

Can Environmental Subsidies Promote the Green Investment of Enterprises?

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Abstract

This article mainly studies the impact of environmental subsidies on enterprises' green investment from a micro level, and the relationship between the two when the industry attributes and local government environmental preferences are different. Empirical analysis shows that environmental subsidies have a significant role in promoting green investments of enterprises; industry attributes and local government environmental preferences can significantly affect the role of environmental subsidies in promoting green investments of enterprises: compared with non-heavily polluting industries, the promotion of environmental protection subsidies on enterprises' green investment is more obvious in heavily polluting industries; compared with the regions with lower local government environmental preferences, the promotion effect of environmental subsidies on enterprises' green investment is more significant in the regions with higher local government environmental preferences. The research conclusions of this paper not only enrich the research content of influencing factors of enterprises' green investment, but also provide theoretical basis and practical guidance for the government to improve the efficiency of the use of environmental subsidy funds and promote the greening process.

Keywords

Environmental Subsidies, Enterprises' Green Investment, Industry Attributes, Local Government Environmental Preferences

1. Introduction

After the reform and opening up, China has created a miracle of rapid economic growth for more than 30 years and has become the second largest economy in the world. At the same time, the extensive mode of economic development has caused great harm to the ecological environment. Air pollution and water pollu-

tion incidents keep cropping up. A series of environmental hazards are warning people: If we want to achieve long-term stable economic development and improve the quality of people's lives, we must work hard to improve the ecological environment, or we will pay a higher price. At the 14th meeting of the central leading group for comprehensively deepening reform, general secretary Xi Jinping stated: China's development has reached the stage of accelerating the construction of ecological civilization; ecological civilization construction is the inevitable requirement of accelerating the transformation of economic development mode and realizing green development. The 13th five-year plan for the ecological environment lists the environment as a binding target for the first time. At the same time, the report to the 19th national congress of the communist party of China (CPC) highlighted the importance of promoting ecological progress, calling for adhering to the basic state policy of conserving resources and protecting the environment, promoting green development, focusing on solving prominent environmental problems, strengthening ecosystem protection, and reforming ecological and environmental supervision mechanisms. Environmental problems have become the focus of public concern.

At present, China's environmental situation is still quite grim. According to the 2018 Global Energy and Carbon Dioxide Report released by the International Energy Agency, global carbon dioxide emissions increased by 1.7% in 2018, setting a new record; of that, China's carbon dioxide emissions rose about 2.5 percent, the largest increase since 2013. In this context, "hard projects" and "hard inputs" are crucial to the overall improvement of China's ecological and environmental quality, and the country attaches great importance to financial support to solve environmental problems. In 2004, the environmental protection law explicitly mentioned the word "finance" for the first time, indicating the government's determination to use fiscal means to improve the environment; in 2007, the government added a new item, "energy conservation and environmental protection expenditure", to separate out spending on environmental protection, further highlighting the government's commitment to environmental protection. However, the burden of environmental governance cannot rest solely with the government. Since industrial pollution is the main source of environmental pollution, the final effect of environmental governance still depends on the green investment of enterprises, so specific actions of environmental governance must be implemented in every enterprise, especially private enterprises—private enterprises are an important force to promote the development of socialist market economy. Compared with state-owned enterprises, it has the characteristics of flexible mechanism, rapid decision-making, strong market adaptability and advanced technology. It will have a positive and far-reaching impact on China's ecological environment governance and economic green transformation by actively participating in the battle of pollution prevention and control and increasing investment to achieve green development.

However, due to the nature of public goods and external characteristics of environmental pollution, the pursuit of profit maximization of "economic man"

and the financing difficulties of private enterprises, private enterprises often have great or small inertia in environmental governance. The overall green investment level of China's private enterprises is relatively low, which requires the government to intervene in the operation of private enterprises through "visible hand", correcting the negative externalities of environmental pollution [1]. In order to effectively solve the environmental governance problems of enterprises and give full play to the guiding role of fiscal expenditure on environmental protection in enterprises' green investment, the government promulgated the accounting standards for enterprises no. 16-government subsidies on February 15, 2006. The guidelines clearly state that the government should provide subsidies to enterprises' environmental protection activities and encourage and support enterprises' environmental governance activities and environmental protection production methods. However, it is not clear whether the large amount of environmental subsidies have played an incentive role in the green investment of private enterprises. Overall, the quality of the environment appears to have improved with government funding. However, some problems of environmental subsidies cannot be ignored: Enterprises such as Zhuzhi Group have been deceiving financial subsidies under the name of energy conservation and environmental protection in the "dangerous times"; Eighty percent of coal-fired power plants enjoy environmental subsidies while still polluting illegally.

