The Effects of Listed Company Charitable Foundation on Business Relationship of Supply Chain: Based on the Empirical Research of Corporate Social Responsibility

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ABSTRACT

The Public Welfare Foundation of a listed company is a non-profit organization with independent legal personality. It is established and funded by a listed company. The purpose of establishing a foundation for a listed company is generally to carry out charitable activities and make important contributions to charitable causes. However, due to the special power separation model, the autonomy of the foundation is poor, and there may be serious agency conflicts, ultimately leading to listed companies becoming beneficiaries of the foundation's charitable activities. We have found from the perspectives of commercial credit, sales, and cooperative relationships that social responsibility initiating organizations (listed companies) can obtain potential benefits from social responsibility fulfilling organizations (listed company public welfare foundations) in supply chain commercial relationships, that is, listed companies that establish public welfare foundations have good supply chain commercial relationships. When a listed company and a public welfare foundation have a close relationship in terms of fund donation, decision-making, business, and naming, the public welfare foundation has a strategic preference in selecting project names, project service areas, project beneficiaries, and project service areas. It prioritizes the interests of the listed company, enabling the listed company to obtain better supply chain business relationships.

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1. Introduction

A foundation is a non-profit legal entity that uses property donated by natural persons, legal persons, or other organizations to engage in public welfare undertakings. The investor, as the principal, donates property to the foundation and entrusts it to engage in charitable and public welfare undertakings. Public foundations are a bridge between wealth and charitable values, using property donated by individuals, legal persons, or other organizations for charitable purposes. Public foundations have developed rapidly in China and have become a major force in meeting the public's demand for charitable resources, playing an important role in maintaining social fairness, alleviating social conflicts, and promoting social harmony. Since the establishment of the first national public foundation in China, the China Children and Teenagers' Fund, in 1981, the foundation has experienced over 30 years of development. After the promulgation of the "Foundation Management Regulations" in 2004, the foundation entered a rapid development mode. Over 90% of the foundations were established after 2004. In the past decade, the average annual growth rate of the number of public foundations has reached 14.96%, showing a significant increase in growth rate.

In the context of the flourishing development of public foundations in China, theoretical research on domestic foundations has become increasingly rich. Research has mainly focused on various types of foundations, including all foundations (Cheng et al., 2018; Shen & Yu, 2019), public foundations (Zhang & Zhu, 2019), national public welfare foundations (Zhang et al., 2013), foundations with high transparency (Chen & Zhang, 2014; Zhang et al.,2023), and community foundations (Li & Tu, 2020). However, research on corporate foundations is relatively scarce, and most studies are theoretical in nature, with very few empirical studies. In terms of research content, the focus has been on exploring foundation organizational performance (Yan & Yuan, 2017), donation income and decision-making (Xie, 2014; Liu et al., 2022), foundation audits (Zhang et al., 2012), and information disclosure (Xie, 2014; Wang et al., 2023), while neglecting the economic consequences of foundation charitable behavior.

Corporate foundations, compared with other types of foundations, have certain peculiarities, such as poor autonomy and the potential for control by the contributing companies (Chen & Li, 2016). They are usually regarded as internal departments of contributing companies, and the multiple principal-agent problems resulting from different rights and obligations may lead to damage to the interests of principals by agents (Li & Yi, 2015). As a non-profit organization with an independent legal personality, a corporate foundation theoretically should not be the beneficiary of the foundation's charitable activities. However, for-profit companies are the initiators, main donors, and director-recommending units of public welfare foundations, and may require public welfare foundations to win a social reputation for the contributing companies and provide the necessary support for their strategies. A large number of studies have shown that corporate foundations can bring direct economic benefits to contributing companies, enhance their brand value (Monfort & Villagra, 2016), increase employee morale and organizational identity (Parket & Eilbirt, 1975), and create market value for the companies (Kitchin, 2003). As Duquette and Ohrn (2018) have pointed out, public welfare foundations are not necessary institutions for companies to conduct charitable donations, and the establishment process of public welfare foundations is cumbersome. Companies need to donate a large number of funds to public welfare foundations for charitable causes and may face expenditure restrictions and regulations. However, large listed companies in the United States still show a high degree of preference for public welfare foundations. This to some extent indicates that although the operating costs are high, public welfare foundations can indeed bring significant benefits to companies.

Given the practical needs of Chinese foundations, the lag in research on domestic enterprise foundations, and the availability of data, this article selects listed companies that establish public welfare foundations as the

research object. Based on the dual dimensions of suppliers and customers, this article explores the economic consequences of public welfare foundations in listed companies from the perspective of supply chain business relationships, and verifies whether the establishment of foundations is beneficial for improving the supply chain relationships of listed companies. On this basis, based on the funding donation relationship, decision-making relationship, management relationship, business relationship, and naming relationship, depict the correlation between listed companies and public welfare foundations of listed companies, further explore the differential impact of the close relationship between social responsibility initiators and fulfillment institutions on the supply chain business relationship of listed companies, and depict the situational dependent factors of potential beneficiary rights of listed companies.

2. Theoretical Analysis and Research Hypothesis

A foundation is a non-profit legal entity, where natural persons, legal persons, or other organizations act as capital contributors to donate assets to the foundation and entrust it to engage in charitable and public welfare undertakings. The agency problem also exists in nonprofit organizations, and foundations are no exception (Zylbersztajn, 2005; Wang et al.,2022). Foundations do not have residual claimants and have the characteristic of separating decision-making power from management power (Fama & Jensen, 1983). The foundation's investors, decision-makers, managers, and beneficiaries are completely separate. As the trustee, the foundation is responsible for giving donated assets to beneficiaries according to the donor's wishes. As an independent nonprofit organization, "non-distribution constraint" is an important characteristic of foundations, that is, after donors donate property to the foundation, the foundation cannot distribute net income to the donors (Mindlin, 2012). Because the donor's donation to the foundation is a unilateral legal act without forming consideration, it will not form an equal power and obligation relationship with the donated property. That is to say, the donor does not have a direct beneficial right to the enterprise, and the foundation's donors will not become beneficiaries at the same time.

According to the differences in funding sources, foundations can be classified into community foundations, corporate foundations, family foundations, individual foundations, and university foundations. Corporate foundations are initiated and managed by for-profit companies and are nonprofit organizations with independent legal personalities that follow the purpose of public welfare and charity. Corporate foundations are legally independent of their funding companies. However, the decision-makers and managers of corporate foundations usually come from their funding companies, and the operation of corporate foundations is to some extent influenced by their funding companies. There is a close relationship between the two (Brown et al., 2006). Compared with non-corporate foundations, corporate foundations have a special power separation mode, which is characterized by a unidirectional path of funding rights, decision-making rights, management rights, and a potential closed loop of benefit rights (Chen & Li, 2016); that is, the decision-making and management rights of corporate foundations are separated, and the funding companies enjoy a certain degree of intangible or tangible returns, namely potential benefit rights.

