

Research on the Mechanism and Effects of Corporate Philanthropy on Enterprise Innovation

Yuqing Li *

School of Accounting, Anhui University of Finance and Economics, Bengbu Anhui, 233030, China

* Corresponding author Email: 1979381671@qq.com

Abstract: This article selects all A-share listed companies from 2012 to 2020 as samples and systematically analyzes the impact mechanism and effect of corporate philanthropy on corporate innovation. Research has found that corporate philanthropy can promote corporate innovation; The degree of marketization, legal level, and government governance level can have a positive impact on corporate innovation through corporate philanthropy; Whether state-owned or non-state-owned enterprises, corporate philanthropy has a significant positive impact on corporate innovation. However, compared to state-owned enterprises, the moderating effect of marketization process, legal level, and government governance level on the relationship between corporate philanthropy and corporate innovation in non-state-owned enterprises is not significant; External investors play a partial mediating role in the relationship between corporate philanthropy and corporate innovation.

Keywords: Corporate Charity; Corporate Innovation; Marketization; Legal System; Government Governance.

1. Introduction

The tenth meeting of the Central Financial and Economic Affairs Commission listed the third distribution of enterprises as a basic institutional arrangement, and proposed that the third distribution is a Critical path method to promote Common prosperity in high-quality development. The third distribution began to be incorporated into the national system level, and caused heated debate because of its combination of voluntary principles and policy guidance (Yang, 2022). The initial distribution is based on the market as the main body, adopting the competitive market mechanism and efficiency as the principle for distribution; Redistribution is based on the government as the main body, using administrative mechanisms to enforce distribution based on the principle of fairness; Corporate philanthropy is based on the whole society, using social morality, customs, and other principles of voluntary distribution. The third distribution is the value and spiritual pursuit of all members of society, and is a symbol of the level of civilization and ideological realm of a country and society. Corporate philanthropy is the redistribution of social resources through public welfare undertakings, which has realized a new path for the government to achieve Common prosperity, is a supplement to the initial distribution and redistribution, and forms a social distribution pattern in which the rich drive the rich and help each other.

Corporate charity can enhance the public's sense of social responsibility, promote mutual assistance and friendship, and enhance the spiritual civilization of the whole society, thereby creating a more relaxed and stable social environment and providing a good social background for corporate competition. The competition of modern enterprises has become increasingly dependent on science and technology, and strengthening innovation has become a new trend in enterprise development. Innovation is an important source for enterprises to gain competitive advantages and create their own value. Through innovation, enterprises build their own capabilities and seek sustainable development. From a long-term development perspective, enterprises should prioritize independent research and innovation as their main

development strategies, strive to improve their innovation level, and ensure that they enhance their core competitiveness in the fierce market competition.

Through corporate philanthropy, enterprises establish a good corporate image, gain the trust of various stakeholders, and receive policy support from the government, financial institutions' funding support, and investors' investment. These sources of funding to some extent ensure the high cost, high-risk, and sustainable innovation behavior of enterprises. Therefore, it can be inferred that corporate philanthropy can promote the development of corporate innovation. However, existing literature systematically elaborates on how corporate philanthropy affects corporate innovation.

The marginal contribution of this article lies in: firstly, research on corporate philanthropy mostly focuses on political interpretation, lacking research on the economic consequences of corporate philanthropy from a microeconomic perspective. This article enriches the research results of corporate philanthropy by examining the impact of corporate philanthropy on corporate innovation. Secondly, this article uses the process of marketization, legal level, and government governance level as moderating variables to analyze the impact of corporate philanthropy on corporate innovation, enriching the theory of corporate innovation. The third is to explore the relationship between corporate philanthropy and corporate innovation, which promotes a positive interaction between corporate philanthropy and corporate innovation, and helps enterprises achieve maximum comprehensive benefits of their own value and social performance.

2. Theoretical Analysis and Research Hypotheses

2.1. The Impact of Corporate Philanthropy on Corporate Innovation

A good social environment and material conditions are the prerequisite and foundation for enterprises to carry out continuous innovative research and development activities, and an important condition for enterprises to conduct research

and development activities is to obtain external resources. Corporate philanthropy encourages enterprises and high-income groups to repay the society, vigorously develop philanthropy, so as to narrow the income and wealth gap, make up for the different preferences of primary distribution and redistribution for efficiency and fairness, and give full play to social forces to alleviate the transformation of social contradictions that market forces and government forces cannot adapt to. It is not only a means to drive the first rich to drive the second rich and achieve Common prosperity, but also a means to improve the distribution system Exploring the Promotion of Social Equity (Yang Rui, 2022). Therefore, firstly, corporate philanthropy reduces the burden on society for enterprises, creates a more relaxed and stable social environment, and provides a good background for enterprise competition. Secondly, through corporate philanthropy, enterprises can establish reputation capital, increase market support for enterprises, enhance investors' investment basis and confidence, gain trust from financial institutions, and obtain certain political resources, laying a solid material foundation for innovation activities. Finally, enterprises can attract outstanding talents and motivate internal employees through corporate philanthropy, providing sufficient human capital support for innovative research and development activities, and improving the willingness and efficiency of research and development innovation. In order to continuously improve market position and increase market share, enterprises will conduct more research and development innovation activities when obtaining sufficient external resources, making research and development activities the norm and trend of enterprise operation, and becoming industry leaders. Based on the above analysis, hypothesis one is proposed.

Assumption 1: Corporate charity will have a promoting effect on innovation in enterprises.