In addition, the implementation process of environmental protection subsidy policy is faced with differences in industry attributes and environmental preference degree of local governments, which may lead to heterogeneity in its green governance effect: On the one hand, as the main manufacturer of environmental pollution, the heavy pollution industry has always been the target of national key rectification. The environmental and industrial regulations faced are significantly different from those of non-heavy pollution industries. Guided by the environmental subsidy policy, its green investment behavior may differ from non-heavily polluting industries; on the other hand, the effective implementation of good environmental policies is closely related to the environmental preferences of local governments (the degree to which local governments attach importance to environmental quality in the performance evaluation) in the context of China's "GDP as hero" political promotion championship. As the distributor of environmental subsidy and the controller of environmental problems, the government's environmental preference may affect the implementation effect of environmental subsidy policies. Therefore, this paper will further investigate how the promotion effect of environmental protection subsidy on enterprises' green investment varies among different industry attributes and different local governments' environmental preferences.

Based on the above background, this paper selects all private a-share listed companies in China from 2011 to 2017 as research objects, and attempts to answer the following questions through a series of empirical studies: as one of the important ways for the government to intervene in the environmental protection activities of enterprises, does environmental protection subsidy really play a pos-

itive role in the green investment of private enterprises? Does the difference in industry attributes and local government's environmental preferences affect the promotion of environmental subsidies on private enterprises' green investment? In-depth research on the above issues will help environmental subsidy policies effectively play their role in green governance of private enterprises, promote the green development of China's private enterprises, and provide theoretical basis and practical guidance for the green process of China's economic development.

2. Theoretical Basis and Research Hypothesis

2.1. The Influence of Environmental Subsidies on Enterprises' Green Investment

According to the theory of market economy, the effective allocation of resources and the efficient operation of economy can be realized by taking the market as the basic tool of resource allocation for various economic activities. However, according to the market failure theory, the governance effect of the market mechanism on the environment is often ineffective due to the externalities of the environment and the properties of public goods, and companies often choose "economic benefit" over "environmental benefit". Therefore, the government's "visible hand" is needed to solve the market failure problem in the process of environmental governance. Environmental protection subsidy is an incentive measure taken by the government to solve the problem of market failure in environmental governance. This paper argues that in the context of the new normal of economic development, the impact mechanism of environmental protection subsidy on green investment of private enterprises includes direct resource acquisition, indirect resource dependence and signal transmission.

Firstly, according to the resource-based view, environmental protection subsidy can act on the green investment behavior of private enterprises through the direct green investment resource supplement mechanism. Resource issues are often the biggest obstacle for private enterprises to make green investments. On the one hand, enterprises need a large amount of investment in environmental protection technology research and development or direct purchase of relevant technology or equipment, which will increase the economic burden of enterprises; on the other hand, since green investment is mostly non-economic investment, although it can help reduce the burden of environmental taxes and penalties, it cannot bring direct cash inflows to enterprises, and it is difficult to make up the corresponding costs. In addition, enterprises often need to invest a lot of energy in environmental governance, which is of high risk. As a result, private enterprises tend to do nothing or only invest less in environmental governance in order to avoid the risk of green investment [2]. And environmental subsidies to the enterprise brought the direct cash inflow, can ease the problem of insufficient funds of private enterprises, directly reduce the cost and risk of private enterprises green investment, reduce the costs and benefits of green gap and improve the private enterprise's risk bearing capacity, can greatly encourage private enterprises green investment motives.

Secondly, starting from the theory of resource dependence, enterprises are interdependent with the surrounding social environment and need to obtain resources in the social environment to survive. In China, the government plays an important role in the enterprise competition environment and plays an important role in the distribution of economic factors [3], controlling the many resources (policy, financial support, etc.) needed for the survival of the enterprise, and companies rely on government for resources. Therefore, for private enterprises that do not have a natural “blood relationship” with the government, in order to continue to obtain the necessary resources from the government and maintain a good relationship with the government, they will actively respond to government policies and comply with government guidelines. Environmental subsidies are the resources that private enterprises receive from the government, and at the same time convey the government’s expectations for the green development of private enterprises. In order to meet the needs of the government, private enterprises will make full use of environmental subsidy resources and increase green investment expenditure.

