

Article

How Does Philanthropy Influence Innovation Management Systems? A Moderated Mediation Model with a Social Exchange Perspective

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Abstract: Social philanthropy and innovation systems both require significant resource investment—how can organizations achieve both? This paper combines social exchange theory, signaling theory and imprinting theory to analyze the intrinsic dynamics mechanism from the perspective of government technology resource acquisition and to explore the influential role of generalist CEOs. Based on the hand-collected multidimensional career experience dataset of CEOs and the quantitative analysis of 3651 enterprises in China's A-share listed manufacturing industry from 2010–2019, the results show that: philanthropic donation has a systematic contribution to corporate innovation investment, in which government science and technology (S&T) resource acquisition plays a partially mediating role; generalist CEOs significantly enhance the effect of philanthropic donations and government S&T resource acquisition on innovation investment. Finally, the statistical results remain stable in the lagged effects experiment and the IV-2SLS model analysis using exogenous variables. The contribution of this study lies in expanding the research on maximizing the combined benefits of economic value creation and social performance from a social exchange perspective, and helping us understand why the share of generalists in the global managerial market big data has been steadily increasing.

Keywords: philanthropic donation; innovation; social exchange; government science and technology resource acquisition; generalist CEO; large-sample data analysis



Citation: He, L.; Jiang, M. How Does Philanthropy Influence Innovation Management Systems? A Moderated Mediation Model with a Social Exchange Perspective. *Systems* **2022**, *10*, 206. <https://doi.org/10.3390/systems10060206>

Academic Editors: Jinan Fiaidhi, Aboul Ella Hassanien and Hye-jin Kim

Received: 24 September 2022

Accepted: 1 November 2022

Published: 3 November 2022

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1. Introduction

Social responsibility and innovation are focal themes in the field of social management system research. With the social trends toward open innovation and collaborative innovation, organizations are increasingly connected with external stakeholders, and their innovation cannot be separated from close collaboration and resource integration with governments, customers, etc. As the highest form of corporate social responsibility [1], philanthropy refers to the donation of a certain amount of money, in-kind resources or services by enterprises to those in need, mainly for social support, poverty alleviation, earthquake relief, etc. It plays an important role in helping enterprises to gain the support of stakeholders and thus benefits them [2]. As shown in Figure 1, according to the China Charitable Giving Report (2021), the total amount of corporate donations in China in 2020 was RMB 121.811 billion, accounting for 83.52% of the total social donations, an increase of 30.77% year-on-year, achieving corporate donations of more than RMB 100 billion for the first time. At the same time, Chinese enterprises' investment in R&D management systems continues to grow—an increase of up to 21.73%. Among them, more than 24% of enterprises have more than 10% R&D personnel, and more than 12% of them have more than 3% of R&D investment intensity. These data show that Chinese enterprises are still making high-intensity R&D investments while achieving high intensity participation in philanthropy.

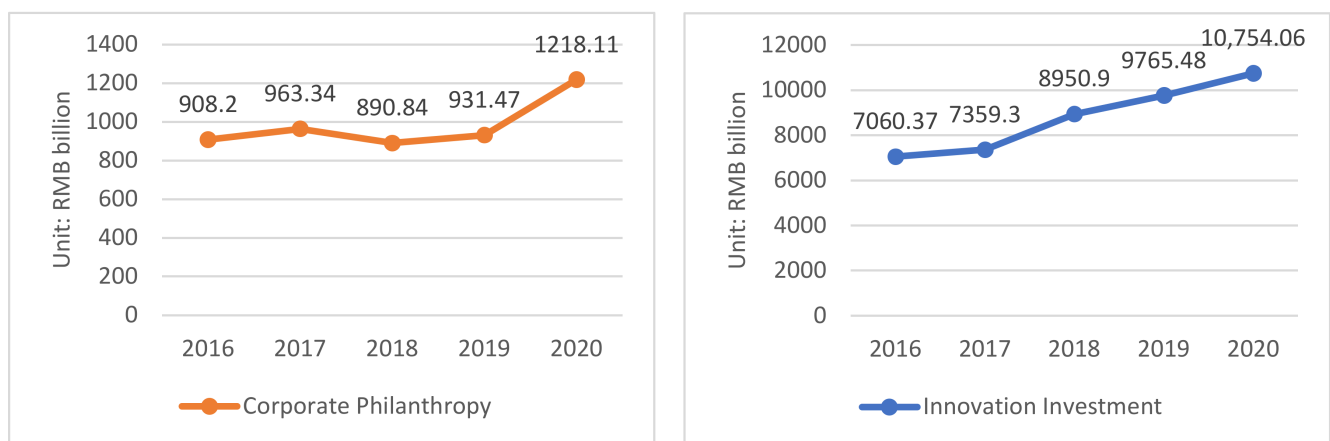


Figure 1. Trends in philanthropic donations and innovation investment by Chinese companies in the past five years.

However, due to the scarcity of organizational resources, resources do not always flow smoothly to innovation [3]. Thus, what is the logic behind generating this phenomenon? Existing research on charitable giving focuses on the motivations of firms for implementing it, including economic motivations, political motivations, altruism, and managerial self-interest [4], and explores the impact of charitable giving on firms based on these motivations, such as obtaining tax incentives, financial subsidies, and corporate financing [5], establishing and maintaining government–enterprise ties [6], bringing advertising effects [4,7], building a corporate brand image [8], enhancing corporate reputation and corporate performance [9,10], etc. However, the nature of enterprises is to pursue profit maximization, and when making philanthropic donations, they will consider economic factors [11]; i.e., finding ways to reduce government regulation and obtain resource compensation through philanthropic donations is their main motive. In reality, government S&T resource subsidies are usually an important source of external innovation resources for organizations. Existing studies also show that government S&T resource acquisition can significantly improve the efficiency of using R&D funds and the marginal innovation efficiency of technology and management personnel, which is beneficial to corporate innovation [12].

At the same time, as the organizers and implementers of production and business activities, managers greatly influence the fulfillment of social responsibility and innovation management [13]. Traditional agency theory focuses on how to implement supervisory incentive mechanisms to guide managers to make Pareto-optimal decisions. However, the implied premise of managerial homogeneity is hardly in line with the reality, and individual managers may have multiple characteristics at the same time. According to the higher-order theory, managers' career experiences influence their cognitive and behavioral patterns, which in turn act on organizational systems. Existing studies on managers' career experiences and the firms have focused on the influence of single specific career experiences, such as military experience [14,15], political experience [16], academic experience [17], and overseas experience [18], but do different career experiences interact and jointly shape managers' management styles? A recent study found that managers combine skills learned throughout their careers when making company decisions, and that executives with rich career experience usually have stronger resilience, cross-border abilities, innovative ideas, and a risk-taking spirit [19], which are important factors. Some domestic scholars have also started to pay attention to the influence of executives' rich career experiences on corporate innovation management systems [20], arguing that general-purpose executives with multidimensional career experience across industries, companies, and positions have richer resources, broader vision, and more comprehensive management skills in financing, investment, and operation, which can improve the level of organizational innovation.

In summary, although scholars have explored social philanthropy and organizational innovation management, there is a lack of sufficient understanding of the intrinsic systemic relationship between the two. In the case of limited resources, philanthropic donations mean less resources for R&D and innovation, so are philanthropic donations and organizational innovation opposed to each other? Meanwhile, domestic and international studies based on the assumption of managerial heterogeneity appeared late and mainly focused on a particular career experience, but few studies have conducted a comprehensive and systematic examination of comprehensive career. What is the impact of “generalist” managers with rich career experience on philanthropic donations and innovation systems? In view of this, this paper analyzes whether corporate philanthropic giving contributes to innovation from the perspective of social exchange between organizations and governments, combining signaling theory, etc., and what is the intrinsic path of action? Can generalist CEOs help firms to obtain government grants through philanthropic behavior and thus promote innovation?