2.2. The Regulatory Effect of Marketization Degree

According to the theory of resource dependence, enterprises are in a capital market environment, and the resources needed for their survival and development need to be obtained from the market environment. The higher the degree of marketization, the more intense the market competition, and the market plays a greater role in resource allocation (Gu Lei Lei, 2017). In regions with higher marketization, on the one hand, a good market environment means that the local Factor market, product market and financial intermediaries are relatively complete, economic resources are more allocated by the market, and factor resources flow more freely. Enterprises can improve their corporate image through corporate philanthropy, help enterprises establish competitive advantages (Shen Yi, 2018), and invest more redundant resources in enterprise innovation, Provide motivation for research and development activities. On the other hand, the higher the degree of market transparency and information symmetry, the more developed market organizations such as industry associations are. Improving financial transparency through corporate philanthropy is beneficial for improving internal governance capabilities, suppressing opportunistic behavior, and making management pay more attention to the growth and long-term benefits of the enterprise. At the same time, it sends a positive signal to the public that the enterprise is operating well and has sufficient cash, increase investors' investment confidence,

alleviate financing constraints (Jin Yu, 2018), and thereby improve the level of innovation investment by enterprises. In regions with low levels of marketization, institutional mechanisms and competition mechanisms are not perfect enough, and enterprises cannot improve their reputation through corporate philanthropy. At the same time, the information conveyed by enterprises through corporate philanthropy to the capital market cannot be effectively transmitted and identified, which is detrimental to research and development investment. Therefore, the degree of marketization, as an important external environment for enterprises, may have an impact on the relationship between corporate philanthropy and R&D investment. Based on the above analysis, Hypothesis 2 is proposed.

Hypothesis 2: The degree of regional marketization has a positive moderating effect between corporate philanthropy and corporate innovation.

2.3. The Regulatory Role of Legal Level

The legal system is the guarantee of innovation. A sound legal system has two positive impacts on enterprise innovation. On the one hand, a higher level of legal system provides protection for enterprise innovation achievements. A comprehensive intellectual property protection law and a good law enforcement and judicial environment prevent the theft of enterprise innovation achievements, allowing enterprises to maximize the excess profits brought by innovation (Shao Wei, 2021). Due to the country's efforts to promote the development of enterprise charity, Tax exemptions, preferential laws, policies, etc. may be adopted. At this time, enterprises have the ability and willingness to invest more resources in corporate charity, obtain more innovative resources through corporate charity, further clarify the direction of innovation, and achieve greater innovation breakthroughs. On the other hand, a good level of legal system regulates the behavior of market entities, effectively reducing default and opportunism in the transaction process (Dong Z, 2016). This not only reduces the transaction cost for enterprises to obtain external innovative resources, but also improves the ability of managers to allocate and use resources reasonably, ensuring the investment of enterprises in the third allocation, and obtaining market support through the development of corporate charity. Thus, it is beneficial for enterprises to successfully carry out innovation activities (Wang Yongjian, 2016). Therefore, when there is a sound legal system, the improvement of the development level of corporate charity has a more significant promoting effect on corporate innovation. Based on the above analysis, hypothesis three is proposed.

Hypothesis 3: The level of regional legal system has a positive moderating effect between corporate philanthropy and corporate innovation.

2.4. Government Governance Level

Unlike Western capital markets, in the Chinese capital market, the government can use the "visible hand" to regulate the allocation of resources in the market. With the gradual maturity of China's capital market, the role of the market in promoting economic development is gradually increasing, but the government still holds the right to allocate resources in the micro market (Zhao Jing, 2014) Therefore, the governance status of the government is an important factor affecting enterprise innovation. A good level of government governance means a reduction in government administrative

intervention, fair allocation of public resources, and a sound institutional environment (Xu Weibin, 2018). These are all conducive to improving the market environment, enhancing the standardization and transparency of resource allocation, enabling enterprises to obtain external resources after conducting corporate charity, promoting healthy development of enterprises, and enhancing the level of innovation investment of enterprises. In addition, a good level of government governance also includes improving work efficiency and reducing rent-seeking behavior, which can effectively reduce the cost of enterprise innovation. In short, the improvement of government governance level requires continuous improvement of work efficiency and transparency, increased fiscal and tax subsidy policies and financing policies, improved execution capabilities of public infrastructure and legal systems, and further improvement of social background and access to innovative resources through the third round, promoting innovative development of enterprises. Based on the above analysis, hypothesis four is proposed.

Hypothesis 4: The level of government governance has a positive moderating effect between corporate philanthropy and corporate innovation.

3. Research Design

3.1. Sample Selection and Data Sources

Due to the fact that patent data can only be collected until 2020, this article selects data from all A-share listed companies from 2012 to 2020 and conducts the following processing: (1) excluding financial and real estate listed companies; (2) Excluding companies classified as ST, * ST, and PT by regulatory agencies; (3) Exclude companies with missing data related to this study; (4) Excluding companies with abnormal data; (5) In order to eliminate the influence of extreme values and Outlier, this paper shrinks the tail of continuous variables at the upper and lower 1% quantiles, and a total of 7626 observations are obtained.

The charity data used in this paper are taken from the CNRDS database, and the original data of financial indicators of other sample companies are from the WIND and CSMAR databases. The empirical data are processed by stata17.0 software.

3.2. Variable Definition

3.2.1. Explanatory Variable: Enterprise Innovation

This article measures a company's R&D activities based on the level of R&D investment (RD), and uses the variable "R&D expenses" in the notes to the financial statements of listed companies as a measure of the level of R&D investment. At present, there are three ways to measure enterprise innovation: one is to take the level of R&D investment as the measurement standard, and divide it by operating income (Pan Yue, 2015), total assets (An Tongliang, 2022) or directly take the Natural logarithm of this variable (Wen Jun and Feng Genfu, 2012); Secondly, it is measured by the number of researchers (Sun Yue, 2020); The third measure is based on the number of patents, which can be divided into the number of patent applications (Zhao Xiaoyang, 2020) and the number of patent authorizations (Li Yuanhui, 2022). Considering that innovation activities require a large amount of capital investment, innovation investment can more objectively reflect a company's independent willingness to invest in innovation and reflect the degree of importance a company

attaches to innovation. This article measures a company's innovation level by adding R&D investment and taking logarithms. At the same time, considering that the number of patents reflects a company's innovation ability, and the number of patent authorizations is influenced by government enterprise relations and approval time, Moreover, innovation activities have a lag characteristic, and in the robustness test, the number of patent applications and their lag period are used as replacement tests.