Finally, from the theory of signal transmission, the role of environmental protection subsidies is to reduce the problem of information asymmetry between private enterprises and external investors, and to reduce the problem of insufficient capital allocation efficiency. Obtaining environmental protection subsidies can effectively convey information to the outside: companies are undertaking environmental protection construction, achieving green development, and improving environmental performance efforts have been recognized and supported by the government, thereby conveying the company’s concept of green development to society. In addition, according to previous research, investors and creditors are environmentally oriented [4] [5]. Therefore, the green signal transmission effect of environmental protection subsidies can help private enterprises to win more attention and financial support from investors and creditors, thereby obtaining more external financing and green investment resources, and reducing the financial constraints of private enterprises.

In summary, under the effective incentive of environmental protection subsidies, the enthusiasm of environmental governance of private enterprises has greatly increased. In order to achieve their own sustainable development, enterprises will seize opportunities, increase environmental protection efforts, and increase their expenditure on environmental governance. Therefore, the first research hypothesis in this paper can be proposed:

H1: Environmental subsidies can significantly promote enterprises’ green investment.

2.2. The Moderating Role of Industry Attributes

The industry environment plays an important role in determining corporate strategic decisions, and investment decisions and behaviors of enterprises will inevitably be affected by the industry environment and industry characteristics [6]. There are large differences in environmental issues between heavily pollut-

ing industries and non-heavily polluting industries. In recent years, with the increasingly prominent problems of environmental pollution and ecological damage, the Ministry of Environmental Protection has successively issued the “Notice on Further Regulating the Application of Listing or Refinancing Environmental Protection Verification of Production and Operation Companies in Heavy Pollution Industries”, “Notice of Application Documents for Operating Company IPO”, etc. Environmental policy documents to strengthen the environmental protection inspection of listed companies in heavily polluted industries. In addition, the Ministry of Environmental Protection issued the “Guidelines for Environmental Information Disclosure of Listed Companies” to improve the level of environmental information disclosure of companies in heavily polluting industries. Subsequently, the Shenzhen Stock Exchange and the Shanghai Stock Exchange also issued the “Guidelines for Social Responsibility of Listed Companies on the Shenzhen Stock Exchange” and “Guidelines on Environmental Information Disclosure of Listed Companies on the Shanghai Stock Exchange” to guide listed companies to actively fulfill their environmental responsibilities. As the main source of environmental pollution, the production and operation activities of listed companies in heavily polluting industries are obviously more regulated by environmental policies, and the final environmental governance effect is directly related to the core competitiveness of enterprises. Therefore, the government’s environmental protection subsidies are more likely to stimulate the enthusiasm of the enterprises in the heavily polluting industries for environmental governance, give play to the role of green investment, and drive the increase of the scale of green investment.

On the other hand, environmental information disclosure in heavily polluting industries is more regulated by the state. The Environmental Information Disclosure Guide for Listed Companies clearly stipulates that listed companies in heavily polluting industries should regularly disclose environmental information, publish annual environmental reports, and disclose detailed information on pollution emissions, environmental compliance, and environmental management, which is conducive to the government to effectively monitor the use of funds and the construction of related environmental protection projects by listed companies after issuing environmental protection subsidies, reduce moral hazard, and then ensure that environmental protection policies effectively play a green guiding role.

In summary, compared with non-heavy polluting industries, the environmental governance effectiveness of enterprises in heavy polluting industries is more closely related to their own development, so that green investment needs are greater, and higher information disclosure can reduce the moral hazard when using environmental subsidies. Therefore, the second hypothesis of this article can be proposed:

H2: Compared with non-heavy polluting industries, the promotion effect of environmental subsidies on enterprises’ green investment is more significant in heavily polluting industries.

2.3. The Moderating Role of Local Governments' Environmental Preferences

Political centralization and fiscal decentralization are the characteristics of China's governance system today. Starting with the tax-sharing reform in 1994, local governments have been gradually given greater discretion in fiscal expenditures, which is conducive to ensuring the autonomy, flexibility, and efficiency of fiscal resource allocation [7]. At the same time, mastering the decisive right to the allocation of environmental subsidies has also given China's local governments or government officials a lot of manipulation opportunities in terms of the size and specific destination of environmental subsidy funds. In this case, government environmental preferences will play a crucial role in the efficient use of environmental subsidy funds. This paper argues that the impact of local government environmental preferences on the relationship between environmental protection subsidies and corporate green investment is mainly realized through the allocation of funds before and after the use of funds.