The main research contributions that this paper may bring to the study of the above issues are: 1. Unlike most previous studies that separate social philanthropy and innovation, the issue of whether corporate technological R&D and philanthropic donations can translate into endogenous or exogenous growth is considered [11], i.e., philanthropic donations can serve as an exogenous source of corporate growth and thus promote innovation. This paper provides empirical evidence from 3651 sample observations of Chinese listed manufacturing companies and considers the systematic relationship between social philanthropy and corporate innovation from a strategic philanthropy perspective, enriching the study of social philanthropy and its outcome variables and microsystem mechanisms. 2. Unlike the existing literature, which mostly studies corporate social philanthropy from organizational behavior theory, resource dependence theory, and agency theory, this paper clarifies the mediating role of government S&T resources in the system of social philanthropy and enterprise innovation, reveals the process “black box” of philanthropic donations affecting innovation, broadens the connotation and application of social exchange theory, and is conducive to the development of social change and technology innovation management systems for maximizing comprehensive benefits. 3. In terms of constructing measures of generalist CEOs, this study takes full account of the local characteristics and data advantages of the Chinese market, and based on the studies of Custódio [19] and Zhao Ziyi [20] on generalist CEOs, the dimensional composition is revised, such as the inclusion of the sub-indicator of the number of organizations served, which is more in line with the Chinese management context. It also enriches the literature in the area of economic consequences of managers’ social experiences and is a useful addition to the higher-order theory.

2. Theoretical Analysis and Hypothesis Development

2.1. *Philanthropic Donation and Corporate Innovation Investment*

Regarding philanthropic donation and innovation investment, only in recent years have some international scholars started to focus on the relationship between the two [21]. Based on resource dependence theory and stakeholder theory, some scholars have empirically studied the impact of corporate fulfillment of social philanthropic responsibility on technological innovation, and found that social philanthropic behavior helps companies to obtain social information and resources needed in the process of technological innovation [11], which is conducive to promoting innovation; some studies have argued that innovation requires large and continuous capital investment from enterprises, whereas philanthropic donations, as non-operating expenses, will directly reduce enterprises’ endogenous cash flow and increase their endogenous financing pressure, which is not conducive to corporate R&D innovation [22].

This paper focuses on analyzing the direct influence relationship between the two from the signaling perspective. In the Chinese context, corporate social donations are usually disclosed in annual reports or business promotion materials, and even widely disseminated by public media, so they have a strong public effect and are more easily perceived by

stakeholders. According to signaling theory, if a company wants to gain the support of its stakeholders, it must deliver relevant information to them. On the one hand, in terms of financial signaling, corporate philanthropy is a kind of real expenditure with a certain imitation cost, which can transmit information about the current good financial status of the enterprise to the outside society [23] and can release a good forecast of future sustainable business performance with important optimistic signals, reduce the degree of information asymmetry inside and outside the enterprise, and eliminate the worries of some important stakeholders about the enterprise's financial situation, so that they are willing to provide financial support to the enterprise [24]. On the other hand, as far as reputational signaling is concerned, charitable giving is a reflection of corporate responsibility and image, which can signal to the external community that the company and its products are honest and reliable. Wang Hua et al. showed that charitable donations help in terms of consumers' purchase intentions and behaviors, enhance the competitiveness of firms in the product market, and provide a source of motivation for corporate innovation when consumers cannot easily identify product quality [25]. Shao Wei et al. showed that charitable giving can convey corporate love to investors, improve corporate reputation, reduce the cost of equity financing, expand the scale of equity financing, and thus enable firms to invest more funds in R&D [26].

In summary, philanthropic donations can help firms obtain sustained resource support from stakeholders and promote innovative investment through financial signaling and reputational signaling. Therefore, the following hypothesis is proposed in this paper:

H1: There is a positive influence of charitable giving on corporate innovation investment.

2.2. Intermediary Role of Government S&T Resource Acquisition

According to social exchange theory, the interaction between individuals or organizations is essentially an exchange relationship, and this "resource–reward" reciprocity creates and maintains the social structure [27]. The logic behind it is that both parties exchange their unique resources to achieve mutual benefit, with self-interest and interdependence at its core. For companies, social relationships with investors, employees, customers, governments, and communities are fundamental to their survival, and corporate philanthropic giving is a "reciprocal exchange" that builds and strengthens these social relationships [28]. At the same time, resource-dependence theory emphasizes that firms cannot generate all the resources needed for development on their own, and they need to rely on external resource holders for their survival and growth [26], including the government, customers, suppliers, and other stakeholders. Therefore, under the constraint of limited internal resources, firms usually keep changing their structure and strategic behavior to manage their relationships with resource holders in order to obtain and maintain resources from the external community [5,23].

In the Chinese institutional context, government departments hold the power to allocate key resources [6], which is an important external source of innovation resources for enterprises. However, specifically, while the government enjoys the privilege of social resource allocation, it also bears the responsibility of responding to major disasters and helping the socially disadvantaged, which often puts huge financial pressure on the government. At this time, enterprises help the government solve many social problems, such as disaster relief and schooling, through charitable donations to relieve financial pressure and share social responsibility, and in return for reciprocal exchange, the government will give the necessary support in resource acquisition [23]. As a reciprocal exchange, the government will give the necessary support to donating enterprises in terms of resource acquisition [23]. Zhang Zengang et al. argued that corporate donation is a means of acquiring political resources, and through philanthropic donations, corporations can gain political reputation, build relationships with decision makers, and have political bargaining capital to better approach government resources [11]. Li Wei'an et al. pointed out that in order to obtain the key resources needed for survival and development, organizations will actively act to facilitate exchanges with resource providers, and corporate charitable giving, which

is free of legal risks and consistent with public values, is a good choice for companies to establish stable ties with the government. Companies can respond to the government's call to meet its needs through philanthropy, which in turn can lead to political resources and the resulting financial resources [5], enhance legitimacy recognition, reduce R&D costs and operational risks, and prompt companies to invest more resources in R&D [13,26].

To summarize, under the framework of reciprocal social exchange theory, philanthropic donations by enterprises help the government, and then they obtain science and technology resources from government departments to promote their own innovation and development. Therefore, this paper proposes the following hypotheses:

H2: There is a positive influence of philanthropic donations on the acquisition of government S&T resources.

H3: Government S&T resource acquisition mediates the relationship between philanthropic donations and innovation investment.