Corporate foundations help to enhance the reputation of funding companies (Fan, 2005; Morsing & Schultz, 2006), establish a good image of funding companies in the public eye (Westhues & Einwiller, 2006), promote employees' career development and training (Ostrower, 2006), and win more recognition from employees (Pedrini & Minciullo, 2011). Kietlińska and Miołajczyk (2014) pointed out that corporate foundations can achieve a close integration of funding companies and civil society, bringing more economic benefits to funding companies. The charitable activities carried out by corporate foundations can convey the signal that the company attaches importance to stakeholders to the public, and win more support from stakeholders for the company, which has a

positive impact on the company's operating profit (Porter & Kramer, 2002). Corporate foundations can enhance shareholders' sense of responsibility for fulfilling social responsibilities, improve the brand reputation of funding companies, and have a positive impact on the market value of funding companies (Wang & Korschun, 2015; Ali, Danish, & Asrar-ul-Haq, 2020; Arco-Castro et al., 2020; Zor et al., 2023). Monfort et al. (2021) pointed out that funding companies can improve their market value by endorsing their brand when establishing a foundation.

The corporate foundation represents the charitable attitude of the funding company, and engaging in philanthropic activities in fields related to the funding company is usually the preferred choice of the corporate foundation (Pedrini, 2011). The potential benefits that the funding company enjoys in its supply chain business relationships are most directly reflected in the funded foundations. The corporate foundation has a positive impact on enhancing the image of the funding company and can be considered a part of the funding company's brand (Monfort & Villagra, 2016). The corporate foundation has a positive impact on the funding company through investments in brand recognition, increasing public loyalty to the company and its products, and other means (Wulfson, 2001). Zhang et al. (2020) pointed out that many corporate foundations utilize the funding company's economic platform, leveraging the funding company's advantages in resource investment, product development, capital operation, and business relationships, to integrate the foundation's public charity behavior into the funding company's consumer behavior, effectively promoting the close integration of the funding company and public charity. Hornstein and Zhao's (2018) study found that when the funding company carries out marketing or supply chain management activities in its branches in a particular area, the corporate foundation is more inclined to carry out philanthropic activities in that area. The funding company tends to link the beneficiaries of the corporate foundation with potential consumers (Westhues & Einwiller, 2006) and potential suppliers to improve consumer loyalty to the company, promote trust between suppliers and the company, and ultimately improve the funding company's supply chain business relationships. Publicly listed companies' initiated foundations are typical representatives of corporate foundations, possessing significant characteristics of corporate foundations. Of course, due to the multiple principal-agent problems caused by different rights and obligations, enterprise foundations may also cause damage to the interests of the principals' listed companies (Li & Yi, 2015). In view of this, we study the impact of public welfare foundations of listed companies on improving the supply chain business relationships of invested listed companies.

Hypothesis 1: Listed companies that establish public welfare foundations have good supply chain business relationships.

Various types of nonprofit organizations, including foundations, are referred to as the third sector of society, characterized by organizational structure, non-profit distribution, voluntariness, public nature, and autonomy. However, corporate foundations have their characteristics and should not be regarded as third-sector organizations, but as intermediate organizations (two and a half) between the second sector ("private domain" enterprises) and the third sector. This is because corporate foundations are initiated by contributing enterprises and, although they have independent legal status, they do not have autonomy (Mindlin, 2012; Wang et al., 2022).

Corporate foundations are non-public foundations with a strong dependence on contributing enterprises (Yang, 2010), typically seen as internal departments of contributing enterprises (Li & Yi, 2015). The close relationship between contributing enterprises and corporate foundations is mainly reflected in fund dependence, member dependence, operational dependence, and name homogeneity. Although the owners of the foundation also exhibit an absence of characteristics, the donated funds of corporate foundations mainly come from profitable contributing enterprises (Petrovits, 2006). The decision-making bodies of the foundation, the board of directors, and the secretary-general, are usually composed of managers from the contributing enterprises. In the operation process of the foundation, contributing enterprises also provide support to the foundation in

knowledge (Minciullo & Pedrini, 2015), skills, management, and material guarantee (Frooman, 1999). The name of the corporate foundation usually includes the core name of the contributing enterprise (Rey-Garcia et al., 2012), showing the close relationship between the corporate foundation and the contributing enterprise. When the existence of an organization (corporate foundation) relies on voluntary contributions of funds from another organization (contributing enterprise) to achieve its goals, the donors of the resources hope that these donated materials can help them achieve their organizational mission and goals (Zylbersztajn, 2005). The establishment of a corporate foundation by a contributing enterprise aims to spread the charitable image of the contributing enterprise, enhance the company's reputation, and increase employees' sense of identity (Pedrini, 2011).

The close relationship between corporate foundations and their sponsoring companies tends to be reinforced by frequent interactions, participation in joint work, and high levels of trust between the two entities (Rowley et al., 2000). As the relationship between the sponsoring company and the corporate foundation becomes closer, the sponsoring company's influence on the corporate foundation's structure, objectives, and charitable activities becomes more far-reaching (Bronn & Vidaver-Cohen, 2009). A key feature of corporate foundations is that their activities are more focused on supporting the sponsoring company, intending to help it gain legitimacy, promote its profit growth, enhance the dissemination of culture and knowledge (Fombrun & Shanley, 1990), and serving as a tool for the sponsoring company to pursue its interests and improve its public relations (Marquardt, 2001; Duquette & Ohrn, 2018), thus playing an important role in driving the sponsoring company's pursuit of corporate interests (Brown et al., 2006). Petrovits (2006) found that companies tend to strategically donate to corporate foundations to manage their earnings and achieve their financial reporting goals. When a sponsoring company establishes a new overseas branch or enters into a new business in a weak institutional environment, the corporate foundation tends to carry out charitable activities in that country to improve the sponsoring company's business environment (Hornstein & Zhao, 2018).

It is the close relationship between corporate foundations and their sponsoring companies that enables the sponsoring companies to potentially benefit more from the corporate foundation's charitable activities (Lev et al., 2010). Therefore, we argue that corporate foundations have a dual identity, with both a social identity in public welfare work and an organizational identity in profit-seeking activities. Thus, the higher the degree of association between a listed company foundation and the listed company, the more benefits the listed company foundation may gain for the listed company in terms of both social welfare and commercial relations. Based on this, Hypothesis 2 is proposed.

Hypothesis 2: The closer the relationship between the initiator (listed company) and executor (listed company foundation) of social responsibility, the more harmonious the commercial relationships of the listed company's supply chain.

3. Model design

3.1. Sample selection and data sources

We selected Chinese A-share listed companies between 2008 and 2019 as the initial sample and used the difference-in-differences method based on the propensity score matching (DID-PSM) to explore the impact of listed company foundations on the business relationships of their supply chains from the perspective of organizational social responsibility (Xie et al., 2022). Considering that the data on the top five customers and suppliers of listed companies began to be disclosed in detail in 2007 and that the new accounting standards in 2007 may have a potential impact on the research conclusions, we chose 2008 as the starting point for the research. When a corporate foundation is initiated by multiple listed companies, this study selected the listed

company with the highest donation to the foundation as the contributing listed company. After removing financial and insurance industry listed companies and samples with missing key data, a total of 1042 unbalanced panel data from sample years were obtained through the propensity score matching method.

The data on listed company foundations were sourced from the Ministry of Civil Affairs, local civil affairs websites, the Foundation Center website, listed company foundation official websites, and the China National Research Data Service Platform (CNRDS). Other data were sourced from the CSMAR and RESSET databases. To mitigate the potential impact of extreme values on the research conclusions, this study truncated all continuous variables at the 1% level.