3.2.2. Explanatory Variable: Corporate Charity

Third D is a public welfare enterprise driven by social morality, culture, habits, and other factors, in which social forces voluntarily help the poor and the weak through private donations, charitable causes, voluntary actions, and other means. Charity is the main carrier of corporate philanthropy. According to the "China Charity Donation Report" released by the China Charity Federation, corporate donations have long been the main source of charitable donations in China, accounting for 60% to 70% of the domestic donations (Deng Guosheng, 2021). Therefore, this paper selects the total amount of donations disclosed in the notes to the financial statements of each enterprise as the standard to measure the development level of corporate philanthropy. In order to eliminate the impact of Homoscedasticity and heteroscedasticity, we add one to the amount of donations and take Natural logarithm. In the robustness test, the outstanding voluntary activities of enterprises are taken as the Statistical model of propensity score matching.

3.2.3. Adjusting Variables

The external environment of enterprises includes economic, legal and political aspects. This paper selects the degree of marketization (MAR), the level of legal system (LAW) and the level of government governance (GOV) as moderating variables, and selects the total score of marketizations in the Report on China's Provincial Marketization Index (2022), the development of market intermediaries and the legal system environment, and the relationship between the government and marketization as alternative variables to test.

3.2.4. Control Variables

Referring to the research of Zhao Xiaoyang (2020) and Shen Yi (2018), this article sets the following control variables: capital structure (Lev), previous company years (Age), Tobin Q value (Tobin Q), total asset turnover rate (Asturatio), total asset net profit margin (ROA), management expense ratio (Manratio), and owner's equity growth rate (OE). The specific variable definitions are shown in Table 1.

3.3. Model Construction

Based on previous theoretical analysis, this article designed regression models (1) and (2). The model settings are as follows:

$$RD_{it} = \alpha_0 + \alpha_1 Third\ distribution_{it} + \sum_{j=2}^9 \alpha_j Controls_{it} + \sum year_t + \sum ind_i + \varepsilon \quad (1)$$

$$RD_{it} = \alpha_0 + \alpha_1 Third\ distribution_{it} + \alpha_2 Adjust_{it} + \alpha_3 Third\ distribution_{it} * Adjust_{it} + \sum_{j=4}^{11} \alpha_j Controls_{it} + \sum year_t + \sum ind_i + \varepsilon \quad (2)$$

Among them, RD is the dependent variable and the innovation investment of the enterprise; Third D is the explanatory variable of corporate philanthropy; Adjust is the moderating variable, and subsequent analysis will test the moderating effects of marketization degree (MAR),

legalization level (LAW), and government intervention (GOV) in sequence; Controls are the control variables. Model 1 verifies the impact of corporate philanthropy on corporate innovation, while Model 2 incorporates moderating variables

and their interaction with explanatory variables. The meanings of *i* and *t* in the above model refer to enterprise and time, respectively.

Table 1. Variable Description

Type	Name	Variables	Definition
Explained variable	enterprise innovation	RD	Investment plus one takes Natural logarithm
Explanatory variables	Enterprise Charity	Third D	Actual charitable donation plus one takes Natural logarithm
The adjustment variables	Marketization degree	MAR	Adopts Wang Xiaolu's total marketization score
	Rule of law level	LAW	The Development and Legal System Environment of Market Intermediary Organizations Adopting Wang Xiaolu
	Government Governance Level	GOV	adopts Wang Xiaolu's relationship between the government and the market
	Capital structure	Lev	Ratio of total liabilities at the end of the period to total assets at the end of the period
Control variables	Years of Listed Company	Age	Subtract the listing time of the enterprise from the year of data statistics
	Tobin Q value	TobinQ	Market value/total assets
	Total Asset turnover	Asturatio	Main business income/total assets
	Net profit margin of total assets	ROA	Net profit/total assets at the end of the period
	Management fee rate	Manratio	Management expenses/main business income
	Growth rate of owner's equity	OE	Operating cash flow/sales
	Ind	Industry	Industry Classification of China Securities Regulatory Commission (2012)
	Year	Year	Year

In order to reduce the possible endogenous impact of the model, OLS regression is used in this paper. In order to reduce the impact of Homoscedasticity and heteroscedasticity on the estimation results, robust Standard error is used to correct the results. In addition, the model 2 adds the interactive term of the regulatory variable and the explanatory variable. In order to eliminate the Multicollinearity effect caused by the interactive term, this paper focuses on the explanatory variable and the regulatory variable.

3.4. Empirical Analysis

3.4.1. Descriptive Statistics and Correlation Analysis

Table 2 presents the descriptive statistical results. The average value of innovation investment is 17.83, the maximum value is 23.59, the minimum value is 0, and the standard deviation is 1.45, indicating a significant gap in innovation investment levels among companies. The average

level of corporate philanthropy development is 3.83, with a standard deviation of 2.20, a minimum value of 0, and a maximum value of 13.60. Although the gap is significant, it indicates that companies have gradually attached importance to the impact of corporate philanthropy on the company. The average degree of marketization is 9.41, the standard deviation is 1.53, and the maximum value is 11.49, which shows a right distribution, indicating that the marketization degree of most enterprises in China is relatively good in the region. The average legal level is 9.80, the standard deviation is 2.78, and the maximum value is 14.30, indicating that the legal system in most regions where Chinese enterprises are located is relatively sound. The average level of government governance is 7.88, the standard deviation is 1.64, and the maximum value is 12.15, showing a right distribution, indicating that most of our companies are located in areas with good government governance levels.