First, local government environmental preferences can optimize the allocation efficiency of environmental subsidy funds. "Famo is more than human", Chinese society is a typical "human society", and the concept of human relationships has been ingrained since ancient times. Enterprises often obtain benefits by "renting" from the government. However, such rent-seeking activities often cause mismatches in resources and even run counter to the original purpose of financial subsidies [8]. Yu Mingguai *et al.* (2010) found that establishing political ties with local governments can help enterprises obtain more financial subsidies, but the financial subsidies obtained through political rent-seeking are not efficient [9]. The government subsidy enjoyed by private enterprises through political rent-seeking is a kind of non-productive rent-seeking behavior. This kind of subsidy will not only help to improve the economic performance of the enterprise, but will also harm social interests. Government environmental protection subsidies are scarce resources. If companies obtain subsidy resources by seeking rent from the government, they may cause the misallocation of environmental subsidy funds, so that enterprises with real subsidy needs will not receive the state's financial support. However, the occurrence of rent-seeking activities is not only related to the profit-seeking characteristics of enterprises, but also reflects the corrupt behavior of local governments. If the local government has a higher environmental preference, it will take the allocation of environmental subsidies more seriously, carefully check the company's environmental funding needs, reduce corruption, prevent subsidy funds from being captured by rent-seeking activities, and promote the maximum use of environmental subsidy funds.

Second, local government environmental preferences can optimize the subsequent use of environmental subsidy funds. Although subsidies are a good measure for the government to achieve both political and economic purposes, the lack of supervision can easily lead to misappropriation or waste of resources by

enterprises [10]. In order to mitigate the moral hazard of using environmental subsidy funds, the supervision mechanism after subsidy is particularly important—a conscious far-sighted government will attach great importance to environmental governance, increase the implementation of environmental economic policies, optimize all aspects of environmental governance, and strictly monitor the use of environmental subsidy funds by enterprises, which will help environmental protection subsidy funds maximize the role of green governance and reduce waste of funds.

In summary, the third hypothesis of this article can be proposed:

H3: Compared with regions with lower local government environmental preferences, the effect of environmental subsidies on enterprises' green investment is more significant in regions with higher local government environmental preferences.

3. Model Setting and Data Processing

3.1. Research Variables and Economic Models

In order to test the three hypotheses proposed in this paper, according to relevant literature [11] [12], we added green investment variables, environmental protection subsidy variables and other control variables, then constructed the following model to investigate the impact of environmental protection subsidies on enterprises' green investment. The details are as follows:

$$GI = \beta_0 + \beta_1 \sum \text{Subsidy} + \sum \text{Controls} + \sum \text{Industry} + \sum \text{Year} + \varepsilon$$

Among them, the explained variable GI is an index to measure the green investment of enterprises. Based on the information about construction in progress and important construction in progress disclosed by CSMAR database, this article first uses the “keyword search” method to sort out construction-related construction projects related to environmental protection, and then manually sorts to ensure the accuracy of the screening results. The screening results mainly include projects under construction that include “energy saving”, “environmental protection”, and “emission reduction” that reflect the role of environmental governance. The amount of new projects under construction in that year is the green investment of the enterprise.

Table 1 shows the meaning of the variables.

3.2. Data Collection and Descriptive Statistics

This article selects A-share listed companies in Shanghai and Shenzhen from 2011 to 2017 as initial samples, and processes the samples according to the following methods: exclude companies whose transaction status is ST in the current year; exclude financial and environmental listed companies; eliminate missing samples of relevant data; exclude samples of abnormal financial data for the year; given the state-owned listed companies themselves take on more social responsibility, the green investment by the state policy and social goal is bigger,

the influence of the private enterprises as an important part of market economy, the flexible mechanism, advanced technology, is very important to fight pollution prevention and control of tough, so, this paper studies the private listed companies only (If the ultimate controller is a natural person, it is defined as a private listed company). After the above screening, a total of 2917 companies-annual samples were obtained. In order to control the influence of outliers, this paper performs Winsorize shrinking processing of 1% for all continuous variables.

The financial data of this article are mainly from the CSMAR database and the WIND database. The sewage charge data and regional GDP data of each region are collected and compiled from statistical yearbooks such as China Environmental Yearbook and China Financial Yearbook. The data processing tools in this paper mainly include Stata and Excel.

Table 1. Research variables.