2.3. The Moderating Role of the "Generalist" CEO

Philanthropic donation and innovation investment, as resource-consuming activities, both have strong uncertainty and high adjustment costs in their decisions. Based on the higher-order and behavioral finance theories, managers have a decisive role in the formulation of corporate strategies and financial decisions, and a growing number of studies have shown that past professional experiences shape managers' different competency structures [29], which can significantly influence their management perspectives and mind-sets. On the one hand, based on the imprinting effect perspective, generalist executives with a combination of career experiences influence their management thinking and decision preferences through cognitive imprinting and competence imprinting, as opposed to professional executives, who have always been engaged in a single career. ① From the perspective of cognitive imprinting, generalist executives with extensive professional experience have been exposed to diverse business environments and diverse organizational cultures, and they have deep knowledge of philanthropic behavior and innovative activities [20]. ② From the perspective of ability imprinting, generalist managers with rich professional experience have continuously improved their management skills, such as opportunity identification, resource integration, and cross-border capabilities, through repeated practice, and may be more capable of identifying and making full use of the company's scarce investment opportunities. They have stronger resource acquisition and resource allocation capabilities, which in turn enhances corporate innovation [30]. On the other hand, based on the resource effect perspective, generalist executives with a combination of professional experiences also have richer social capital. ① From the perspective of social networks, managers serving in different industries in different companies inevitably expand the boundaries of interpersonal interactions and can provide informal insurance mechanisms for their philanthropic and innovative activities. ② From the perspective of information asymmetry, managers can efficiently obtain more non-redundant information by virtue of their own social networks. ③ From the perspective of resource-based theory, rich professional experience promotes knowledge sharing and resource synergy, which can effectively support corporate innovation.

Managers' past career experiences can be explored in the following five dimensions: 1. The functional departments in which they worked. 2. The company the manager worked for. Hu and Liu [31] found that Chinese executives who had worked in different companies were able to accumulate diverse social capital and improve corporate investment. 3. The industry in which the manager worked. Multiple industry experiences help managers to develop cross-border awareness and transfer knowledge resources. 4. The organization in which managers work. Different organizations have different organizational styles and cultures, which affect their cognitive and behavioral preferences. For example, independent directors with academic backgrounds contribute to enhancing corporate innovation [17]; experience in military organizations may make executives prefer radical actions, such as

adopting aggressive financing methods [14]. 5. The geographical type of employment, such as mainly overseas employment experience. Since the economic environments, institutional environments, and cultural environments of China and overseas regions are different, overseas working experience can enhance the managers' ability to adapt to the environment and their sense of independent innovation, which can better enhance the innovation level of enterprises [30].

Based on this, this paper focuses on generalist CEOs with career experience in different functions, companies, industries, organizations, and geographies, and proposes the following hypotheses:

H4: The positive contribution of philanthropic donation to corporate innovation investment is stronger when the CEO is a generalist with rich career experience.

H4a: Generalist CEOs enhance the positive contribution of philanthropic donation to corporate innovation investment by enhancing the impact effect of corporate philanthropic donation on government S&T resource acquisition.

H4b: The generalist CEO enhances the positive effect of philanthropic donations on corporate innovation investment by increasing the effect of government S&T resource acquisition on corporate innovation investment.

In summary, the following theoretical model of research hypothesis was constructed in this study (as Figure 2).

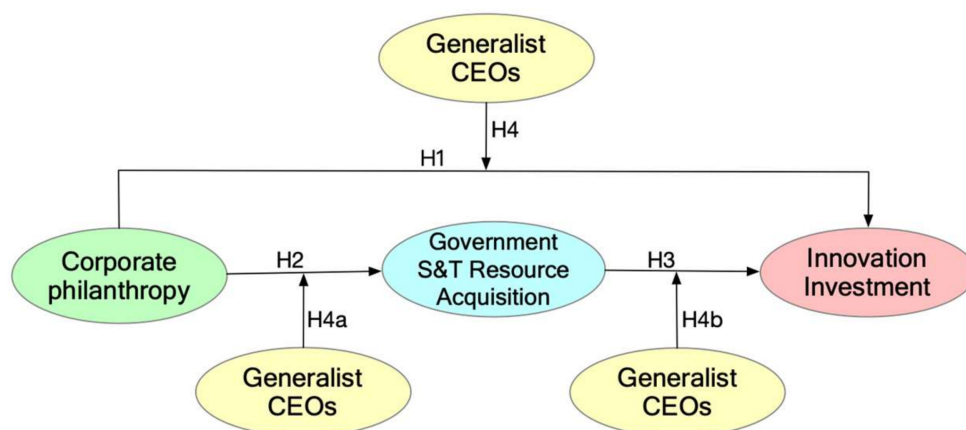


Figure 2. Theoretical model.

3. Research Methodology

3.1. Sample Selection and Data Sources

We selected listed manufacturing companies in Shanghai and Shenzhen A-shares from 2010 to 2019 as the research sample, and the data of CEO career experience were read and compiled manually by downloading CEO CV files from the CSMAR database, combined with company announcements, Sina Finance, Hexun.com (accessed on 29 June 2022), etc., after supplementation. The corporate-level data were obtained from the annual reports of the companies in that year, which are mainly from the websites of stock exchanges and the official websites of the companies, and the missing annual reports were supplemented by the WIND database and Flush Finance, etc.

The raw data were processed as follows: exclude the sample of companies in the ST and PT categories in the sample period; exclude individuals with missing values in the main variables; exclude companies with gearing ratios greater than 100% that are in fact insolvent; and winsorize the continuous variables involved in the model at the 1% and 99% levels, considering the possibility of extreme values of the relevant variables. The final sample of 3651 firm-annual observations was obtained.

3.2. Variable Design

3.2.1. Innovation Investment (RDI)

To reduce the effect of enterprise size, the relative size of corporate R&D investment is expressed by the value equal to $\log(\text{ratio of corporate R\&D expenditure to operating revenue} \times 100 + 1)$ [1,13].

3.2.2. Philanthropic Donations (DON)

To reduce the impact of enterprise size, the relative size of philanthropic donations is expressed by the value equal to $\log(\text{ratio of donation amount to operating revenue} \times 100 + 1)$. In the data processing, the amount with the word “donation” in the specific items of non-operating expenses disclosed in the annual reports of listed companies was collated, and the data with “non-social welfare” and “donation and fine expenses” were excluded.

3.2.3. Government S&T Resource Acquisition (SUB)

In order to reduce the influence of enterprise size, the relative amount is expressed as a value equal to $\log(\text{the ratio of government subsidies related to scientific and technological research and development to operating revenue} \times 100 + 1)$. In the data processing, the details of government subsidies under the non-operating expenses disclosed in the annual reports of listed companies were compiled, and the keyword search method was used to identify the following keywords: ① Keywords related to technological innovation, such as “R&D,” “development,” “innovation,” “technology renewal and renovation,” “technology project appropriation,” “technology project,” and “key technology applications.” ② Keywords of government policies on science and technology support and innovation, such as “Star and Fire Plan,” “Torch Plan,” “863,” and “Productivity Promotion Center.” ③ Key words related to the innovation achievements of enterprises, such as “intellectual property,” “invention patent,” and “copyright.” ④ Keywords related to innovative talents and technical cooperation, such as “attracting talents and wisdom,” “talent storage,” “university-enterprise cooperation,” and “overseas team.” ⑤ Proper nouns related to high-tech or strategic fields, such as “integrated systems,” “robotics,” “sensing,” “cloud computing,” “laser,” etc. The detailed matters containing keywords are regarded as government R&D subsidies for science and technology to be grouped and summed up, and finally, the amount of government S&T resources acquired by the enterprise in the current period is obtained.