Table 2. Descriptive Statistics of Main Variables

Variables	Obs	Mean	Sd	Min	Max
RD	7596	17.83	1.45	0	23.59
Third D	1878	3.83	2.20	0	13.60
MAR	7626	9.41	1.53	-0.16	11.49
LAW	7626	9.80	2.78	0.46	14.30
GOV	7626	7.88	1.64	-7.15	12.15
Lev	7626	0.38	0.19	0.01	0.99
Age	7626	12.09	6.87	0	29
TobinQ	7626	2.40	1.91	0.73	92.25
Asturatio	7626	0.62	0.42	0.00	8.06
ROA	7626	0.05	0.04	-0.06	0.49
Manratio	7626	0.11	0.22	0.001	16.21
OE	7618	0.32	1.99	-0.55	56.26

Table 3 shows the correlation coefficient matrix, and the correlation coefficient between corporate innovation investment and corporate philanthropy is significantly

positive at the 1% level, which preliminarily supports hypothesis 1 of this article, indicating that corporate philanthropy can promote corporate innovation. In addition,

among the moderating variables, except for the level of government governance, all other variables are significantly correlated with innovation investment, while corporate philanthropy is not correlated with marketization level, legal level, and government governance level. It is speculated that there may be some control variables that play an important role in the relationship between government governance level and corporate innovation, corporate philanthropy and

marketization level, legal level, and government governance level. Further testing and analysis will be conducted in the future. In addition, the correlation between variables is less than 0.9. In the variance inflation factor test, the mean of the model inflation factor is 3.31, less than 5, and the model inflation factor is less than 9, which also excludes the possibility of Multicollinearity between variables.

Table 3. Correlation Analysis of Main Variables

Variables	RD	Third D	MAR	LAW	GOV	Lev	Age	TobinQ	Asturatio	ROA	Manratio	OE
RD	1											
Third D	0.246***	1										
MAR	0.097***	0.032	1									
LAW	0.126***	0.031	0.852***	1								
GOV	0.018	-0.001	0.800***	0.607***	1							
Lev	0.229***	0.066***	0.128***	0.112***	0.019*	1						
Age	0.147***	-0.028	0.198***	0.197***	0.081***	0.389***	1					
TobinQ	0.154***	0.137***	0.052***	0.058***	0.043***	0.221***	-0.020*	1				
Asturatio	0.144***	0.076***	0.066***	0.050***	0.068***	0.193***	0.153***	-0.019*	1			
ROA	0.070***	0.203***	0.130***	0.129***	0.068***	0.399***	0.153***	0.188***	0.113***	1		
Manratio	0.071***	0.127***	-0.026**	-0.013	-0.013	0.102***	0.153***	0.104***	0.161***	-0.001	1	
OE	0.057***	-0.032	0.021*	0.023**	-0.001	0.086***	0.070***	-0.003	0.052***	0.089***	0.016	1

Note: *** represents $p < 0.01$, ** represents $p < 0.05$, and * represents $p < 0.1$. Same below

3.4.2. Regression Analysis and Hypothesis Testing Results

Table 4. Research on the Mechanism and Effects of Corporate Philanthropy on Enterprise Innovation

Variables	(1)	(2)	(3)	(4)
Third D	0.156*** (8.49)	0.164*** (9.06)	0.160*** (8.84)	0.160*** (8.89)
MAR	—	0.147*** (5.51)	—	—
LAW	—	—	0.096*** (7.19)	—
GOV	—	—	—	0.106*** (4.32)
Third D*MAR	—	0.038*** (3.55)	—	—
Third D*LAW	—	—	0.023*** (4.07)	—
Third D*GOV	—	—	—	0.017* (1.74)
Lev	2.883*** (10.69)	2.963*** (11.13)	2.963*** (11.20)	2.901*** (10.87)
Age	0.033*** (5.81)	0.039*** (6.81)	0.038*** (6.72)	0.0361*** (6.35)
TobinQ	-0.236*** (-5.44)	-0.219*** (-5.19)	-0.218*** (-5.09)	-0.221*** (5.19)
Asturatio	0.610*** (4.44)	0.548*** (4.25)	0.556*** (4.24)	0.573*** (4.34)
ROA	7.622*** (7.16)	7.071*** (6.69)	7.262*** (6.85)	7.055*** (6.61)
Manratio	5.236*** (6.32)	4.747*** (5.85)	4.768*** (5.86)	4.866*** (5.95)
OE	-0.041*** (-3.94)	-0.042*** (-4.01)	-0.041*** (-3.78)	-0.042*** (-3.86)
Ind/ Year	Yes	Yes	Yes	Yes
_cons	13.76*** (39.53)	12.44*** (29.48)	13.08*** (37.07)	12.92*** (31.81)
N	1867	1866	1866	1866
R-sq	0.32	0.34	0.34	0.33
F	31.69	32.85	32.97	31.72

Column (1) in Table 4 shows the regression results for Model 1. Among them, the coefficient of the development level of corporate philanthropy is 8.49, which is significantly positive at the 1% level, indicating that corporate philanthropy has a significant positive impact on corporate innovation investment. Hypothesis 1 is validated. In terms of control variables, all variables are significant at the 1% level, with the exception of Tobin Q value and owner's equity growth rate, all other variables being significantly positive, indicating reasonable resource allocation. Mature enterprises with strong profitability pay more attention to long-term profits and corporate growth, thereby promoting innovation investment and competing for initiative in market competition. The Tobin Q value and owner's equity growth rate are significantly negatively correlated with innovation investment, possibly due to the higher market value of innovative enterprises compared to other types of enterprises.

The columns (2) - (4) in Table 4 respectively show the test results of the moderating effect of marketization level, legal level, and government governance level on corporate philanthropy and innovation investment. The interaction term between corporate philanthropy and the level of marketization and rule of law is significantly positively correlated at the 1% level, while the interaction term between corporate philanthropy and government governance is significantly positively correlated at the 10% level. This indicates that the level of marketization, rule of law, and government governance can positively regulate the positive relationship between corporate philanthropy and innovation investment, verifying Hypothesis 2, Hypothesis 3, and Hypothesis 4. Compared to the level of government governance, the degree of marketization and legal level strengthening of corporate philanthropy has a more significant promoting effect on the level of innovation

investment of enterprises. This may be because with the development of corporate philanthropy, the market environment and legal level are further optimized, creating a more relaxed and stable social environment for enterprises, providing a good background for enterprise competition, enabling enterprises to benefit from it and achieve economic goals. Corporate philanthropy has also to some extent alleviated the pressure on the government, improved its governance level, improved the external environment, helped enterprises reduce development barriers, and increased innovation investment.