Variable	Code	Definition
Green investment	GI	Divide the environmental-related capital expenditure of the enterprise under construction by the year-end total assets, then multiply by 100
Environmental subsidies	Subsidy	Divide government grants related to environmental protection by year-end total assets and multiply by 100
Industry attributes	Pollution	Dummy variable. If the industry the company belongs to is a heavily polluting industry, the value is 1; otherwise, the value is 0
Local government environmental preferences	EP	Local sewage charge income divided by local GDP, then multiplied by 100
Company Size	Size	Natural logarithm of total assets at the end of the year
Agency cost	Cost	Overhead rate, overhead divided by operating income
Investment Opportunities	Opportunity	Annual Tobin Q
Operating cash flow	Ocf	Net cash flow from operating activities divided by total assets at the end of the year
Cash holdings	Cash	Monetary funds held at the end of the year divided by total assets at the end of the year
Growth	Growth	(Current operating income-last year's operating income)/Last year's operating income
Shareholding ratio of independent directors	Independent	Number of independent directors/number of directors
Regional environmental supervision	Law	The natural logarithm of the number of environment-related laws and regulations at the provincial level
Regional environmental governance investment	Invest	The natural logarithm of the total investment in environmental pollution control at the provincial level
Regional development level	Zone	In the eastern region, it is 2; in the central region, it is 1; and in the western region, it is 0

Table 2 gives descriptive statistical characteristics of the explained, explanatory, and control variables. The average value of green investment (GI) is 0.078, that is, the green investment expenditure of private enterprises accounts for about 0.08% of the total assets of the enterprise. In addition, the minimum value, the first quartile, the median, and the third quartile are all 0, which indicates that the overall private investment consciousness of private enterprises is not strong and that less than a quarter of private enterprises have made green investments. The standard deviation of environmental subsidies (Subsidy) is 0.083, and the average value is 0.032, indicating that the amount of environmental subsidies received by different private enterprises varies greatly; the minimum value is 0, the median value is 0.006, and the maximum value is 0.562, which indicates that most of the sample companies received less subsidies.

4. Empirical Analysis and Robust Test

4.1. Environmental Subsidies and Enterprises' Green Investment

In order to examine the relationship between environmental protection subsidies and enterprises' green investment, this paper conducts regression tests on the model, and the results are shown in **Table 3**. In column (1), no control variable is added, and the regression coefficient of enterprises' green investment (GI) on environmental subsidies (Subsidy) is 1.272, which is significant at the level of 1%. In column (2), only some influencing factors at the company level are controlled, such as company size, agency cost, investment opportunity, operating cash flow, cash holding, etc. The results show that the estimated coefficient of environmental protection subsidy (Subsidy) is 1.232, which is still significant at the level of 1%. In column (3), some regional-level influencing factors such as the intensity of regional environmental supervision (Law), regional environmental governance investment (Invest), and regional marketization level (Zone) are further added to the control variables. And the estimated coefficient of environmental subsidies is 1.134, which is still significant at the level of 1%. To sum up, after controlling the influencing factors at the company level and the regional level, the environmental protection subsidy has a significantly positive correlation with the green investment of private enterprises. The enthusiasm of environmental governance of private enterprises after receiving environmental subsidies will increase, and there will be a larger scale of green investment. That is, environmental subsidies effectively play a role in promoting green investments by private enterprises, which validates the hypothesis 1 in this paper.

4.2. The Moderating Role of Industry Attributes

In order to examine whether the promotion effect of environmental subsidies on enterprises' green investment is different between heavily polluting industries and non-heavy polluting industries, this article divides the sample companies into two groups of samples and the results are shown in **Table 4**: Column (1)

lists the relationship between environmental protection subsidies (Subsidy) and private enterprises' green investments (GI) when the industry attribute is a heavily polluting industry. The value of the Subsidy's coefficient β_1 is 1.377, and it is significant at the level of 1%, indicating that when the industry attribute is a heavily polluting industry, the increase in environmental subsidies can significantly promote private enterprises to increase green investment. Column (2) lists the relationship between environmental subsidies (Subsidy) and private companies' green investments (GI) when the industry attribute is non-heavy polluting industries. The value of the Subsidy coefficient β_1 is 0.553, but it is not significant, that is, the environmental subsidy will not have a significant impact on the green investment of non-heavy polluting industries. The results of column (1) and column (2) show that compared with non-heavy polluting industries, the increase in environmental subsidies can significantly promote private enterprises to increase green investment in the heavily polluting industries, and the hypothesis 2 is verified. This may be because, compared with non-heavy polluting industries, the degree of greening of companies in heavy polluting industries is related to their core competitiveness, so that environmental subsidies can play a more incentive role. Moreover, more environmental information disclosure enables the government to effectively monitor its use of environmental subsidy funds, avoid waste of funds, and thereby enable environmental subsidies to be used efficiently.