3.2.4. Generalist CEO (CEO Career Experience Richness Index, CEO_CERI)

Referring to the studies of Custódio et al. [19] and Zhao Ziyi et al. [20], the portrayal dimensions were revised by combining the characteristics of Chinese executive resume information, and the following five dimensions were considered in a comprehensive manner: ① The number of functional department types in which the CEO has been employed. Referring to the job classification criteria of Crossland et al. [32], the types of functional departments studied in this paper mainly include six categories: production operations, R&D and design, finance and finance, marketing, legal, and general management. ② The number of companies in which the CEO has been employed. ③ The number of industries in which the CEO has worked. The number of industries in which the CEO had worked was calculated by searching the industries in which the CEO had worked according to the 2012 SEC industry classification standards for the companies described in the CEO's CV. ④ Number of different organizations the CEO has worked for. These include military organizations, research institutions, financial institutions, government agencies, corporate entities, non-profit organizations, and other organizations. ⑤ The number of geographic types of CEO employment. This refers to whether the CEO has worked overseas (excluding overseas study experience). Finally, because the data of the five measurement dimensions have a certain correlation, we adopted principal component analysis to downscale them, extracted the principal components with stronger explanatory power, calculated the com-

prehensive score by weighting the variance contribution rate as the weight, and finally obtained the generalist CEO index.

3.2.5. Control Variables

In addition to the above core variables, to ensure the stability of the model, we set control variables for firm characteristics, governance structure, financial status, and regional macro-regulation. For firm characteristics, enterprise age (Fage), enterprise scale (LnA), and enterprise nature (SOE) were selected; for governance structure, board size (BOA), sole director ratio (Indep), dual position (Dual), CEO gender (CEO_gender), CEO age (CEO_age), and CEO education (CEO_edu) were selected. For financial status, enterprise value (Tobin's Q), gearing ratio (Lev), and firm growth (Growth) were selected; at the level of regional macro-regulation, tax incentives (Tax_in) and economic size (LnGDP) were selected. Dummy variables were also set to control for annual, segmented industry, and regional fixed effects. The specific variable descriptions are shown in Table 1.

Table 1. Definitions of the variables.

Variable Name	Variable Symbol	Variable Definition
Innovation investment	RDI	$\text{Log}(\text{R\&D investment expenses}/\text{operating revenue} \times 100 + 1)$
Philanthropic donations	DON	$\text{Log}(\text{donation amount}/\text{operating revenue} \times 100 + 1)$
Government S&T resource acquisition	SUB	$\text{Log}(\text{amount of government science and technology R\&D subsidy}/\text{operating revenue} \times 100 + 1)$
Generalist CEOs	CEO_CERI	A generalist CEO index built on five dimensions: function, company, industry, organization, and geographic type
Enterprise age	Fage	Measured as the difference between the year of observation minus the year of establishment
Enterprise scale	LnA	Natural logarithm of total assets at the end of the period
Enterprise nature	SOE	State-controlled enterprises take the value of 1, others are 0
Board size	BOA	Number of board members
Sole director ratio	Indep	Percentage of independent directors on enterprise boards
Dual position	Dual	CEO and chairman of the board of directors, the two positions together take 1, otherwise 0
CEO_gender	CEO_gender	CEO's gender is 1 if male, otherwise 0
CEO age	CEO_age	Age of the CEO in the year of observation
CEO education	CEO_edu	1 = Secondary school and below, 2 = Junior college, 3 = Bachelor's degree, 4 = Master's degree, 5 = PhD degree, 6 = Degree published in other forms such as honorary doctorate, correspondence course, etc., 7 = MBA/EMBA
Enterprise value	Tobin's Q	$(\text{Market value of stocks} + \text{book value of liabilities})/\text{Total assets at the end of the year}$
Gearing ratio	Lev	Liabilities/Total assets at year-end
Enterprise growth	Growth	Growth rate of main business revenue
Tax Incentives	Tax_in	Natural logarithm of the actual amount of tax benefits enjoyed by the enterprise and the total amount of various tax refunds received
Economic Scale	LnGDP	Natural logarithm of regional real GDP
Year dummy variable	YEAR	Dummy variables for control years, the paper sets the corresponding dummy variables for each of the 10 years from 2010 to 2019
Industry dummy variable	IND	Dummy variables controlling for manufacturing industry segments, represented by 31 sub-category industry dummy variables
Province dummy variable	PROV	Dummy variables controlling for region, expressed as dummy variables for 34 provincial administrative regions

3.3. Model Construction

To investigate the direct impact relationship between philanthropic donations and corporate innovation investment, Model (1) was constructed:

$$\begin{aligned}
RDI_{it} = \alpha_0 + \alpha_1 DON_{it} &+ \alpha_2 Fage_{it} + \alpha_3 LnA_{it} + \alpha_4 SOE_{it} + \alpha_5 BOA_{it} + \alpha_6 Indep_{it} \\
&+ \alpha_7 Dual_{it} + \alpha_8 CEO_{genderit} + \alpha_9 CEO_{ageit} + \alpha_{10} CEO_{eduit} \\
&+ \alpha_{11} Tobin's Q_{it} + \alpha_{12} Lev_{it} + \alpha_{13} Growth_{it} + \alpha_{14} Tax_{in_{it}} \\
&+ \alpha_{15} LnGDP_{it} + \sum YEAR + \sum IND + \sum PROV + \varepsilon
\end{aligned} \quad (1)$$

In order to investigate the indirect relationship between philanthropic donations, government S&T resource acquisition, and corporate innovation investment, Model (2) was constructed:

$$\begin{aligned}
RDI_{it} = \alpha_0 &+ \alpha_1 DON_{it} + \alpha_2 SUB_{it} + \alpha_3 Fage_{it} + \alpha_4 LnA_{it} + \alpha_5 SOE_{it} + \alpha_6 BOA_{it} \\
&+ \alpha_7 Indep_{it} + \alpha_8 Dual_{it} + \alpha_9 CEO_{genderit} + \alpha_{10} CEO_{ageit} \\
&+ \alpha_{11} CEO_{eduit} + \alpha_{12} Tobin's Q_{it} + \alpha_{13} Lev_{it} + \alpha_{14} Growth_{it} \\
&+ \alpha_{15} Tax_{init} + \alpha_{16} LnGDP_{it} + \sum YEAR + \sum IND + \sum PROV + \varepsilon
\end{aligned} \quad (2)$$

To investigate the moderating effect of generalist CEOs on the direct relationship between philanthropic donations and corporate innovation investment, Model (3) was constructed:

$$\begin{aligned}
RDI_{it} = \alpha_0 &+ \alpha_1 DON_{it} + \alpha_2 CEO_{CERIit} + \alpha_3 DON_{it} * CEO_{CERIit} + \alpha_4 Fage_{it} \\
&+ \alpha_5 LnA_{it} + \alpha_6 SOE_{it} + \alpha_7 BOA_{it} + \alpha_8 Indep_{it} + \alpha_9 Dual_{it} \\
&+ \alpha_{10} CEO_{genderit} + \alpha_{11} CEO_{ageit} + \alpha_{12} CEO_{eduit} \\
&+ \alpha_{13} Tobin's Q_{it} + \alpha_{14} Lev_{it} + \alpha_{15} Growth_{it} + \alpha_{16} Tax_{in_{it}} \\
&+ \alpha_{17} LnGDP_{it} + \sum YEAR + \sum IND + \sum PROV + \varepsilon
\end{aligned} \quad (3)$$