3.5. Robustness Testing

3.5.1. Control of Endogeneity

In this study, there may be a reverse causal problem between corporate philanthropy and corporate innovation investment, that is, there may be endogeneity issues in the research process. When the innovation investment of most enterprises increases, market competition increases, and market vitality is activated, on the one hand, the enterprise hopes to establish a good social image to increase market competitiveness, on the other hand, a strong enterprise with high market share, and the public expects the enterprise to make more contributions to society. Therefore, the enterprise increases charitable donations (Xiong Langyu, 2020), thereby improving the level of corporate charity. In basic regression, fixed model regression has been used to alleviate endogeneity issues to some extent. To further control the potential endogeneity in the model, this study used a two-stage least squares method for processing. Based on the research of Shen Yi (2018), this paper takes the Natural logarithm of income tax expense and sales expense plus one as the interactive Instrumental variables estimation.

Table 5. IV-2SLS Regression Results of Corporate Philanthropy on Corporate Innovation

Variables	(1)	(2)
Third D	—	0.845*** (15.40)
Intercept	0.860*** (48.09)	—
Lev	0.780*** (8.90)	1.499*** (4.27)
Age	-0.001 (-0.45)	0.039*** (4.85)
TobinQ	-0.028*** (-3.69)	-0.096** (-2.30)
Asturation	0.113** (4.44)	0.537*** (4.06)
ROA	-1.713*** (-4.37)	-2.893* (-1.91)
Manratio	0.857*** (6.81)	4.262*** (4.09)
OE	-0.032*** (-2.92)	-0.012 (-0.35)
Ind/ Year	Yes	Yes
_cons	12.04*** (75.53)	10.99*** (19.22)
N	7189	1782
R-sq	0.43	0.34
F	175.91	—

The regression results in Table 5 indicate that there is a positive correlation between the income tax expenses and sales expenses of listed companies and the level of corporate charity development, and it is significant at the 1% level, indicating that enterprise income tax expenses and sales expenses will affect corporate donations. Since the research

uses interactive Instrumental variables estimation, column (1) of Table 5 is the regression result of the first stage, and the Instrumental variables estimation is significantly positively correlated at the level of 1%, and the T value is 48.09, indicating that there is no problem of over identification and weak Instrumental variables estimation. Column (2) of Table

5 is the regression result of the second stage, and the development level of corporate philanthropy is significantly positively correlated with corporate innovation investment at the level of 1%, and its coefficient is 0.845, which again supports hypothesis 1. This indicates that after controlling for the potential endogeneity of the model, corporate philanthropy can still significantly improve the level of corporate innovation.

3.5.2. Using a Negative Binomial Regression Model

Due to the inconsistent measurement methods of enterprise innovation by relevant scholars, patent authorization is influenced by various factors such as government approval and government enterprise relations. In terms of measuring enterprise innovation, it is not as representative as the number of patent applications, and the number of enterprise patent applications is also a reflection of the enterprise's innovation ability. The sample values of the number of patent applications are all non-negative integers, and some of the current year's applications are 0, which will cause the variable to show a significant left distribution, it is not Normal

distribution. If linear model is used, regression may not achieve the best effect. At the same time, innovation returns have a lag. Therefore, in order to make the conclusion of this article more reliable, this article uses a negative binomial regression model to measure the number of patent applications as a substitute variable for measuring enterprise innovation and lags it for one period. The regression results are shown in Table 6.

Column (1) of Table 5 shows the regression results of the number of patents applied by enterprises at the time of the year. It can be seen that the development level of corporate philanthropy is significantly positive at the 1% level, indicating that corporate philanthropy can significantly promote enterprise innovation. Column (2) of Table 5 shows the regression results of the number of patents applied by enterprises with a lag of one period, which is significantly positively correlated at the 10% level, indicating that corporate philanthropy significantly promotes enterprise innovation. The adoption of a new model setting further confirms the robustness of the original conclusion.

Table 6. Negative Binomial Regression and Lagged Regression Results of Corporate Philanthropy and Corporate Innovation

Variables	(1)	(2)
Third D	0.191*** (5.59)	0.0937* (1.93)
Lev	3.729*** (6.57)	-1.113 (-1.57)
Age	0.002 (0.28)	-0.018 (-1.07)
TobinQ	-0.169*** (-6.10)	-0.0583* (-1.68)
Asturation	0.667*** (2.67)	-0.032 (-0.11)
ROA	2.945** (2.22)	-0.984 (-0.59)
Manratio	3.677*** (3.11)	-2.786** (-2.23)
OE	0.217 (0.65)	-0.0508*** (-4.51)
Ind/ Year	Yes	Yes
_cons	1.221*** (3.78)	4.846*** (10.69)
N	1787	1786
Pseudo R2	0.034	0.005
F	—	—

3.5.3. Propensity Score Matching

Corporate charity not only manifests as donations and volunteer activities, but also as whether the enterprise supports charitable causes, establishes charitable funds, charitable trusts, etc.

Since corporate philanthropy includes not only philanthropy, but also voluntary action and other ways to help the weak and needy, in order to make the core conclusions of this paper more stable and reliable, and better reveal the causal relationship between corporate philanthropy and corporate innovation, this paper uses the Logit method to estimate the development level of corporate philanthropy with the Statistical model of outstanding volunteer activities of enterprises, and gets the tendency score of corporate philanthropy development level. Match enterprises with and without outstanding volunteer activities using a one-to-three nearest neighbor matching. Finally, we estimate the Average

treatment effect of corporate philanthropy on R&D investment according to the matched sample. Table 7 reports the test results of matching balance, and it can be seen that there is not much difference in the samples before and after matching, and the standardized deviation of each matching variable after matching is less than 10%. It can be seen that after solving the sample deviation and replacing the variables, the results of this article are still robust. Overall, the test results show that the empirical conclusion of this article is relatively reliable.

