selected, and the logarithm of the number of authorized patents plus 1 is taken to measure enterprise green innovation (GPAT).

4.2.2 Explanatory variables

Economic Policy Uncertainty (Epu), as measured by the China Economic Policy Uncertainty Index created by Baker etal[5].

4.2.3 Adjustment variables

The degree of ownership concentration (Top1) refers to the practice of previous studies, and uses the proportion of the largest shareholder to measure the degree of ownership concentration.

4.2.4 Control variables

This paper selects enterprise Size (Size), net profit rate on total assets (ROA), accounts receivable ratio (REC), nature of controller (Soe), TobinQ (TobinQ), company establishment age (FirmAge), Growth rate of operating income, total assets turnover(ATO), and institutional investor shareholding ratio(INST), GDP Growth rates by province, and controlled for year and industry.

4.3 Regression model

Considering that green innovation activities have high risks and uncertainties, it takes a certain amount of time for enterprises to make innovation decisions and harvest innovation outputs, so there maybe a certain delay incorporate green innovation.In this paper,the number of green patents granted in phase t+1 is selected to measure green innovation.In order to control the influence of missing characteristic variables on the regression results, this paper adopts the fixed firm effect model to represent the individual firms.To test hypothesis, this paper constructs a model(1):

$$GPAT_{t+1}=\beta_0+\beta_1 Epu_t+Control+\gamma+\varepsilon \qquad (1)$$

In order to prove hypothesis 2, the adjustment variable of ownership concentration is added to model 2, and model (2) is established:

$$GPAT_{t+1}=\beta_0+\beta_1 Epu_t+\beta_2 Top1_t+\beta_3 Top1_t*EPU_t+Control+\gamma+\varepsilon \qquad (2)$$

5. Empirical results and analysis

In Table 1, the first column estimated coefficient of Epu is 0.0916, which is significant at the level of 1% (t=3.41), indicating that the coefficients of economic policy uncertainty index (Epu) are positive and have a statistical significance level of 1%, indicating that the increase of economic policy uncertainty will prompt enterprises to increase the level of green innovation. It is consistent with the conclusion of hypothesis 1 in this paper.

In the second column, the regression results with the addition of the regulating variable equity concentration are shown. The regression coefficient between the cross term Epu*Top1 and GPAT is 0.0474, which is significant at 5% (t=2.7), indicating that economic policy uncertainty has a more significant promoting effect on green innovation in enterprises with high ownership concentration. This is consistent with the conclusion of hypothesis 2.

Table 1: Regression result.

	GPAT	
Epu	0.0916***	0.0941***
	(3.41)	(3.50)
Top1		0.0112
		(0.10)
Top1*Epu		0.0474**
		(2.70)
Size	0.216***	0.217***
	(12.71)	(12.79)
ROA	-0.242*	-0.261**
	(-2.48)	(-2.66)
REC	0.246	0.249
	(1.86)	(1.88)
SOE	0.0423	0.0490
	(0.90)	(1.04)
TobinQ	0.00799	0.00775
	(1.41)	(1.37)
FirmAge	0.248*	0.237*
	(2.52)	(2.39)
INST	-0.0936*	-0.106**
	(-2.31)	(-2.61)
ATO	-0.0706**	-0.0668*
	(-2.63)	(-2.49)
Growth	-0.00695**	-0.00701**
	(-3.20)	(-3.22)
GDP Growth	0.198	0.176
	(0.41)	(0.36)
_cons	-5.780***	-5.772***
	(-10.17)	(-10.05)
Year	Yes	Yes
Industry	Yes	Yes
N	14311	14311
R^2	0.2202	0.2210

6. Robustness test

In order to make the conclusion of this paper more reasonable, this paper uses replacement main variables and the uncertainty of economic policy in the United States as the tool variable to conduct robustness test. The results are consistent with the above results, indicating that the model design is reasonable.

7. Conclusions and Suggestions

Based on the above research conclusions, this paper puts forward the following suggestions: First, the government should give full play to the guiding effect of economic policies. The government should formulate economic policies that are conducive to green innovation by enterprises, and give full play to its policy advantages while maintaining its development focus. Second, the government should encourage and support enterprises to carry out green innovation. The survival and development of enterprises should carry out the road of innovation, pay attention to cultivating green innovation concept, improving green innovation literacy and forging green innovation ability. Third, we should actively respond to challenges brought about by uncertainties. Enterprises must seize the opportunities contained in uncertainty, take advantage of the trend to accelerate green innovation.

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