Table 2. Descriptive statistics.

Variable	Sample	Mean	SD	P25	Median	P75	Min	Max
GI	2917	0.078	0.315	0	0	0	0	2.143
Subsidy	2917	0.032	0.083	0	0.006	0.022	0	0.562
Pollution	2917	0.417	0.493	0	0	1	0	1
EP	2917	0.024	0.014	0.015	0.022	0.029	0.002	0.076
Size	2917	21.931	0.957	21.233	21.84	22.525	20.123	24.648
Cost	2917	0.093	0.053	0.057	0.085	0.116	0.016	0.308
Opportunity	2917	2.26	1.547	1.201	1.855	2.844	0.329	8.851
Ocf	2917	0.049	0.065	0.011	0.048	0.089	-0.149	0.213
Cash	2917	0.169	0.111	0.09	0.137	0.221	0.019	0.55
Growth	2917	0.227	0.416	0.021	0.145	0.303	-0.374	2.727
Independent	2917	0.213	0.052	0.176	0.207	0.25	0.111	0.364
Law	2917	19.949	11.568	10	20	29	2	46
Invest	2917	5.872	0.636	5.475	5.903	6.436	3.603	6.859
Zone	2917	1.602	0.692	1	2	2	0	2

Table 3. Environmental subsidies and enterprises' green investment.

Variable	(1)	(2)	(3)
Subsidy	1.272*** (4.09)	1.232*** (3.97)	1.134*** (3.68)
Size		-0.0298 (-0.78)	-0.0401 (-1.05)
Cost		-3.187*** (-4.63)	-2.846*** (-4.15)
Opportunity		-0.0957*** (-3.40)	-0.0910*** (-3.24)
Ocf		0.863* (1.90)	0.870* (1.92)
Cash		-0.992*** (-3.32)	-1.002*** (-3.37)
Growth		-0.0421 (-0.61)	-0.0408 (-0.60)
Independent		-1.462** (-2.57)	-1.433** (-2.53)
Law			0.00309 (1.00)
Invest			0.192*** (3.53)
Area			-0.191*** (-3.95)
Constant	-0.961*** (-4.12)	0.481 (0.53)	-0.168 (-0.18)
Industry FEs	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
N	2917	2917	2917
Pseudo. R2	0.0225	0.0509	0.0583

Figures in parentheses indicate t-values. ***, **, * represent statistical significance at 1%, 5%, 10%, respectively (two-tail).

Table 4. The moderating effect of industry attributes and local government environmental preferences.

Variable	(1)	(2)	(3)	(4)
	Heavy pollution industries	Non-heavy polluting industries	Low local government environmental preferences	High local government environmental preference
Subsidy	1.377** (3.15)	0.553 (1.31)	0.628 (1.44)	1.547*** (3.41)
Size	-0.0129 (-0.24)	-0.108** (-2.02)	0.00884 (0.2)	-0.0728 (-1.11)
Cost	-2.826*** (-3.06)	-2.332** (-2.42)	-3.080*** (-3.64)	-1.47 (-1.30)
Opportunity	-0.0994** (-2.52)	-0.0637* (-1.67)	-0.0866*** (-2.65)	-0.0831 (-1.64)
Ocf	0.484 (0.78)	0.216 (0.34)	0.664 (1.22)	0.99 (1.33)
Cash	-0.636 (-1.59)	-0.769* (-1.86)	-1.200*** (-3.07)	-0.975** (-2.13)
Growth	0.0199 (0.21)	-0.0861 (-0.90)	-0.0841 (-1.04)	-0.0138 (-0.12)
Independent	-1.598** (-2.04)	-1.536* (-1.93)	-1.204* (-1.78)	-1.085 (-1.14)
Law	0.00286 (0.63)	0.00286 (0.72)	0.00568* (1.67)	-0.00137 (-0.18)
Invest	0.247*** (3.37)	-0.0003 (-0.00)	0.147* (1.87)	0.193* (1.87)
Area	-0.192*** (-3.02)	-0.0345 (-0.48)	-0.224*** (-3.60)	-0.133 (-1.62)
Constant	-0.925 (-0.67)	2.263* (1.72)	-1.014 (-0.87)	0.308 (-0.19)
Industry FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
N	1215	1702	1734	1183
Pseudo. R2	0.0481	0.0518	0.0804	0.0534

Figures in parentheses indicate t-values. ***, **, * represent statistical significance at 1%, 5%, 10%, respectively (two-tail).