3.2. A model of the impact of public benefit foundations on business relationships

Based on a preliminary sample of A-share listed companies in China from 2008 to 2019, we focus on the dual dimensions of suppliers and customers to reflect the supply chain business relationships of listed companies. By using the DID-PSM method, the following model is established to test hypothesis 1 and explore the impact of the foundation on the business relationships of listed companies.

$$
\begin{aligned}
BRAP1_{it} \text{ or } BRAP2_{it} \quad = &\; \alpha + \beta_1 TREAT_i + \beta_2 POST_t + \beta_3 TREAT_i \times POST_t + \beta_4 SIZE_{it} + \beta_s LEV_{it} \\
& + \beta_6 ROE_{it} + \beta_7 CF_{it} + \beta_8 INV_{it} + \beta_9 AGE_{it} + \beta_{10} SUPP_{it} + \beta_{11} SOE_{it} \\
& + \beta_{12} LSH_{it} + \beta_{13} INDE_{it} + \gamma_i \textstyle\sum YEAR_i + \pi_j \textstyle\sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{1}
$$

$$
\begin{aligned}
BRCP_{it} \quad = &\; \chi + \delta_1 TREAT_i + \delta_2 POST_t + \delta_3 TREAT_i \times POST_t + \delta_4 SIZE_{it} + \delta_s LEV_{it} \\
& + \delta_6 CF_{it} + \delta_7 RECE_{it} + \delta_8 CUST_{it} + \delta_9 SFEE_{it} + \delta_{10} SOE_{it} + \delta_{11} LSH_{it} \\
& + \delta_{12} INDE_{it} + \delta_{13} DUAL_{it} + \phi_i \textstyle\sum YEAR_i + \iota_j \textstyle\sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{2}
$$

$$
\begin{aligned}
BRSO_{it} \text{ or } BRCO_{it} \quad = &\; \varpi + \theta_1 TREAT_i + \theta_2 POST_t + \theta_3 TREAT_i \times POST_t + \theta_4 SIZE_{it} + \theta_s LEV_{it} \\
& + \theta_6 ROE_{it} + \theta_7 MS_{it} + \theta_8 SOE_{it} + \theta_9 LSH_{it} + \theta_{10} INDE_{it} + \theta_{11} DUAL_{it} \\
& + \theta_{12} MSH_{it} + \vartheta_i \textstyle\sum YEAR_i + \rho_j \textstyle\sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{3}
$$

The dependent variable in this model is the business relationships of the listed companies, which includes three dimensions: commercial credit relationships between the listed companies and suppliers (BRAP1, BRAP2), commercial sales relationships between the listed companies and customers (BRCP), and commercial cooperation relationships between the listed companies and major suppliers or customers (BRSO, BRCO), with a total of five variables.

The degree of commercial credit financing (BRAP1, BRAP2) measures the commercial credit relationship between the listed company and its suppliers, reflecting the amount of commercial credit that the suppliers are willing to grant the listed company. BRAP1 is measured by the ratio of accounts payable to operating costs, while BRAP2 is measured by the ratio of accounts payable minus prepayments to operating costs.

Customer purchase willingness (BRCP) is measured by the growth rate of the listed company's sales revenue, reflecting the commercial sales relationship between the listed company and its customers. The stronger the willingness of customers to purchase the listed company's products, the higher the growth rate of its sales revenue.

The willingness of major suppliers (BRSO) and major customers (BRCO) to cooperate reflects the long-term commercial cooperation relationship between the listed company and its major suppliers or customers. In the top five suppliers, the accumulated years of continuous business cooperation between each major supplier and the company divided by five is the measurement of BRSO. In the top five customers, the accumulated years of continuous business cooperation between each major customer and the company divided by five is the measurement of BRCO.

Since the time of the establishment of the foundation varies among companies, this study uses the

multi-time-point propensity score matching method to control for the self-selection effect of listed companies in establishing foundations based on four matching indicators: company size, debt, profitability, and equity nature. Through the nearest-neighbor matching method, this study selects comparable listed companies that have not established foundations for each listed company that has established a foundation. TREAT is a dummy variable for the treatment group, which is assigned a value of 1 if the listed company has established a foundation (treatment group), and 0 if the listed company has not established a foundation (control group). POST is a dummy variable for the treatment period, which is assigned a value of 1 if the listed company has established a foundation, and 0 otherwise.

Drawing on Tang et al. (2017) and Fang and Chu (2019), Model (1) controls for the following variables that affect commercial credit financing: firm size (SIZE), leverage ratio (LEV), return on equity (ROE), operating cash flow (CF), inventory growth rate (INV), firm age (AGE), the proportion of purchasing amounts from the top five suppliers to the total purchasing amount (SUPP), ownership structure (SOE), the shareholding ratio of the largest shareholder (LSH), board independence (INDE), and year and industry virtual variables (YEAR, INDU).

Drawing on Teng et al. (2020), Model (2) controls for the following variables that affect commercial sales relationships: firm size (SIZE), leverage ratio (LEV), operating cash flow (CF), net accounts receivable (RECE), the concentration of the top five customers (CUST), customer relationship investment level (SFEE), ownership structure (SOE), the shareholding ratio of the largest shareholder (LSH), board independence (INDE), dual leadership structure (DUAL), and year and industry virtual variables (YEAR, INDU).

Drawing on Pan and Zhang (2020), Model (3) controls for the following variables that affect commercial cooperative relationships: firm size (SIZE), leverage ratio (LEV), return on equity (ROE), market share (MS), ownership structure (SOE), the shareholding ratio of the largest shareholder (LSH), board independence (INDE), dual leadership structure (DUAL), executive shareholding (MSH), and year and industry virtual variables (YEAR, INDU).

3.3. A model of the impact of institutional affiliation of socially responsible organizations on business relationships

Based on the funding donation relationship, decision-making relationship, management relationship, business relationship, and naming relationship, the following model is established to verify hypothesis 2 and analyze the effect of the closeness between listed companies and foundations on the business relationships of listed companies. This is done to further explore the potential differences in the benefits of listed companies acquiring foundation public charity behaviors.

$$
\begin{aligned}
BRAP1_{it} \ or \ BRAP2_{it} \quad = \zeta &+ \psi_1 DDMBN_{it} + \psi_2 SIZE_{it} + \psi_3 LEV_{it} + \psi_4 ROE_{it} + \psi_5 CF_{it} + \psi_6 INV_{it} \\
&+ \psi_7 AGE_{it} + \psi_8 SUPP_{it} + \psi_9 SOE_{it} + \psi_{10} LSH_{it} + \psi_{11} INDE_{it} \\
&+ \xi_i \sum YEAR_i + v_j \sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{4}
$$

$$
\begin{aligned}
BRCP_{it} = \quad \tau &+ \varsigma_1 DDMBN_{it} + \varsigma_2 SIZE_{it} + \varsigma_3 LEV_{it} + \varsigma_4 CF_{it} + \varsigma_5 RECE_{it} + \varsigma_6 CUST_{it} + \varsigma_7 SFEE_{it} \\
&+ \varsigma_8 SOE_{it} + \varsigma_9 LSH_{it} + \varsigma_{10} INDE_{it} + \varsigma_{11} DUAL_{it} + v_i \sum YEAR_i + o_j \sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{5}
$$

$$
\begin{aligned}
BRSO_{it} \ or \ BRCO_{it} = D &+ h_1 DDMBN_{it} + h_2 SIZE_{it} + h_3 LEV_{it} + h_4 ROE_{it} + h_5 MS_{it} + h_6 SOE_{it} \\
&+ h_7 LSH_{it} + h_8 INDE_{it} + h_9 DUAL_{it} + h_{10} MSH_{it} + \wp_i \sum YEAR_i + \partial_j \sum INDU_j + \varepsilon_{it}
\end{aligned} \tag{6}
$$

The dependent variables and control variables in Model (4)-(6) are the same as those in Model (1)-(3). The independent variable is the relevance (DDMBN) between the public welfare foundation of the listed company and the listed company, including a total of six variables: overall relationship (ALL), funding donation relationship (DONE), decision-making relationship (DECI), management relationship (MANA), business relationship (BUSI), and naming relationship (NAME).