The Average treatment effect results of the impact of corporate philanthropy on corporate innovation estimated by PSM method are shown in Table 8. It can be seen that the causal effect of corporate philanthropy on corporate innovation is about 48.3%, which is significant at the level of 1%. The estimated coefficient sign and significance level have not changed fundamentally, which is consistent with the

benchmark regression results, further verifying the reliability of the main conclusions of this paper.

Table 7. Comparison of Differences before and after Variable Matching

Variables	Sample matching	Mean value		Standardization deviation (%)	T	
		treatment group	control group		T	P
Lev	Unmatched	0.487	0.425	32.7	5.88	0.000
	Matched	0.487	0.489	-1.2	-5.53	0.000
Age	Unmatched	17.111	15.614	24.4	4.41	0.000
	Matched	17.111	17.239	-2.1	-5.25	0.000
TobinQ	Unmatched	1.979	2.515	-34.4	-5.95	0.000
	Matched	1.979	2.018	-2.5	5.57	0.000
Asturatio	Unmatched	0.669	0.640	6.4	1.15	0.250
	Matched	0.669	0.643	5.7	0.34	0.735
ROA	Unmatched	0.048	0.050	-4.1	-0.74	0.458
	Matched	0.048	0.047	1.6	1.34	0.181
Manratio	Unmatched	0.087	0.098	-16.6	-2.93	0.003
	Matched	0.087	0.091	-5.7	1.35	0.177
OE	Unmatched	0.180	0.335	-10.1	-1.68	0.094
	Matched	0.180	0.172	0.5	2.20	0.028

Table 8. Average treatment effect (PSM) of Corporate Philanthropy on Corporate Innovation

Variables	Sample matching	treatment group	control group	Difference	Standard error	T
VOL	Unmatched	18.686	18.125	0.561	0.101	5.55***
	ATT	18.686	18.203	0.483	0.123	3.93***

4. Further Analysis

4.1. From the Perspective of Property Heterogeneity

This article divides the entire sample into two groups based on the nature of the enterprise: state-owned enterprises and non-state-owned enterprises. In different groups, the impact of corporate philanthropy on enterprise innovation is examined, and the moderating effects of marketization, legal level, and government governance ability are tested. The inspection results are shown in Table 9.

Columns (1) - (4) of Table 9 show the regression results for state-owned enterprises, while columns (5) - (8) show the regression results for non-state-owned enterprises. Through comparison, it can be found that corporate philanthropy positively and significantly promotes corporate innovation in both state-owned and non-state-owned enterprises, both at a 1% level. This may be because corporate philanthropy improves the market competition environment to a certain extent, making the market environment more inclusive and transparent. Both state-owned and non-state-owned enterprises have better development prospects, making it easier to identify market opportunities. The higher the degree of information symmetry, the easier it is to stimulate the innovation awareness of enterprises and guide their long-term development. This further confirms hypothesis 1. This article also examined the moderating effects of marketization, legal level, and government governance level on corporate philanthropy and innovation investment in state-owned and non-state-owned enterprises. From columns (5) to (8) of Table 9, it can be found that compared to state-owned enterprises, the moderating effects of marketization, legal level, and government governance level on corporate innovation in non-state-owned enterprises are not significant. The interaction term between marketization degree and explanatory variables is significant at the 10% level, which may be because the optimization of market mechanisms can greatly stimulate the innovation willingness of state-owned and non-state-owned enterprises. The interaction term between legal level and

government governance ability and explanatory variables is significant at the 1% level in state-owned enterprises, but not significant in non-state-owned enterprises. This may be because the actual controller of state-owned enterprises is a government agency, Managers are relatively familiar with and sensitive to the legal system and government governance capabilities, while controllers and managers of non-state-owned enterprises are relatively insensitive. Moreover, China is currently in the stage of developing a country, and strengthening the legal system for intellectual property protection and adjusting government governance capabilities may not have a positive impact on enterprise innovation (Liu Siming, 2015).

4.2. From the Perspective of External Investors

Enterprise innovation requires a large amount of free cash flow, and compared to internal financing, external funds have a greater role in promoting innovation investment in enterprises (Li Huidong, 2013). External investors are more concerned about the growth of enterprises brought about by scientific research and innovation (Bottazizi et al., 2001), and can ensure the continuity of future innovation investment for enterprises. Corporate philanthropy can further optimize the market competition mechanism and information transmission mechanism, improve the market information environment, enhance investors' confidence and investment willingness in the market and enterprises, enable enterprises to receive sufficient external financial support and optimize their corporate governance capabilities, thereby making the management of enterprises more focused on obtaining long-term benefits, increasing innovation investment, and promoting innovative development.

In order to further verify the intermediary effect of external investors on enterprise innovation, this paper introduces the variable of institutional investors' shareholding ratio to test the Mesomeric effect. Compared to individual investors, institutional investors have an increasingly large capital market with abundant funds, stronger information collection capabilities, and professional qualities in rational investment (Kong Gaowen, 2019). Institutional investors are more

mature and can enable enterprises to access more R&D and innovation resources.