To investigate the moderating effect of generalist CEOs on the indirect influence between philanthropic donations, government S&T resource acquisition, and corporate innovation investment, Models (4) and (5) were constructed:

$$\begin{aligned}
SUB_{it} = \alpha_0 + \alpha_1 DON_{it} + \alpha_2 CEO_{CERIit} + \alpha_3 DON_{it} * CEO_{CERIit} + \alpha_4 Fage_{it} + \\
\alpha_5 LnA_{it} + \alpha_6 SOE_{it} + \alpha_7 BOA_{it} + \alpha_8 Indep_{it} + \alpha_9 Dual_{it} + \alpha_{10} CEO_{genderit} + \\
\alpha_{11} CEO_{ageit} + \alpha_{12} CEO_{eduit} + \alpha_{13} Tobin's Q_{it} + \alpha_{14} Lev_{it} + \alpha_{15} Growth_{it} + \\
\alpha_{16} Tax_{in_{it}} + \alpha_{17} LnGDP_{it} + \sum YEAR + \sum IND + \sum PROV + \varepsilon
\end{aligned} \quad (4)$$

$$\begin{aligned}
RDI_{it} = \alpha_0 + \alpha_1 SUB_{it} &+ \alpha_2 CEO_{CERIit} + \alpha_3 SUB_{it} * CEO_{CERIit} + \alpha_4 Fage_{it} + \alpha_5 LnA_{it} \\
&+ \alpha_6 SOE_{it} + \alpha_7 BOA_{it} + \alpha_8 Indep_{it} + \alpha_9 Dual_{it} + \alpha_{10} CEO_{genderit} \\
&+ \alpha_{11} CEO_{ageit} + \alpha_{12} CEO_{eduit} + \alpha_{13} Tobin's Q_{it} + \alpha_{14} Lev_{it} \\
&+ \alpha_{15} Growth_{it} + \alpha_{16} Tax_{init} + \alpha_{17} LnGDP_{it} + \sum YEAR + \sum IND \\
&+ \sum PROV + \varepsilon
\end{aligned} \quad (5)$$

This paper focuses on data analysis of the collated unbalanced panel data using Stata 15.0 software (StataCorp, College Station, TX, USA). The Hausman test results show that the *p*-values of Models (1)–(5) are all significantly zero at 1%, so the fixed-effects model was chosen for estimation. In order to eliminate the influences of potential residual correlation and heteroskedasticity on the inference of significance of the estimated coefficients, the more valid weighted least-squares (WLS) method was selected, and the inverse of the fitted value of the square of the residuals of the regression was used as the weight for WLS estimation. Meanwhile, the standard errors of the regression results were clustered to the firm level, and the *t*-values of all regressions were adjusted by the cluster of the firm dimension.

4. Empirical Results and Analysis

4.1. Descriptive Statistics and Correlation Analysis

The Pearson correlation coefficients, means, and standard deviations of the main variables of the study are shown in Table 2. The absolute values of the correlation coefficients among the variables are less than 0.5, and the maximum value of the calculated variance inflation factor (VIF) is 4.48, thus excluding the problem of serious multicollinearity among the variables. As the independent variable, the mean value of philanthropic donation (DON) is 0.028 and the standard deviation is 0.039, which indicates that the overall level of charitable donation among listed manufacturing enterprises is low at present and that there is much volatility among different enterprises. The correlation coefficient between corporate philanthropic donation (DON) and innovation investment (RDI) is 0.209, indicating that corporate philanthropic donation has a catalytic effect on innovation investment [13], which initially verifies hypothesis 1 of this paper. The generalist CEO index (CEO_CERI) calculated by principal component analysis has negative values, and the positive and negative signs only represent the magnitude of the richness of their career experiences and have no practical meaning and do not affect the subsequent regressions. The median of this index is lower than the mean, indicating that most CEOs in China have lower-than-average richness of career experiences, suggesting that generalist CEOs with compound career experiences are a scarce resource.

Table 2. Descriptive statistics and correlation analysis of main variables.

	RDI	DON	CEO_CERI	Fage	LnA	SOE	BOA	Indep	Dual	Growth	Tax_in	LnGDP
RDI	1											
DON	0.209 ***	1										
CEO_CERI	0.096 ***	0.019	1									
Fage	−0.035 *	−0.038 **	−0.025 **	1								
LnA	0.031 **	0.011 **	0.016	0.218 ***	1							
SOE	−0.029 **	−0.014 **	−0.010	0.218 ***	0.351 ***	1						
BOA	0.020	0.009	0.030 *	0.051	0.302 ***	0.275 ***	1					
Indep	0.076 **	0.012	0.060 **	0.005	−0.028	−0.070 ***	−0.418 ***	1				
Dual	0.017	0.006 *	0.014 ***	−0.090 **	−0.188 ***	−0.285 ***	−0.191 ***	0.133 ***	1			
Growth	0.003 *	0.009	−0.007	0.003	0.008	−0.021	−0.010	0.012	0.019	1		
Tax_in	0.009 **	0.131 **	0.048	0.081 **	0.039 ***	0.121 ***	0.141	0.021	−0.057 *	−0.027	1	
LnGDP	0.257 **	0.003	0.128 ***	0.095 *	0.027 *	−0.214 **	−0.146	0.019	0.109 **	0.018	0.069 **	1
mean	0.190	0.028	0.054	14.03	21.88	0.331	8.796	0.370	0.282	0.215	8.46	10.85
sd	0.027	0.039	0.609	5.267	1.092	0.471	1.581	0.053	0.450	1.382	2.174	0.423

Note. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Regression Analysis

4.2.1. Philanthropic Donation and Corporate Innovation Investment

Table 3 examines the effect of philanthropic donations on corporate innovation investment. It can be seen that after controlling for the relevant variables, the regression coefficient of philanthropic donations is 0.648, which passes the significance test at the 0.01 level, and H1 is supported (that the behavior of philanthropic donations has a significant positive impact on corporate innovation investment). The signaling and advertising effects generated by philanthropic donations can make enterprises pay more attention to long-term orientation when performing charitable activities, and this motivation to achieve long-term benefits enhances enterprises' willingness to innovate, which in turn drives them to continuously invest in innovation [13]. In addition, the social capital accumulated by enterprises through philanthropic activities is conducive to establishing good relationships with stakeholders, gaining their recognition, and obtaining their continuous resource support to invest in innovation; on the other hand, it helps establish political connections with the government, and the legitimacy recognition brought by such good government–enterprise relations can bring enterprises a more certain policy environment, lower-interest bank credit, and more convenient financing channels. These resources can significantly reduce the cost of R&D and promote enterprises to invest more resources in R&D [26].

Table 3. Regression results of corporate philanthropy and innovation investment.

Variables	(1) RDI	(2) RDI
DON		0.648 *** (5.60)
Fage	−0.003 * (−1.73)	−0.004 * (−1.78)
LnA	0.041 ** (2.10)	0.042 ** (2.50)
SOE	−0.040 ** (−2.43)	−0.040 ** (−2.52)
BOA	0.001 (0.23)	0.002 (0.59)
Indep	0.025 ** (2.36)	0.044 ** (2.54)
Dual	0.011 (1.30)	0.021 (1.21)
CEO_gender	0.034 ** (2.50)	0.037 ** (2.15)
CEO_age	−0.001 (−0.87)	−0.001 (−1.17)
CEO_edu	0.015 *** (5.73)	0.013 *** (4.25)
Tobin's Q	0.022 *** (6.48)	0.020 *** (5.06)
Lev	−0.382 *** (−11.16)	−0.381 *** (−10.33)
Growth	0.007 ** (2.27)	0.008 ** (2.05)
Tax_in	0.012 *** (2.69)	0.016 ** (2.40)
LnGDP	0.323 ** (2.53)	0.235 ** (2.39)
YEAR/IND/PROV	Control	Control
Constant	2.292 ** (2.31)	1.363 (1.26)
Observations	3651	3651
R-squared	0.538	0.487
F test	0	0
Adj_R ²	0.535	0.478
F	279.5	250.45