The overall relationship (ALL) is a variable that summarizes the relevance between the listed company and the foundation, constructed from the following five virtual variables: whether there is funding donation (DONE0), whether decision-makers coincide (DECI0), management relationship (MANA), business relationship (BUSI), and naming relationship (NAME). The specific formula for measuring ALL is ALL=(DONE0+ DECI0+ MANA + BUSI + NAME)/5. The larger the value of ALL, the higher the relevance between the listed company and the foundation. We are not sure which variable has the greater impact, so we assume that their impact on the dependent variable is equal. Moreover, we conducted separate regressions for each variable, so neither weighting nor averaging may affect the results. In addition, some independent variables are dummy variables, and we believe that weighting them may not be appropriate. We referred to Zhang et al. (2023).

The funding donation relationship (DONE) is measured by dividing the donation income from the listed company to the listed company foundation by the total donation income obtained by the listed company foundation. The virtual variable of whether there is a funding donation (DONE0) takes a value of 1 when the listed company donates to the listed company foundation and 0 otherwise.

The decision-making relationship (DECI) is measured by the proportion of directors of the listed company who serve as members of the foundation. The board of directors is the decision-making body of the foundation and is responsible for important matters within the scope of the charter. When there is a high degree of overlap between the directors of the foundation and the senior management of the listed company, the foundation is more likely to reflect the will of the listed company in its charitable activities, indicating a closer relationship between the foundation and the listed company. The decision-making personnel overlap (DECI0) is a dummy variable, with a value of 1 when the directors of the foundation are from the senior management of the listed company, and 0 otherwise.

The management relationship (MANA) is a dummy variable indicating whether the secretary-general of the listed company foundation comes from the listed company, with a value of 1 if so, and 0 otherwise. The secretary-general is the highest full-time manager responsible for the daily affairs of the foundation and is elected by the board of directors, to whom they are accountable.

The business relationship (BUSI) is a dummy variable indicating whether the purpose or business scope of the listed company foundation is related to the business operations of the listed company, with a value of 1 if so, and 0 otherwise. According to the "Foundation Management Regulations," the foundation must clearly define the purpose and scope of its public welfare activities in its charter. When the purpose or business scope of the foundation is related to the business operations of the listed company to a certain extent, it indicates that the charitable activities of the listed company are to some extent centered around its business operations, suggesting a close relationship between the foundation and the listed company.

The naming relationship (NAME) is a dummy variable with a value of 1 when the name of the listed company foundation is derived from the name of the listed company, and 0 otherwise. For example, the Zijin Mining Charity Foundation is a national non-public fundraising foundation initiated by Zijin Mining Group Co., Ltd. in 2012 with a capital contribution of RMB 200 million, and the name of the foundation is derived from the name of the sponsoring listed company.

4. Analysis of the empirical results

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for the variables. The mean values for the size of commercial credit financing, as measured by BRAP1 and BRAP2, are 0.225 and 0.152, respectively. This indicates that, on average,

the sample companies receive commercial credit from their suppliers, as a percentage of their operating costs, of more than 15% for procurement-related activities. The mean value for customer purchase intention (BRCP) is 0.471, indicating that the sample companies have experienced an average annual growth rate of 47.1% in sales revenue. The mean value for the willingness of the top five suppliers to cooperate (BRSO) is 0.629, indicating that the average cumulative period for establishing commercial relationships between the top five suppliers and the sample companies is seven and a half months. The mean level of willingness to cooperate with the top five customers (BRCO) is 1.216, indicating that the average cumulative period for establishing commercial relationships between the top five customers and the sample companies is more than one year. The average percentage of donations received by the sample companies' foundations from the listed companies that made contributions is 9.4%. Nineteen percent of foundation directors and 5.9% of foundation secretaries come from senior management of the listed companies. 41.7% of the listed company foundations have purposes or business scopes related to the listed companies operations as stipulated in their articles of association. 58.6% of the listed companies use their core names in the names of the foundations they established with their contributions.

The mean value for company size (SIZE) is 23.820. The average levels of asset-liability ratio and return on net assets for the sample companies are 56% and 10.7%, respectively. The average proportion of net cash flow from operating activities to total operating income is 4.3%. The mean values for inventory growth rate and company age are 34.9% and 8.085, respectively. The average proportion of purchases made from the top five suppliers to the total purchases of the sample companies is 24.3%. Fifty-one percent of the sample companies are state-owned enterprises. The average shareholding ratio of the largest shareholder is 40.1%, and the average proportion of independent directors is 37.8%. The average proportion of net accounts receivable to total assets is 8.1%. The mean level of sales from the top five customers as a percentage of total sales for the sample companies is 29.4%. The average proportion of customer relationship investment cost incurred through sales and management expenses to operating income is 18.1%. Nineteen point two percent of the sample companies have CEOs who also serve as chairpersons. The average market share is 6.7%. The average level of executive shareholding is 5.2%.

Table 1. Descriptive statistics.

Variables	Mean	Median	Standard Deviation	Variables	Mean	Median	Standard Deviation
BRAP1	0.225	0.167	0.251	CF	0.043	0.084	0.929
BRAP2	0.152	0.113	0.274	INV	0.349	0.144	1.060
BRCP	0.471	0.141	3.240	AGE	8.085	8.421	1.193
BROS	0.629	0.000	1.064	SUPP	0.243	0.164	0.227
BRCO	1.216	1.000	1.570	SOE	0.510	1.000	0.500
DONE	0.094	0.000	0.263	LSH	0.401	0.378	0.178
DECI	0.190	0.106	0.243	INDE	0.378	0.364	0.062
MANA	0.059	0.000	0.237	RECE	0.081	0.043	0.096
BUSI	0.417	0.000	0.494	CUST	0.294	0.242	0.200
NAME	0.586	1.000	0.496	SFEE	0.181	0.107	0.519
SIZE	23.820	23.740	1.745	DUAL	0.192	0.000	0.394
LEV	0.560	0.580	0.202	MS	0.067	0.021	0.124
ROE	0.107	0.098	0.134	MSH	0.052	0.0002	0.130

4.2. Analysis of empirical results

We use the propensity score matching method with multiple time points and employ a stepwise regression

approach to ultimately determine four paired variables: company size (SIZE), asset-liability ratio (LEV), return on equity (ROE), and equity nature (SOE). The nearest neighbor matching method is used to select the control group of listed companies to control for the self-selection effect of the foundation established by the listed company. Table 2 presents the results of the matching balance test. After matching, the absolute value of the standard deviation is less than 5%, and the p-value of the t-test is not significant, satisfying the parallel hypothesis. The test results show that before matching, there were significant differences between the treatment group and the control group in terms of the matching variables. However, after matching, the differences between the treatment group and the control group are no longer significant, and the distribution is relatively balanced. Therefore, the matching variable selection in this paper is reasonable, and the estimation results are valid.

Table 2. Results of the matching balance test.