4.3. The Moderating Role of Local Governments' Environmental Preferences

In order to examine whether the promotion effect of environmental subsidies on private enterprises' green investment is different between regions with lower local government environmental preferences and regions with higher local government environmental preferences, this paper divides the sample companies according to the local government's environmental preferences. For the two groups of samples with higher local government environmental preferences and lower local government environmental preferences, the models were regressed. The results are shown in **Table 4**. Column (3) lists the relationship between environmental subsidies (Subsidy) and private companies' green investments (GI) when local government environmental preferences are low. The value of the Subsidy coefficient β_1 is 0.628, but it is not significant, that is, when the local government's environmental preference is low, the environmental subsidy will not have a significant impact on the green investment of private enterprises. Column (4) lists the relationship between environmental subsidies (Subsidy) and private companies' green investments (GI) when local governments have a high degree of environmental preference. The value of the Subsidy coefficient β_1 is 1.547, and it is significant at the level of 1%, which indicates that when the local government has a high degree of environmental preference, the increase in environmental subsidies can significantly promote the private enterprises' great green investment. The results in columns (3) and (4) show that compared with regions with lower local government environmental preferences, the increase in environmental subsidies in regions with higher local government environmental preferences can significantly promote the growth of private enterprises' green investment, from which assumption 3 is verified. This may be because, compared with the lower local government's environmental preference, when the local government's environmental preference is higher, rent-seeking activities in the allocation of environmental subsidy funds will be reduced, and the problem of mismatched and inefficient use of environmental subsidy funds caused by information asymmetry can be alleviated, thereby improving the efficiency of the use of environmental subsidy funds.

4.4. Robust Test

Although the impact of environmental subsidies on enterprises' green investment has been empirically tested, the problems of self-selection, mutual causality, and missing variables may affect the accuracy of the results. Firstly, the probability and amount of an enterprise's environmental protection subsidies are not random, but are closely related to many factors such as the company's environmental governance effectiveness, green investment needs, and investment construction capabilities, so there will be self-selection issues. Secondly, there may be interaction between environmental subsidies and the green investment behavior of enterprises, that is, the green investment behavior of enterprises may affect the environmental subsidies they receive, so the causal relationship between the two

should be further explored. Finally, there are many factors affecting the green investment behavior of enterprises, and there may be missing variables. In order to eliminate the impact of the above problems on the results, this paper draws on the ideas of Lu Hongyou *et al.* (2019) and constructs two instrumental variables for environmental subsidies: the first instrumental variable is “average green investment by industry/average government environmental subsidy by industry”; the second instrumental variable is the lagging term for environmental subsidies [13]. Then IV-Tobit model was used for regression, and the research conclusions did not change substantially.

5. Conclusions and Suggestions

5.1. Conclusions

In order to change the mode of economic development and build a new environment-friendly society, the Chinese government has been committed to environmental governance and environmental investment in recent years. Every year, a large amount of money is distributed to enterprises as environmental subsidies to improve their environmental governance behavior. However, the overall improvement of environmental quality is not very obvious, the pollution level of production activities of enterprises is still at a high level, and environmental accidents occur from time to time. The effect of environmental subsidies on corporate environmental governance is worth studying. This article takes the listed companies of Chinese A-share private enterprises from 2011 to 2017 as the research object. Based on previous studies, it combines market failure theory, resource dependence theory, signal transmission theory, and the rent-seeking theory, and comprehensively uses the literature research method, qualitative research method, and empirical research method to thoroughly analyze the impact of government environmental subsidies on enterprises' green investment, and the difference of relationship between the two in different industry attributes and local government environmental preference. The following conclusions are mainly drawn.

First, there is a positive correlation between environmental protection subsidies and total green investment of enterprises. With the increase of environmental protection subsidies, the level of green investment of enterprises has also increased accordingly. Environmental protection subsidies have promoted the environmental governance of enterprises.

Second, the nature of the industry will affect the promotion of environmental protection subsidies to enterprises' green investment. Compared with non-heavily polluting industries, the promotion effect of environmental subsidies on enterprises' green investment is more significant in heavily polluting industries.