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

4.2.2. Philanthropic Donations, Government S&T Resource Acquisition, and Corporate Innovation Investment

A three-step mediation regression analysis was used in this work [1,11]. Model (1) was used to test the effect of the independent variable on the mediating variable, and Model (2) was used to test whether the mediating variable plays a mediating role between the independent variable and the dependent variable, and the results are shown in Table 4. From Model (1), we can see that corporate philanthropic donation has a significant positive impact on government S&T resource acquisition ($\beta = 0.342$, $p < 0.01$), indicating that there is indeed a social exchange principle of “reciprocal benefit” between enterprises and government. In Model (2), the regression coefficients of corporate philanthropic donations and government S&T resource acquisition on corporate innovation investment were significant ($\beta = 0.423$, $p < 0.01$; $\beta = 0.418$, $p < 0.01$), and the variance explained 51.3%. The model fit well. Comparison with Table 3 shows that the regression coefficient of philanthropic donations on innovation investment was smaller ($0.423 < 0.648$) and the difference passes the SUEST test at the 1% significance level ($\chi^2(1) = 17.02$, Prob > $\chi^2 = 0.0000$), indicating that gov-

ernment S&T resource acquisition plays a partial mediating role in the relationship between philanthropic donations and innovation investment. Firms acquire more government S&T resource subsidies through the social exchange effect of philanthropic donation behavior, and these increased S&T resources can better address the input of innovation projects, which in turn promotes corporate innovation. Hypotheses H2 and H3 are supported.

Table 4. Regression results of corporate philanthropy, government S&T resource acquisition, and innovation investment.

Variables	(1) SUB	(2) RDI
DON	0.342 *** (4.04)	0.423 *** (5.27)
SUB		0.418 *** (9.63)
Fage	−0.000 (−0.55)	−0.003 (−1.03)
LnA	−0.019 ** (−2.34)	−0.032 ** (−2.52)
SOE	0.006 (0.98)	−0.038 ** (−2.46)
BOA	0.004 (1.48)	0.000 (0.51)
Indep	0.079 (1.63)	0.093 (1.24)
Dual	0.010 (1.07)	0.014 * (1.87)
CEO_gender	0.020 (1.43)	0.016 (1.34)
CEO_age	0.000 (0.21)	−0.001 (−1.09)
CEO_edu	0.006 *** (3.07)	0.012 *** (4.72)
Tobin's Q	0.009 *** (3.45)	0.015 *** (5.41)
Lev	−0.062 *** (−4.06)	−0.330 *** (−11.60)
Growth	0.006 *** (2.66)	0.006 * (1.87)
Tax_in	0.003 ** (2.43)	0.011 *** (6.28)
LnGDP	0.110 ** (2.03)	0.260 ** (2.57)
YEAR/IND/PROV	Control	Control
Constant	0.748 (1.25)	1.910 * (1.80)
Observations	3651	3651
R-squared	0.460	0.522
F test	0	0
Adj_R ²	0.444	0.513
F	110.11	156.96

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

4.2.3. Moderating Role of a Generalist CEO

The main explanatory variables were standardized before calculating the interaction terms, and the related regression results are presented in Table 5. The moderating effect of the direct influence of generalist CEOs on the relationship between charitable giving and innovation investment was first tested. The results of Models (5) and (6) in the table show that the coefficient of Don*CEO_CERI is significantly positive ($\beta = 0.292$, $p < 0.01$), indicating that the level of diversity of the CEO has a significant positive moderating effect on the

relationship between philanthropic donation and corporate innovation investment. A broad range of career experiences help CEOs to develop diverse management skills and superior boldness, so generalist CEOs with broad career experience are better able to identify “meaningful adventures” [32] and are more innovative. This relationship is illustrated in the left panel of Figure 3, where hypothesis H4 is verified. Secondly, the moderating role played by generalist CEOs in the indirect pathway relationship among philanthropic donations, government resource acquisition, and innovation investment was examined. The results of Models (1) and (2) in the table show that the coefficients of CEO_CERI and Don*CEO_CERI are not significant ($\beta = 0.101, p > 0.1$; $\beta = 0.130, p > 0.1$). Therefore, hypothesis H4a was not supported. The results from models (3) and (4) in the table show that generalist CEOs enhance the positive relationship between government S&T resource acquisition and corporate innovation investment ($\beta = 0.246, p < 0.01$). Hypothesis H4b is supported, and the moderating effect is plotted in the right panel of Figure 3.

Table 5. The moderating effect of the generalist CEO.

Variables	(1) SUB	(2) SUB	(3) RDI	(4) RDI	(5) RDI	(6) RDI
DON	0.333 *** (3.95)	0.339 *** (4.03)			0.635 *** (6.78)	0.676 *** (6.37)
SUB			0.432 *** (10.33)	0.433 *** (10.14)		
CEO_CERI	0.100 (0.60)	0.101 (0.55)	0.205 ** (2.34)	0.205 ** (2.33)	0.207 ** (2.03)	0.206 *** (2.98)
DON*CEO_CERI		0.130 (0.85)				0.292 *** (8.05)
SUB*CEO_CERI				0.246 *** (3.35)		
Fage	−0.000 (−0.76)	−0.000 (−0.52)	−0.003 * (−1.69)	−0.003 (−1.63)	−0.003 * (−1.70)	−0.003 (−1.56)
LnA	−0.020 ** (−1.97)	−0.019 ** (−2.26)	0.032 *** (2.68)	0.032 *** (2.75)	0.043 *** (3.58)	0.044 *** (3.61)
SOE	0.006 (1.03)	0.007 (1.11)	−0.040 ** (−2.55)	−0.041 ** (−2.00)	−0.028 ** (−2.49)	−0.028 ** (−2.48)
BOA	0.004 (1.57)	0.004 (1.55)	0.000 (0.53)	0.000 (0.59)	0.000 (0.64)	0.000 (0.66)
Indep	0.093 (1.52)	0.080 (1.55)	0.073 (1.01)	0.071 (0.99)	0.090 ** (2.15)	0.087 ** (2.13)
Dual	0.008 (1.37)	0.010 * (1.71)	0.014 * (1.77)	0.013 * (1.65)	0.012 (1.47)	0.012 (1.41)
CEO_gender	0.020 (1.44)	0.019 (1.31)	0.017 (1.43)	0.017 (1.43)	0.032 ** (2.23)	0.033 ** (2.27)
CEO_age	0.000 (0.33)	0.000 (0.43)	−0.001 (−0.95)	−0.000 (−0.85)	−0.001 (−0.82)	−0.001 (−0.85)
CEO_edu	0.005 *** (2.97)	0.006 *** (3.11)	0.013 *** (5.21)	0.013 *** (5.11)	0.015 *** (5.62)	0.016 *** (5.79)
Tobin's Q	0.009 *** (3.24)	0.009 *** (3.34)	0.016 *** (5.31)	0.016 *** (5.33)	0.021 *** (5.95)	0.021 *** (5.98)
Lev	−0.061 *** (−4.04)	−0.063 *** (−4.14)	−0.338 *** (−14.98)	−0.336 *** (−14.87)	−0.366 *** (−12.49)	−0.369 *** (−12.66)
Growth	0.006 *** (2.63)	0.006 *** (2.66)	0.006 * (1.78)	0.006 * (1.76)	0.007 ** (2.31)	0.007 ** (2.24)
Tax_in	0.003 ** (2.41)	0.003 ** (2.37)	0.010 *** (5.65)	0.010 *** (5.61)	0.013 *** (7.20)	0.013 *** (7.20)
LnGDP	0.116 ** (2.16)	0.110 ** (2.04)	0.244 *** (2.60)	0.247 ** (2.54)	0.288 ** (2.56)	0.302 ** (2.51)
YEAR/IND/PROV	Control	Control	Control	Control	Control	Control

Table 5. Cont.