Variables	Matching process	Mean value of variables		Standard deviation %	Reduction in deviation %	T-test	
		Experimental group	Control group			t	p>|t|
SIZE	Before matching	23.874	22.023	115.900		25.440	0.000
	After matching	23.874	23.901	-1.700	98.500	-0.230	0.822
LEV	Before matching	0.559	0.435	59.400		11.360	0.000
	After matching	0.559	0.569	-4.800	91.900	-0.710	0.479
ROE	Before matching	0.128	0.069	20.100		2.240	0.025
	After matching	0.128	0.129	-0.200	98.900	-0.060	0.956
SOE	Before matching	0.530	0.362	34.200		5.300	0.000
	After matching	0.530	0.524	1.300	96.200	0.140	0.890

Table 3 presents the regression results of the impact of listed company charitable foundations on commercial relationships. In columns (1) and (2), the regression coefficient of the treatment period dummy variable (POST) is significantly positive, reflecting the time trend difference in the existence of commercial relationships of listed companies when excluding the influence of the foundation establishment. The regression coefficients of the treatment group dummy variable (TREAT) and the treatment period dummy variable (POST) are both positive, but the significance is not ideal, indicating that there is not much difference in the matching results, and no significant time trend is shown. In all columns of Table 3, the coefficient of the interaction term (TREAT * POST) is significantly positive at least at the 5% level, indicating that the net effect of the establishment of listed company charitable foundations on commercial relationships is significantly positive. That is to say, the establishment of charitable foundations has a positive driving effect on improving the commercial relationships of listed companies. The regression results show that although listed companies and listed company foundations are both independent legal entities, the special power separation mode of listed company foundations enables the invested listed companies to obtain potential benefits from the listed company foundations, playing a significant improvement effect on the good commercial relationships between listed companies and customers/suppliers.

Table 3. DID regression results for listed public benefit foundations influencing business relationships.

	(1) BRAP1	(2) BRAP2	(3) BRCP	(4) BRSO	(5) BRCO
C	-0.088**	1.405***	-1.044***	1.725***	1.347***
	(-2.550)	(7.462)	(-4.272)	(7.037)	(6.180)
TREAT	0.036*	0.033	0.055*	0.047	0.008
	(1.808)	(1.375)	(1.810)	(1.019)	(0.644)
POST	0.058*	0.111**	0.393	0.028	0.141
	(1.802)	(2.555)	(1.033)	(0.313)	(0.828)
TREAT× POST	0.224***	0.226***	0.582***	0.405**	0.758**
	(6.029)	(5.482)	(4.607)	(2.109)	(2.210)
SIZE	0.010**	0.793***	0.527***	0.509***	0.093**
	(2.267)	(4.603)	(4.107)	(4.323)	(2.120)
LEV	0.102***	0.129***	0.287***	-0.014	-0.909***
	(2.913)	(3.101)	(2.867)	(-0.064)	(-2.906)
SOE	-0.342**	0.016	-0.416*	-0.228***	-0.179
	(-2.407)	(1.021)	(-1.908)	(-2.914)	(-1.594)
LSH	0.116***	0.729***	-0.376	0.567***	0.108
	(2.767)	(4.925)	(-0.892)	(2.801)	(0.374)
INDE	0.704***	0.567***	0.561***	0.536**	0.548**
	(5.035)	(2.821)	(3.796)	(2.217)	(2.559)
ROE	-0.039	0.034		0.112	0.066
	(-0.841)	(0.746)		(0.498)	(0.211)
INV	0.098***	0.118***			
	(3.840)	(3.981)			
AGE	-0.029	-0.049*			
	(-1.590)	(-1.702)			
SUPP	0.048*	0.040			
	(1.661)	(1.134)			
CF	-0.080**	-0.020	0.102**		
	(-2.425)	(-0.418)	(2.541)		
RECE			2.839		
			(1.095)		
CUST			0.719		
			(0.867)		
SFEE			-0.161		
			(-1.309)		
DUAL			-0.141***	-0.705***	-1.009***
			(-4.445)	(-3.888)	(-3.205)
MS				-0.711***	-0.260
				(-2.958)	(-0.541)
MSH				0.715**	0.551
				(2.297)	(1.141)
YEAR	YES	YES	YES	YES	YES
INDU	YES	YES	YES	YES	YES
Adj.R 2	0.113	0.153	0.185	0.123	0.046
F	2.855***	2.475***	5.977***	18.391***	4.823***
N	841	841	678	1042	1042

Notes: t-values in brackets; *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4 presents the regression results on the impact of the degree of association between the initiators of social responsibility (publicly listed companies) and the performers of social responsibility (listed company foundations) on the commercial relationships of publicly listed companies. The regression coefficients of the overall relationship (ALL) between publicly listed companies and foundations are significantly positive at the 1% level. The regression results indicate that when there is a close connection between a publicly listed company and the foundation it has established, the commercial credit relationship between the publicly listed company and its suppliers, the commercial sales relationship between the publicly listed company and its customers, and the commercial cooperation relationship between the publicly listed company and its large suppliers and customers all show a more harmonious state. When there is a close association between a publicly listed company and its foundation, the foundation will consider the interests of the publicly listed company to some extent when carrying

out public welfare and charity activities, which is manifested in the field of supply chain commercial relationships, showing that the foundation attaches importance to key stakeholders such as customers and suppliers of the publicly listed company, ultimately improving the commercial relationships of the publicly listed company. The regression results further clarify the contextual factors under which publicly listed companies can obtain potential benefit rights from their publicly listed company foundations, providing a way for social responsibility organizational structures to improve the supply chain commercial relationships of publicly listed companies. It should be noted that because the earliest annual report information of the foundation can be traced back to 2012, and many foundations have not disclosed annual report information, the data on whether funds have been donated (DONE0), whether decision-makers overlap (DECI0), and management relationships (MANA) are seriously missing. Therefore, the sample size of Table 4 has been greatly reduced, but this does not have a significant impact on the verification conclusion of Hypothesis 2.

Table 4. Impact of socially responsible organizational affiliation on business relationships of listed companies.

	(1) BRAP1	(2) BRAP2	(3) BRCP	(4) BRSO	(5) BRCO
C	-1.214***	1.493***	-0.101***	1.444***	0.353***
	(-4.673)	(8.079)	(-2.819)	(6.653)	(3.677)
ALL	0.648***	0.871***	0.690***	0.782***	0.713***
	(5.216)	(5.033)	(3.357)	(5.204)	(3.131)
SIZE	0.010**	0.596***	1.842***	0.772***	0.105**
	(2.068)	(5.121)	(7.318)	(5.564)	(2.419)
LEV	0.097***	0.116***	-0.119	0.069	-0.809**
	(2.747)	(2.781)	(-0.263)	(0.304)	(-2.512)
SOE	-0.063**	-0.434***	-0.431*	-0.252***	-0.207*
	(-2.117)	(-5.073)	(-1.866)	(-3.099)	(-1.740)
LSH	0.710***	0.119***	0.096**	0.109**	0.108**
	(4.932)	(2.752)	(2.322)	(2.433)	(2.548)
INDE	-0.284***	-0.335***	1.211	-1.110**	-2.053**
	(-3.487)	(-2.895)	(0.752)	(-2.026)	(-2.559)
ROE	-0.036	0.042		0.198	0.162
	(-0.768)	(0.926)		(0.879)	(0.505)
INV	0.660***	0.530***			
	(5.100)	(2.669)			
AGE	-0.387*	-0.235*			
	(-1.714)	(-1.668)			
SUPP	0.057*	0.040			
	(1.856)	(1.071)			
CF	-0.073**	-0.002	1.015**		
	(-2.067)	(-0.039)	(2.322)		
RECE			2.977		
			(1.080)		
CUST			0.842		
			(0.956)		
SFEE			-0.157		
			(-1.315)		
DUAL			-0.662***	-0.422***	-1.106***
			(-3.881)	(-2.793)	(-4.206)
MS				-0.674**	-0.511
				(-2.417)	(-0.983)
MSH				0.502*	0.590**
				(1.653)	(2.163)
YEAR	YES	YES	YES	YES	YES
INDU	YES	YES	YES	YES	YES
Adj.R 2	0.450	0.451	0.114	0.195	0.195
F	13.740***	12.320***	2.985***	2.844***	2.844***
N	237	237	187	259	259