Table 9. Analysis of Property Heterogeneity

Variables	State-owned enterprise				Non-state-owned enterprises			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Third D	0.146*** (8.49)	0.165*** (6.54)	0.154*** (6.27)	0.163*** (6.49)	0.156*** (7.37)	0.152*** (7.16)	0.158*** (7.47)	0.157*** (7.37)
MAR	—	0.276*** (8.64)	—	—	—	0.067** (2.43)	—	—
LAW	—	—	0.150*** (8.49)	—	—	—	0.0609*** (3.79)	—
GOV	—	—	—	0.215*** (6.65)	—	—	—	0.059** (2.33)
Third D *MAR	—	0.0400*** (2.98)	—	—	—	0.0274* (1.95)	—	—
Third D *LAW	—	—	0.0266*** (3.72)	—	—	—	0.007 (0.91)	—
Third D *GOV	—	—	—	0.0314** (2.28)	—	—	—	0.002 (0.19)
Lev	1.813*** (4.63)	1.953*** (5.21)	2.030*** (5.42)	1.838*** (4.80)	3.076*** (10.77)	3.056*** (10.74)	3.061*** (10.79)	3.043*** (10.66)
Age	-0.010 (-0.95)	-0.012 (-1.15)	-0.010 (-0.99)	-0.012 (-1.18)	0.0367*** (5.02)	0.0405*** (5.50)	0.0410*** (5.59)	0.0393*** (5.33)
TobinQ	-0.526*** (-8.86)	-0.498*** (-8.77)	-0.489*** (-8.60)	-0.494*** (-8.53)	-0.144*** (-4.85)	-0.138*** (-4.66)	-0.135*** (-4.55)	-0.138*** (-4.64)
Asturatio	0.653*** (4.18)	0.507*** (3.38)	0.557*** (3.72)	0.526*** (3.43)	0.509*** (4.53)	0.488*** (4.36)	0.486*** (4.35)	0.500*** (4.45)
ROA	9.364*** (5.46)	7.868*** (4.75)	8.876*** (5.40)	7.888*** (4.67)	7.362*** (7.47)	7.187*** (7.31)	7.081*** (7.20)	7.123*** (7.21)
Manratio	4.500*** (2.88)	3.272** (2.18)	3.626** (2.43)	3.622** (2.37)	5.057*** (6.68)	4.779*** (6.31)	4.774*** (6.32)	4.855*** (6.39)
OE	-0.032 (-1.13)	-0.028 (-1.05)	-0.027 (-1.00)	-0.031 (-1.12)	-0.071 (-1.03)	-0.084 (-1.22)	-0.087 (-1.27)	-0.080 (-1.16)
Ind/ Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	16.17*** (18.19)	14.11*** (16.00)	15.37*** (18.02)	14.82*** (16.71)	13.19*** (34.91)	12.59*** (27.64)	12.74*** (32.30)	12.69*** (29.20)
N	863	863	863	863	1003	1003	1003	1003
R-sq	0.35	0.40	0.41	0.38	0.34	0.35	0.35	0.35
F value	31.69	32.85	32.97	31.72	19.08	18.43	18.63	18.12

This article adopts the classic three-step intermediary test method of Wen Zhonglin (2014). Firstly, it tests whether the development level of corporate charity can improve the innovation investment of enterprises, as shown in Model 1; Secondly, to test whether corporate philanthropy can promote external investors' investment activities, as shown in Model 3; Finally, examine the level of corporate philanthropy development and the role of external investors in simultaneously investing in corporate innovation, as shown in Model 4.

$$INS_{it} = \alpha_0 + \alpha_1 Third\ distribution_{it} + \sum_{j=2}^9 \alpha_j Controls_{it} + \sum year_t + \sum ind_i + \varepsilon \quad (3)$$

$$RD_{it} = \alpha_0 + \alpha_1 Third\ distribution_{it} + \alpha_2 Third\ distribution_{it} + \sum_{j=3}^{10} \alpha_j Controls_{it} + \sum year_t + \sum ind_i + \varepsilon \quad (4)$$

The regression results are shown in Table 10. In column (2), the shareholding ratio of external investors is significantly positively correlated with the level of corporate philanthropy at the 1% level, indicating that corporate philanthropy can significantly promote external investor investment. From

column (3), it can be seen that the development level of corporate philanthropy and external investors' contribution to corporate innovation are significantly positively correlated at the 1% level, indicating that corporate philanthropy can increase the shareholding ratio of institutional investors, so as to improve the level of enterprise innovation investment.

5. Research Conclusion and Enlightenment

This article systematically analyzes the impact mechanism and effect between corporate philanthropy and corporate innovation. The research results indicate that: (1) there is a significant positive correlation between corporate philanthropy and corporate innovation, and the optimization of social environment and resource allocation by corporate philanthropy has a positive impact on corporate innovation; (2) The degree of marketization, level of legal system, and level of government governance can have a positive impact on corporate innovation through corporate philanthropy. A sound market and institutional mechanism can greatly leverage the effectiveness of corporate philanthropy, enhance people's confidence in the capital market, stimulate market

vitality, and promote innovative development of enterprises; (3) Whether state-owned or non-state-owned enterprises, corporate philanthropy has a positive impact on corporate innovation. However, compared to state-owned enterprises, the moderating effect of marketization process, legal level, and government governance level on the relationship between corporate philanthropy and corporate innovation in non-state-owned enterprises is not significant; (4) External investors

have played a partial intermediary role in the relationship between corporate philanthropy and corporate innovation. Through corporate philanthropy, the market environment has been improved, and investors are full of confidence in the market, providing sufficient funds and innovative resources for corporate innovation, promoting the innovative development of the enterprise.

Table 10. External Investor Perspectives

Variables	(1)	(2)	(3)
Third D	0.119*** (8.07)	0.215*** (6.63)	0.0902*** (6.39)
INS	—	—	0.134*** (14.24)
Lev	2.586*** (12.17)	2.989*** (6.00)	2.187*** (10.73)
Age	0.0347*** (7.05)	0.105*** (10.47)	0.0203*** (4.14)
TobinQ	-0.194*** (-7.21)	-0.177*** (-3.49)	-0.170*** (-6.65)
Asturatio	0.590*** (4.71)	0.108 (0.44)	0.575*** (5.53)
ROA	6.973*** (8.77)	13.47*** (8.82)	5.128*** (6.68)
Manratio	4.998*** (7.91)	0.917 (0.60)	4.846*** (8.10)
OE	-0.0433*** (-4.58)	-0.144*** (-7.74)	-0.0243*** (-2.80)
Ind/ Year	Yes	Yes	Yes
_cons	14.10*** (47.21)	12.71*** (17.47)	12.39*** (40.58)
N	1866	1877	1866
Pseudo R2	0.33	0.21	0.39
F	39.78	22.64	51.20

Based on the empirical research conclusions of this article, the following policy recommendations are proposed: (1) Promote the development of corporate charity, create a good environment for the development of public welfare, and actively improve the institutional mechanisms of corporate charity. Corporate charity has to some extent promoted the sustainable development of enterprises, not only improving the development environment of enterprises, but also achieving social and economic benefits of enterprises; (2) Improve the level of government governance and law enforcement, further reduce government intervention, improve the standardization and transparency of resource allocation, optimize the market environment, stimulate market vitality, ensure that the entire society can generate maximum value from innovative resource investment, and provide a good institutional environment for enterprise innovation; (3) Vigorously developing external investors, external investors can utilize their professional advantages to supervise the operation of the management of listed companies, participate in corporate governance, encourage managers to invest in enterprise innovation, and reduce agency costs for enterprises.