Variables	(1) SUB	(2) SUB	(3) RDI	(4) RDI	(5) RDI	(6) RDI
Constant	0.806 (1.36)	0.752 (1.26)	1.714 * (1.72)	1.741 * (1.75)	1.905 * (1.77)	2.048 * (1.91)
Observations	3651	3651	3651	3651	3651	3651
R-squared	0.462	0.461	0.520	0.521	0.527	0.519
F test	0	0	0	0	0	0
Adj_R ²	0.446	0.444	0.511	0.511	0.518	0.509
F	110.10	109.79	156.44	155.56	157.95	155.11

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

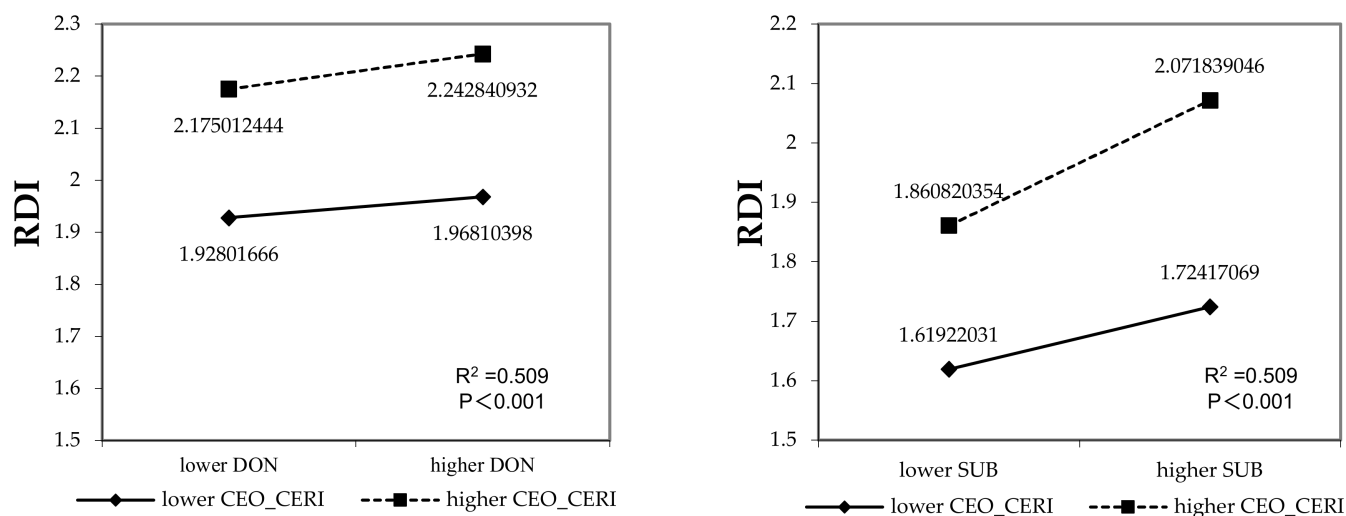


Figure 3. The moderating effect of the generalist CEO.

4.2.4. Robustness Test

Three main methods were used for robustness testing. First, changing the measures of the main data indicators. Drawing on related studies [33], the main variables were standardized using total assets as proxy variables for the analyzed indicators (RDI₂, SUB₂). In addition, drawing on the study by Leilei Gu et al. [10], robustness tests were conducted using one-period lag (L1.DON₂) and two-period lag (L2.DON₂) of the dependent variable charitable donation indicators, and this treatment helped to mitigate possible endogeneity problems and forward-looking bias. The model was changed to a fixed-effects GLS panel model for empirical testing. The correlation results are shown in Table 6, which shows that corporate philanthropic donation is consistently and significantly positively correlated with innovation investment (RDI₂), and the impact mechanism remains stable after changing the metric of the data and accounting for the time-lag effect.

Finally, because both corporate philanthropy and innovation investment involve allocation of corporate resources to operations, philanthropic donations affect innovation investment, and corporate innovation investment may in turn affect the performance of philanthropic donations. Certain control variables are inevitably missed when considering the effect of corporate philanthropy on innovation. Therefore, we used a two-stage instrumental variables approach (IV-2SLS) to detect possible endogeneity issues. The instrumental variable for philanthropic donations was chosen as the average level of donations per year by industry segment for manufacturing firms (IV.DON). Theoretically, the average level of donations by industry segment in each year is significantly correlated with corporate philanthropic donations but not with corporate R&D investment, making it suitable as an instrumental variable. As shown by the second-stage results in Table 7, there is still a positive relationship between philanthropic donations and corporate innovation

investment, and it passed the 1% significance level test. This indicates that the results remained stable after considering the endogeneity issue.

Table 6. Robustness test: varying the model and measurements and considering the time-lag effect.

Variables	(1) RDI ₂	(2) RDI ₂	(3) SUB ₂	(4) SUB ₂	(5) RDI ₂	(6) RDI ₂	(7) RDI ₂	(8) RDI ₂
L1.DON ₂	0.561 *** (4.98)		0.359 *** (3.32)		0.313 *** (4.81)		0.417 *** (4.72)	
L2.DON ₂		0.467 *** (2.74)		0.223 ** (2.16)		0.274 *** (4.86)		0.246 *** (4.62)
SUB ₂					0.298 *** (8.37)	0.301 *** (7.17)		
CEO_CERI							0.107 *** (2.74)	0.105 ** (2.06)
L1.DON ₂ *CEO							0.252 ** (2.02)	
L2.DON ₂ *CEO								0.103 * (1.84)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR/IND/PROV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	903	703	903	703	903	703	903	703
Wald Chi2	2134.30	1828.22	1373.78	1309.25	1244.77	909.45	1146.28	835.28

Z-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7. Robustness test: IV-2SLS results.

Variables	(1) First Stage DON	(2) Second Stage RDI
IV.DON	1.326 *** (2.86)	
DON		0.547 *** (4.31)
Controls	Control	Control
YEAR/IND/PROV	Control	Control
Constant	0.168 (0.92)	1.222 ** (2.18)
Observations	3651	3651
R-squared	0.443	0.420

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

5. Discussion

This study has both theoretical and practical implications for corporate and social administrations to guide the development of philanthropic and innovative activities. First, it enriches the study of charitable behavior with its outcome variables and its micro-mechanisms, providing support for the economic and political motivations of philanthropic donations in the Chinese manufacturing context. While previous studies have focused on the impact of philanthropic donations on firm performance [10], we constructed and quantified the relationship between philanthropic donations and innovation investment, and verified that firms are able to obtain more resource support through the signaling effect and social exchange effect of philanthropic donations, which in turn promote innovation investment. This has theoretical implications for further revealing the “black box” in the process of philanthropic donations affecting corporate innovation.