*Notes: t-values in brackets; *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.*

Table 5 presents a breakdown of the overall relationship (ALL) between foundations and listed companies, showing the effects of funding donation relationships (DONE), decision-making relationships (DECI), management relationships (MANA), business relationships (BUSI), and naming relationships (NAME) on the supply chain business relationships of listed companies. The funding donation relationship (DONE) and decision-making relationship (DECI) are both significantly positive at the 5% level, indicating that the more funding a listed company donates to a foundation and the higher the proportion of foundation directors from the listed company, the better the supply chain business relationships of the listed company. The management relationship (MANA) has a significant positive effect on customer purchase intention (BRCP) and large customer cooperation intention (BRCO) at the 5% level. The regression results show that when the foundation secretary-general is from the listed company, customers have a stronger willingness to purchase products from the listed company, and cooperation between large customers and the listed company is also closer. However, the impact of the management relationship (MANA) on business credit financing scale (BRAP1, BRAP2) and large supplier cooperation intention (BRSO) is not significant, indicating that the improvement effect of the management relationship (MANA) on the supply chain business relationships of listed companies is more reflected in the consumer field. The business relationship (BUSI) has a significantly positive regression coefficient at the 1% level for the business credit financing scale (BRAP1, BRAP2), customer purchase intention (BRCP), large supplier cooperation intention (BRSO), and large customer cooperation intention (BRCO). The regression results show that when the foundation's purpose or business scope is related to the listed company's business activities, the supply chain business relationships of the listed company are better. According to the "Foundation Management Regulations," foundations should use their assets based on the purpose and business scope of the charter and public welfare activities. Non-public foundations must spend no less than 8% of their fund balance on public welfare activities stipulated by the charter. If a listed company sets the foundation's purpose or business scope in an area related to the company's operations through legitimate and compliant means, the listed company can legitimately obtain more potential benefits from the foundation's public welfare and charitable activities. The regression coefficient of the naming relationship (NAME) is significantly positive at least at the 10% level, indicating that when the foundation's name is derived from the listed company, the reputation association between the two has a positive driving effect on the supply chain business relationships of the listed company.

Table 5. The impact of the closeness of the sub-category of association between foundations and listed companies on business relationships.

The closeness of the relationship between the Foundation and the listed company	(1)	(2)	(3)	(4)	(5)
	BRAP1	BRAP2	BRCP	BRSO	BRCO
DONE	0.062***	0.048***	0.257**	0.126**	0.364***
	(4.058)	(3.103)	(2.082)	(2.585)	(2.836)
DECI	0.233**	0.882**	0.855**	1.097**	3.731***
	(2.462)	(2.615)	(2.026)	(2.446)	(2.841)
MANA	0.010	0.028	0.333**	0.418	0.407**
	(0.049)	(0.143)	(2.536)	(0.387)	(2.648)
BUSI	0.251***	0.264***	0.976***	0.412***	0.959***
	(3.262)	(5.576)	(3.120)	(3.439)	(2.864)
NAME	0.107**	0.097*	0.039***	0.086**	0.346**
	(2.225)	(1.874)	(3.919)	(2.611)	(2.439)

*Notes: The data in the table are regression coefficients for the effects of financial donation relationship (DONE), decision relationship (DECI), management relationship (MANA), business relationship (BUSI), and naming relationship (NAME) on business relationships; regression results for the remaining variables are not presented due to space constraints. t-values in parentheses. *, **, *** indicate significant at the 10%, 5% and 1% levels, respectively.*

4.3. Robustness test

To ensure the reliability of our regression results, we conducted robustness tests from the perspectives of variable measurement (Zhao et al., 2023), PSM matching methods, the heterogeneity of socially responsible organizations, and the role of organizational relationships on the impact of business relations. The results of the robustness tests are consistent with our previous findings.

4.3.1. Re-testing of variable measurement and matching methods

Following Tang et al. (2019), we used (accounts payable + bills payable + prepaid accounts)/operating costs as the first substitute indicator for measuring the scale of commercial credit financing. Following Fang and Chu (2019), we used (accounts payable + bills payable - prepaid accounts)/operating costs as the second substitute indicator. Following Pan and Zhang (2020), we used the number of the top five customers in the previous year divided by five as a proxy variable for customer cooperation willingness, and the number of the top five suppliers in the previous year divided by five as a proxy variable for supplier cooperation willingness. By replacing the above substitute variables in the regression model, the conclusions we drew are consistent with our previous findings.

In addition to the nearest neighbor matching method, we also employed radius matching, kernel matching, Mahalanobis matching, and local linear regression matching methods to select matching companies for our sample listed companies to overcome self-selection bias. After changing the matching method, the regression results we obtained are consistent with our previous findings.

4.3.2. Heterogeneity analysis of social responsibility fulfilling organizations

The research findings of this paper confirm the positive impact of foundations on the business relationships of listed companies. As the organizational structure for fulfilling the social responsibility of listed companies, the heterogeneity of foundations may have differential effects on the positive relationship between foundations and business relationships. Therefore, this paper further explores the differential impact of the organizational heterogeneity of social responsibility-fulfilling organizations (foundations) on business relationships from the perspectives of foundation organizational size, organizational type, annual inspection, and evaluation level.

The organizational size of foundations is classified based on the original fund of the foundation. Foundations with an original fund exceeding RMB 8 million are considered large-scale, while those with less than RMB 8 million are considered small-scale. Generally speaking, the original fund of a nationwide public foundation is no less than RMB 8 million, and that of a non-public foundation established by applying to the Civil Affairs Department is no less than RMB 20 million.

The organizational type of foundations can be divided into charitable and non-charitable organizations. Foundations apply for registration to the Civil Affairs Department of the county level or above, and those meeting the conditions for charitable organizations (to carry out charitable activities; not for profit; having their name and residence; having organizational bylaws; having necessary assets; having a qualified organization and leader; and meeting other conditions stipulated by laws and administrative regulations) are recognized as charitable organizations. Charitable organizations can apply for public fundraising qualifications and enjoy tax benefits.

The operational quality of foundations is subject to annual inspection and evaluation by the registration and management authorities. Foundations should submit their annual work reports for the previous year reviewed and approved by the business supervisory unit to the registration and management authorities before March 31 each year and accept their inspections. The registration and management authorities for social organizations conduct comprehensive evaluations of the foundation's basic conditions, internal governance, work performance, and social evaluation by evaluation criteria, and the evaluation level is graded from high to low as 5A, 4A, 3A, 2A,

1A.