References

- [1] Yang Rui. Corporate Charity, Corporate Charity and Common prosperity [J]. Social Science Front, 2022 (05): 275-280.
- [2] Gu Leilei, Ouyang Wenjing. Charitable Donation, Marketing Ability, and Corporate Performance [J]. Nankai Management Review, 2017,20 (02): 94-107.
- [3] Jin Yu, Wang Peilin, Li Tian. Will charitable donations affect a company's research and development activities? [J] Modern Finance and Economics (Journal of Tianjin University of Finance and Economics), 2018,38 (08): 43-59.
- [4] Shao Wei, Liu Jianhua. Research on the Impact of Marketing Ability on Innovation of Small and Medium sized Enterprises: Based on the Perspective of Institutional Environment [J]. Journal of Finance and Economics, 2021 (10): 91-101. DOI: 10.13762/j.cnki.cjlc.2021.10.008.
- [5] Zhiqiang Dong and Xiaohai Wei and Yongjing Zhang The allocation of entrepreneurial effects in a rent seeing society: Evidence from China [J] Journal of Comparative Economics, 2016, 44 (2): 353-371.
- [6] Wang Yongjian, Xie Weihong. Research on the Interaction between Task Environment and Institutional Environment on Enterprise Innovation [J]. Science and Technology Management, 2016,37 (04): 89-97.
- [7] Zhao Jing, Hao Ying. Government Intervention, Property Rights Characteristics, and Enterprise Investment Efficiency [J]. Research Management, 2014,35 (05): 84-92. DOI: 10.19571/j.cnki.1000-2995.2014.05.011.
- [8] Xu Weibin, Lv Xingying, Zhou Jian, Chen Ying. The Mechanism of Government Governance Affecting Enterprise Innovation Performance: Market Effect and Herd Effect [J]. Science and Technology Progress and Countermeasures, 2018,35 (18): 120-126.
- [9] Pan Yue, Pan Jianping, Dai Yiyi. Corporate Litigation Risk, Judicial Local Protectionism, and Enterprise Innovation [J]. Economic Research, 2015,50 (03): 131-145.

- [10] An Tongliang, Wen Rui. Mechanism and Demonstration of the Impact of Digital transformation of Chinese Enterprises on Innovation [J]. Modern Economy Discussion, 2022 (05): 1-14. DOI: 10.13891/j.cnki.mer.2022.05.003.
- [11] Wen Jun, Feng Genfu. Heterogeneous Institutions, Enterprise Nature, and Independent Innovation [J]. Economic Research, 2012,47 (03): 53-64.
- [12] Sun Yue, Zhao Qing. Research on Industry Military Collaboration, Government Science and Technology Support, and Technological Innovation Efficiency: A Test Based on Interaction and Spatial Spillover Effects [J]. Science and Technology Progress and Countermeasures, 2020,37 (02): 42-50.
- [13] Zhao Xiaoyang, Xu Chaoyang. Will charitable donations affect technological innovation-- Based on the moderating effect of executive overconfidence [J]. Financial and Accounting Communication, 2020 (20): 15-20. DOI: 10.16144/j.cnki. issn 1002-8072.2020.20.003.
- [14] Li Yuanhui, Chen Rongrong, Li Runyu. Financial Equity Linkages, Monetary Policy, and Enterprise Innovation [J]. Journal of Finance and Economics, 2022 (05): 66-78. DOI: 10.13762/j. cnki. cjl.2022.05.008.
- [15] Shen Yi, Xu Guanghua, Qian Ming. The moderating effect of charitable donations, research and development investment, and financial resources: from the perspective of strategic interaction [J]. Management Review, 2018,30 (02): 159-171. DOI: 10.14120/j.cnki.cn11-5057/f.2018.02.015.
- [16] Xiong Langyu, Wen Mingzhen, Hou Jingjing, Zhu Lingxuan. Enterprise Technology Innovation, Government Subsidies, and Charitable Donations [J]. Friends of Accounting, 2020 (07): 78-83.
- [17] Liu Siming, Hou Peng, Zhao Yanyun. Intellectual property protection and China's industrial innovation capability - empirical research from Panel data of provincial large and medium-sized industrial enterprises [J]. Quantitative Economic and Technological Economic Research, 2015,32 (03): 40-57. DOI: 10.13653/j.cnki.jqte.2015.03.003.
- [18] Li Huidong, Tang Yuejun, Zuo Jingjing. Do you want to innovate with your own money or with someone else's money- - Research on the Financing Structure and Corporate Innovation of Chinese Listed Companies [J]. Financial Research, 2013 (02): 170-183.
- [19] Innovation and corporate growth in the evolution of the drug industry [J] Giulio Bottazzi, Giovanni Dosi, Marco Lippi, Fabio Pammolli, Massimo Riccaboni International Journal of Industrial Organization 2001 (7).
- [20] Kong Gaowen, Hu Linfeng, Kong Dongmin, Wang Qin. Research on Innovation Preference and Fund Performance of Fund Shareholdings [J]. Journal of Management science, 2019, 22 (12): 70-83.
- [21] Wen Zhonglin, Ye Baojuan. Analysis of Mesomeric effect: Methods and Model Development [J]. Progress in Psychological Science, 2014, 22 (05): 731-745.