Second, this study broadens the meaning and applications of social exchange theory. Most of the existing studies have analyzed from the perspectives of organizational behavior theory, resource dependence theory, and agency theory, but this paper analyzes the mutually beneficial behavior between enterprises and government from the perspective of social exchange, which provides a unique perspective to unravel the long-standing controversy about the relationship between corporate social responsibility and innovation. At the same time, most of the previous studies on external resource acquisition have focused on suppliers, customers, competitors, universities, and research institutions outside of enterprise [5],

lacking an in-depth investigation of the role of governmental S&T resources. This paper enriches the research results in the field of social resource acquisition by clarifying the role of government S&T resources in corporate innovation, and helps to further clarify the value of charitable donations to corporate innovation.

Finally, we further analyzed the conditions that influence firms benefiting from philanthropy. Existing studies have paid little attention to the influential role played by the composite career experiences of executives within organizations [20,31]. We found that generalist CEOs “boost” the roles of philanthropic donations in corporate innovation and government access to S&T resources to enhance corporate innovation through a total effect moderation model. This further supports the “dynamic role theory” of generalist CEOs and broadens the application of higher-order theoretical results in the field of corporate philanthropy and innovation.

This study offers some implications for management systems practice. First, organizations should pay attention to the signaling utility of philanthropic behavior, build a set of scientific and effective donation mechanisms, track and evaluate the social and corporate benefits of philanthropic behavior in a timely fashion, and more rationally use philanthropic behavior in exchange for external science and technology innovation resources to promote sustainable innovation development of enterprises. The results of this paper show that philanthropy and innovation investment are not contradictory to each other. Enterprises can achieve a win–win situation between them and the government by “exchanging” resources with the government through charitable donations. Therefore, corporate decision makers should objectively evaluate and manage philanthropic donations and elevate them to strategic decisions at the organizational level.

Second, enterprises should pay full attention to the access to government S&T resources. In an open innovation environment, internal innovation resources have an enhancing effect on enterprise innovation performance, and external innovation resources, especially government S&T resources, also play an important role in promoting enterprise innovation [11]. Therefore, in addition to acquiring resources from external suppliers, distributors, science and technology institutions, universities and colleges, and enterprises should also incorporate the acquisition of government S&T resources into their strategic planning systems, improve the complementary mechanisms of internal and external innovation resources, optimize the organization’s resource allocation, realize the effective integration of internal and external innovation resources, and further promote the benign development of enterprise innovation by acquiring complementary government S&T resources.

Thirdly, each organization needs to improve its training and selection mechanism for composite talents to maximize the regulating and guiding role of generalist CEOs. This study found that generalist CEOs help companies to obtain S&T resources through charitable donations and thus enhance innovation. Therefore, for management practice, it is not only necessary to pay attention to the introduction of generalist talents with complex career experiences, but also to build a good development platform for talents, such as providing multifaceted knowledge and skill training, overseas work opportunities, and rotational exchange study, to cultivate managers’ comprehensive management skills and diversified ways of thinking and enhance their innovation awareness and ability. In addition, this study emphasizes the role of composite managers, but does not deny the unique advantages of professional talents in their specialized fields, so companies need to focus on screening talent traits and optimizing talent resource allocation.

This study offers some policy implications for social management systems at all levels. First, the modern market economy system should be improved at the level of government regulation, and efforts should be made to alleviate the resource dilemma of organizational development. China’s government-led resource allocation system still exists to expose companies to resource dilemmas, and companies may obtain resources for innovation and development through alternative strategies of informal systems, such as strategic philanthropy [1]. This, to some extent, distorts the altruistic nature of philanthropic

behavior and increases the cost burden of enterprises. Therefore, the market environment can be optimized through macro-regulation and appropriate incentives to reduce financing costs and promote innovation development.

Second, the overall leadership of philanthropy should be continuously strengthened, and the social culture of philanthropy should be enhanced. Philanthropy is crucial to the development of social and economic systems. Although enterprises make philanthropic donations to obtain resources, they also assume social responsibility and promote social stability to a certain extent. Therefore, all sectors of society should be guided to view corporate philanthropy in a more objective manner, give more encouragement and affirmation, and create a healthy and inclusive environment for the development of social philanthropy.

Third, more attention should be paid to the cultivation of complex talents and the improvement of talent policies. We should fully coordinate the resources of schools, enterprises, and research institutes to bring into play the roles of theoretical education and practical training to improve management ability. At the same time, we should improve the synergistic policy system of compound talents from multiple angles to maximize the cultivation, regulation, and guidance of generalist CEOs, and achieve a balance between social management benefits and innovative economic development.

6. Conclusions and Future Studies

Does corporate philanthropy have the nature of signaling and social exchange? Are generalist CEOs better suited as leaders of organizations? This paper investigated these questions from the perspective of corporate innovation. Based on the cross-fertilization of social exchange theory, signaling theory, imprinting theory, and higher-order theory, we used manually collected data of generalist CEOs and conducted a study based on the logic of “action principle—action path—action effect—influence factor” to monitor and quantitatively validate the big data sample of Chinese manufacturing companies.

The main findings suggest that: (1) Philanthropy has a signaling role. Through philanthropic donations, enterprises can effectively alleviate the information asymmetry between external stakeholders and enterprises, obtain continuous resource support from stakeholders, and extend their external knowledge and social networks, which has a significant incentive effect on their R&D behavior. (2) Philanthropy has a social exchange effect. However, unlike the debt financing returns found in previous studies [5], we found that philanthropic donations can bring returns to government S&T resources for enterprises through the linkage and social exchange behavior between enterprises and government, thus enabling enterprises to invest more resources in R&D and indirectly promoting innovation investment, i.e., philanthropic donations are the “quid pro quo” for enterprises’ acquisition of external resources for innovation. (3) Generalist CEOs are the “boosters” of enterprise innovation development. In Figure 3, it can be seen that the higher the level of the CEO generalist, the stronger the effect of philanthropic donations on innovation investment, and the stronger the effect of government S&T resource acquisition on innovation investment, indicating that generalist CEOs can serve the strategic philanthropy of the organization, and can provide a boost to the exchange behavior of enterprise and government resources and innovation development.

Although some meaningful findings were obtained in this paper, there are still some shortcomings. First, the data were all from Chinese listed companies, and the research findings may have some limitations. In the future, we may consider expanding the scope of the study by selecting small and medium-sized organizations from different regions, cultures, and market environments as research objects for comparative studies to clarify the structural similarities and differences in the roles of philanthropic behavior in innovation development and to expand the generalizability of the findings. Secondly, this study provides only one possible path for analyzing the relationship between philanthropic and innovative activities. To study the systematic influence of philanthropic donations on innovation in social organizations, it is necessary to consider not only the acquisition and input of innovation resources, but also the adaptability of different scientific and technological

resources, and to analyze the differential absorption and transformation levels of different organizations by proxy [13]. Finally, only charity that is actually noticed by stakeholders is beneficial to gaining recognition [11], i.e., organizations' benefits from philanthropy will be influenced by the cognitive evaluations of stakeholders. Therefore, future research can combine psychology-related theories to more comprehensively and systematically clarify the boundary conditions of philanthropy affecting innovation systems.

Author Contributions: Conceptualization, L.H. and M.J.; methodology, L.H.; software, L.H.; validation, L.H. and M.J.; formal analysis, L.H. and M.J.; investigation, L.H. and M.J.; resources, L.H.; data curation, L.H.; writing—original draft preparation, L.H.; writing—review and editing, L.H. and M.J.; supervision, M.J.; project administration, M.J.; funding acquisition, L.H. and M.J. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The authors are grateful to the editor and anonymous referees for their constructive comments and suggestions, which sufficiently helped the authors to improve the presentation of this manuscript.

Conflicts of Interest: The authors declare no conflict of interest.

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