Table 6 presents the differential impact of foundation heterogeneity. When grouped according to foundation organizational size, it can be seen that in the larger size group, the positive impact of foundations on business relationships is significantly positive at least at a level of 5%. In the smaller size group, the impact of foundations on business relationships is not significant. This suggests that the effect of foundations on the promotion of business relationships in listed companies is more evident in larger foundation organizations. Whether a foundation is a charitable organization or not does make a significant difference. Regardless of whether a foundation is a charitable organization, the establishment of a foundation significantly improves the business relationships of listed companies.

The establishment of a foundation has a significant positive impact on the business relationships of listed companies, regardless of whether the foundation's annual inspection is qualified or not. The same is true for foundation ratings. Both 3A and above-rated foundations and those rated below 3A significantly improve the business relationships of listed companies. If a foundation passes its annual inspection or is rated 3A or above, it indicates that the foundation's operation is more standardized and transparent. For foundations with an unqualified annual inspection or a rating below 3A, there may be serious agency problems, which could result in listed companies having greater control over the foundation, enabling them to potentially benefit from the foundation's charitable activities, and significantly improving their business relationships. Foundations with a qualified annual inspection or a rating of 3A or above have higher standards and transparency. Such foundations can better carry out public welfare and charity projects, promote interactions between enterprises and society (Herlin & Pedersen, 2013), and enhance the credibility of corporate social responsibility projects (Menon & Kahn, 2003). When a company performs well in corporate social responsibility, it can win higher reputation capital, increase suppliers' trust in the company, and improve the company's business credit and financing levels (Zhang & Deng, 2018), significantly improving the business relationships of listed companies.

Table 6. Differential impact of foundation heterogeneity on the relationship between foundations and business relationships of listed companies.

Foundation Heterogeneity	(1) BRAP1	(2) BRAP2	(3) BRCP	(4) BRSO	(5) BRCO
Large-scale	2.464*** (4.473)	0.368*** (3.593)	0.682*** (3.912)	0.642** (2.524)	0.823*** (4.352)
Small-scale	0.020 (0.922)	0.010 (0.218)	0.030 (0.202)	0.030 (0.419)	0.204 (0.639)
Charitable	0.330*** (3.635)	1.673** (2.087)	6.617** (2.636)	0.748*** (2.712)	0.834** (2.229)
Non-charitable	0.003** (2.075)	0.171** (2.133)	0.358** (2.192)	0.255** (2.584)	0.178** (2.243)
Pass	1.889** (2.114)	2.577* (1.703)	0.322*** (3.720)	0.262*** (6.254)	0.021*** (3.829)
Fail	0.048*** (3.103)	0.124*** (3.429)	0.264*** (5.063)	0.022** (2.290)	0.074** (2.284)
3A+	0.264*** (4.112)	0.399*** (3.255)	3.689*** (2.796)	1.206** (2.164)	0.770*** (4.070)
3A-	0.018*** (2.616)	0.212** (2.064)	0.063*** (3.573)	0.063* (1.737)	0.021** (2.088)

Notes: The data in the table are regression coefficients for the interaction term TREAT* POST, with t-values in brackets. For space constraints, only regression results for key variables are given.

4.4. Analysis of impact mechanisms

The findings of this study indicate that when there is a close relationship between a listed company and its foundation, the listed company has better business relationships within its supply chain. The logical reasoning behind this conclusion is that as an enterprise foundation, the listed company's foundation may fully consider the interests of the listed company in conducting charitable activities due to its close relationship with the company, enabling the listed company to benefit from potential gains from the foundation's charitable actions. To verify this reasoning, this study conducted further analysis of the foundation's charitable behavior from the perspectives of the naming of charitable projects, service areas of charitable projects, target populations, and geographic regions served, to explore whether the close relationship between the listed company's foundation and the listed company would affect the foundation's charitable decision-making to a certain extent.

The foundation's publicly available annual work report provides detailed information on the foundation's business activities, including the implementation of its charitable projects (project names, whether public donations were solicited, annual project revenue and expenditure, project operation mode, target populations and fields, service areas, and project descriptions, etc.). Based on the manual collection of the above information, model (7) was established to investigate whether the degree of association between the listed company and its foundation would affect the foundation's charitable behavior:

$$CHAR_{it} = \alpha + \beta_1 DDMBN_{it} + \beta_2 FASSET_{it} + \beta_3 FLVE_{it} + \beta_4 FAGE_{it} + \beta_5 FADM_{it} + \beta_6 FPRO_{i(t-1)}$$
$$+\beta_7 FTI_{it} + \gamma_i \sum YEAR_i + \pi_j \sum FAREA_j + \varepsilon_{it} \tag{7}$$

In model (7), the public charity project (CHAR) is the dependent variable, which includes four variables: public charity project name (CHARN), public charity project service area (CHARD), public charity project service region (CHARA), and public charity project service population (CHARP).

The public welfare charity project name (CHARN) measures the proportion of projects each year that continues to use the core name of the listed company. Taking the Vanke Public Welfare Foundation as an example, it is a national non-public fundraising foundation initiated by Vanke Corporation Limited in 2008. In 2018, the Vanke Public Welfare Foundation carried out a total of 27 projects, of which 2 projects were named after "Vanke," namely the Aiyoo Vanke Care Center and the "Vanke Cup" Environmental Photography Contest. Therefore, the CHARN of the Vanke Public Welfare Foundation in 2018 is 2/27=0.074.

The proportion of service areas related to the listed company's operations or industries in the public welfare charity projects carried out each year by the foundation is the measurement method for the public welfare charity project service area (CHARD). The service areas of public welfare charity projects include education, medical health, culture and art, sports, scientific research, social services, ecological environment, law and citizen rights, policy advocacy, disaster relief, poverty alleviation and community development, volunteer services, and public welfare development. Taking the Vanke Public Welfare Foundation as an example again, in 2017, it carried out a total of 37 public welfare charity projects, including 2 poverty alleviation projects, 1 community development project (Phoenix Community Reconstruction in Shenzhen Guangming New District), 2 public welfare development projects, 8 education projects, 1 ecological environment project, and 1 other project (supporting families of students who died in the Beida Shanying Society). The community development project is related to Vanke's operations or the real estate industry. Therefore, the CHARD of the Vanke Public Welfare Foundation in 2017 is 1/37=0.027.

The public welfare and charity project service area (CHARA) uses the proportion of the public welfare and charity project service area of the foundation as a measure of the proportion of the invested listed company's associated areas. The associated areas of the invested listed company refer to the locations of the company's major customers and major suppliers, regions where the company's products are popular, or where the company's key subsidiaries are located. According to Vanke's 2017 annual report, the regions where Vanke's top

five revenue-generating projects are located are Shanghai and Guangdong. Vanke did not disclose the specific names of its top five customers and top five suppliers, so it is impossible to determine their respective regions. Vanke's major subsidiaries are located in a total of 23 regions, including Beijing, Guangdong, Guizhou, Hebei, Hubei, Shanxi, Shanghai, Sichuan, Xinjiang, Yunnan, Zhejiang, Jiangsu, Anhui, Tianjin, Liaoning, Jilin, Shandong, Chongqing, Shaanxi, Henan, Guangxi, Gansu, and Hong Kong. In 2017, Vanke Foundation carried out a total of 37 public welfare and charity projects, of which 18 were conducted nationwide, one in Hong Kong, and the rest was distributed in Beijing, Guangdong, Guizhou, Hebei, Hubei, Shanxi, Shanghai, Sichuan, Xinjiang, Yunnan, Zhejiang, and Tibet. Only Tibet (two projects, namely the Snow Leopard Protection Project and the Entrepreneurship Support Project for Blind School Graduates in Tibet) was not a key sales area or main subsidiary distribution area for Vanke. Therefore, in 2017, Vanke Foundation's CHARA was 35/37 = 0.946.