Third, the degree of local government's environmental preferences will affect the promotion of environmental protection subsidies to enterprises' green investment. Compared with the regions with lower local government environmental preferences, the promotion effect of environmental subsidies on enterprises'

green investment is more significant in the regions with higher local government environmental preferences.

5.2. Policy Suggestions

Based on the above research conclusions, we can see that the efficiency of the use of environmental subsidy funds is still at a low level, and there is still much room for improvement in improving the environment and the enthusiasm of corporate environmental governance. Based on this, this article proposes the following policy recommendations.

First, standardize the information disclosure system and improve the information transparency of enterprises. A key factor affecting the efficiency of the use of environmental subsidy funds is the reasonable allocation of funds, which is based on the government's full understanding of all aspects of the enterprise. At present, the quantity and quality of environmental information disclosure in China cannot meet the government's information needs. On the one hand, only heavily polluting companies have been subject to mandatory disclosure of environmental information, and there are not many companies that voluntarily disclose environmental information, resulting in relatively limited environmental information available to the government; on the other hand, companies lack a uniform standard for environmental information disclosure in social responsibility reports and sustainable development reports. As a result, a lot of "soft disclosure" and "selective disclosure" will appear, making the government unable to accurately judge the current situation of environmental pollution and governance of enterprises and the degree of demand for environmental protection funds, which seriously affects the rationality of the allocation of subsidy funds. Therefore, standardizing the information disclosure system of enterprises is of great significance for improving the efficiency of the use of environmental subsidy funds and advancing China's environmental governance process.

Second, implement differentiated environmental protection subsidies. According to the research conclusions of this article, industry attributes will affect the role of environmental subsidies in promoting green investments in enterprises: Compared with non-heavy polluting industries, the promotion of environmental protection subsidies on enterprises' green investment is more significant in heavily polluting industries. In addition, the environmental pollution problems of the heavily polluting industries are more prominent, and it is necessary to focus on motivating and guiding enterprises in the heavy polluting industries to actively assume the responsibility of environmental governance. Therefore, when allocating environmental protection subsidies, compared with non-heavy polluting industries, companies in heavy polluting industries should be given greater support and a wider range of environmental subsidy support, so as to improve the efficiency of the use of environmental subsidy funds.

Third, strengthen the environmental preferences of government departments. Local governments have direct control over the allocation of environmental subsidy funds, which has an important impact on the efficiency of subsidy funds. In

the past, in the development background that aimed at pursuing economic growth, the concept of “Economic growth over environmental quality” prevailed in local governments. As a result, the “rent-seeking activities” of enterprises and the low level of government environmental supervision may weaken the environmental governance effect of environmental subsidy funds, which are major obstacles in China’s environmental governance process. The state should conduct more environmental protection publicity and education, establish and improve environmental quality target responsibility mechanisms and evaluation and assessment mechanisms, strengthen the environmental protection responsibilities of relevant leading cadres, and then increase their environmental preferences, optimize the allocation of environmental protection resources, and prevent the waste of environmental subsidy resources. This will help environmental protection subsidies effectively play a role in promoting green investment in enterprises.

5.3. Research Limitations and Prospects

The research limitation of this paper is mainly that the measurement of enterprise green investment level is not accurate and comprehensive. Due to the lack of a clear environmental information disclosure system in China, the environmental protection investment and expenditure data standards disclosed by companies in social responsibility reports and sustainable development reports are different, lacking comparability, and the specific scope of green investment amounts disclosed by companies is vague. It may include both capitalized expenditure and expensed expenditure, or it may only refer to capitalized expenditure. Only a few companies have clearly disclosed the capitalized expenditures and expensed expenditures of green governance separately. Therefore, in the study of the impact of government environmental subsidies on enterprises’ green investment, this article only considers companies that clearly disclose the capitalization of green governance expenditures, and does not consider the expense of green governance expenditures. The environmental governance role of environmental subsidies may also be reflected in costly green governance expenditures. Therefore, if there is a better way to measure the level of green investment in the future, or if companies generally increase the level of disclosure of green investment data, the amount of green investment in the company can be better measured, and the research conclusion will be more reliable.

There is still room for further research on the use of environmental subsidy funds. The definition of the efficiency of the use of environmental protection subsidy funds in this article refers only to its environmental protection behavior—the promotion of green investment levels. The efficiency of environmental subsidy funds has not been analyzed from the results of corporate environmental governance—environment performance. The level of green investment of an enterprise does not necessarily represent the effect of environmental governance, so this paper believes that the use of government environmental subsidy funds

can be further studied in the future in terms of environmental governance effects.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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