The public welfare and charity project service population (CHARP) uses the number of key stakeholders of the invested listed company served by the public welfare and charity projects conducted by the foundation divided by the total number of public welfare and charity projects as a measure. The service population of public welfare and charity projects includes all people, children, the elderly, women, the disabled, ethnic minorities, animals, certain special groups, and certain groups with specific diseases. Key stakeholders are determined based on the company's main business, mainly including consumers, suppliers, governments, shareholders, communities, etc. Taking Vanke Foundation as an example again, in 2019, Vanke Foundation carried out a total of 17 projects, of which 9 projects served Vanke's key stakeholders, including 7 urban garbage classification projects, 1 community development project, and 1 project for evaluating and advocating for community waste management. Therefore, in 2019, Vanke Foundation's CHARP was 9/17 = 0.529.

The independent variable of Model (7) is the degree of association (DDMBN) between the listed company and the foundation, measured in the same way as Models (4), (5), and (6), covering six variables in total, including the comprehensive relationship (ALL), the funding relationship (DONE), the decision-making relationship (DECI), the management relationship (MANA), the business relationship (BUSI), and the naming relationship (NAME).

The control variables for Model (7) are as follows: organizational size (FASSET), which is the natural logarithm of the net assets of the foundation; debt-to-asset ratio (FLEV), which is the ratio of the foundation's debt to assets; foundation establishment time (FAGE), which is the natural logarithm of the number of days since the foundation was established; business supervisory department (FADM), with a value of 1 if the business supervisory department is a government agency, and 0 otherwise; fund balance (FPRO), which is the natural logarithm of the difference between the foundation's total revenue and total expenditure; information disclosure quality (FTI), which is measured by subtracting the China Foundation Transparency Index (referred to as FTI) from 100. FTI is a comprehensive indicator system jointly developed by the Foundation Center and the Center for Integrity and Governance of Tsinghua University, which reflects the level of self-discipline and transparency of China's foundations in basic information, project information, financial information, etc.; region (FAREA) and virtual variables for year (YEAR).

Table 7 presents the regression results of the impact of the close relationship between listed companies and foundations on the public welfare and charity behavior of foundations. The overall relationship (ALL) between listed companies and foundations is significantly positively correlated with the names (CHARN), service areas (CHARD), service regions (CHARA), and service populations (CHARP) of public welfare and charity projects at the 1%, 1%, 5%, and 5% levels, respectively. The regression results indicate that when there is a close relationship between listed companies and foundations, the foundation tends to include the company's core name in the project name, choose areas related to the company's business or industry to carry out public welfare and charity projects, carry out public welfare and charity projects in the locations of the listed company's major customers and suppliers, or where the company's products are popular or where its main subsidiaries are located, and

choose key stakeholders who benefit from the listed company's contributions as beneficiaries.

After subdividing the overall relationship (ALL) between listed companies and foundations, the regression coefficients of the funding donation relationship (DONE), decision-making relationship (DECI), business relationship (BUSI), and naming relationship (NAME) are significantly positive. The management relationship (MANA) is significantly positively correlated with public welfare and charity project names (CHARN) and service areas (CHARD) at the 10% level, but its positive impact on service regions (CHARA) and service populations (CHARP) is not significant. Overall, the regression results to some extent confirm the existence of the principal-agent problem between listed company foundations due to their close relationship resulting from the listed company's contributions to the foundation. This leads the foundation to consider the interests of the listed company when carrying out public welfare and charity projects, allowing the listed company to potentially benefit from the foundation's public welfare and charity behavior. The strategic preference for the selection of public welfare and charity project names, service areas, service regions, and service populations may be a potential pathway through which the degree of association between listed companies and foundations affects business relationships.

Table 7. Impact of the closeness of the sub-category of association between foundations and listed companies on the philanthropic behavior of foundations.

The closeness of the relationship between the Foundation and the listed company	(1) CHARN	(2) CHARD	(3) CHARA	(4) CHARP
ALL	0.631***	2.267***	1.051**	0.644**
	(2.867)	(2.933)	(2.474)	(2.373)
DONE	0.250***	0.354**	0.926***	0.024***
	(3.276)	(1.998)	(2.787)	(3.928)
DECI	0.865**	0.747*	0.402***	0.292**
	(2.051)	(1.916)	(3.113)	(2.347)
MANA	0.065*	0.099*	0.031	0.006
	(1.906)	(1.684)	(0.250)	(0.310)
BUSI	0.273***	0.304***	0.404***	7.033***
	(3.235)	(7.079)	(4.752)	(2.772)
NAME	0.003*	1.423*	0.845**	0.102*
	(1.835)	(1.816)	(2.188)	(1.954)

Notes: The data in the table are regression coefficients for the impact of the umbrella relationship (ALL), the financial donation relationship (DONE), the decision relationship (DECI), the management relationship (MANA), the business relationship (BUSI), and the title relationship (NAME) on the decision making of public charity projects; regression results for the remaining variables are not presented due to space constraints. t-values are in parentheses. *, **, *** indicate significant at the 10%, 5% and 1% levels, respectively.

5. Conclusion

Based on the dual dimension of the supplier-customer relationship of the listed company, we examine the impact of the listed company's foundation on the supply chain business relationship of the listed company from five dimensions: donation relationship, decision-making relationship, management relationship, business relationship, and naming relationship, and explore the influence of the foundation on the supply chain business relationship of the listed company. The conclusions of the study are as follows:

(1) The establishment of a public welfare foundation has a positive effect on improving the supply chain business relationship of the listed company. Although the listed company and the listed company's public welfare foundation are both independent legal persons, the special power separation mode of the public welfare

foundation enables the listed company to obtain potential benefits from the foundation, which has a significant promoting effect on the supply chain business relationship.

(2) In the promoting effect of the public welfare foundation on the supply chain business relationship of the listed company, the heterogeneity of the public welfare foundation has an obvious differential effect. The promoting effect of the public welfare foundation on the supply chain business relationship of the listed company is more reflected in the larger-sized foundations. Regardless of whether the foundation is a charitable organization or not, the establishment of public interest foundations significantly improves the supply chain business relationships of listed companies. Public welfare foundations that pass the annual inspection, obtain a rating of 3A or higher have higher norms and transparency and improve the reputation and image of the listed company through public welfare and charity activities, which have a positive impact on the supply chain business relationship of the listed company. Public welfare foundations that fail to pass the annual inspection or obtain a rating of less than 3A have more serious agency problems. The listed company can obtain certain potential benefits by controlling the public welfare foundation, which significantly improves the supply chain business relationship of the listed company.

(3) When the listed company and the listed company's public welfare foundation have close relationships in terms of donation relationships, decision-making relationships, business relationships, and naming relationships, the commercial credit relationship between the listed company and the supplier, the commercial sales relationship between the listed company and the customer, and the business cooperation relationship between the listed company and the major supplier or customer are more harmonious. The closer the management relationship between the listed company and the public welfare foundation, that is, when the senior management of the listed company serves as the secretary-general of the foundation, the business relationship between the listed company and the customer is significantly improved, but the improvement effect on the business relationship between the listed company and the supplier is not significant.

(4) When there is a close relationship between the listed company and the foundation established by the listed company's contribution, the foundation will consider the interests of the listed company from the dimensions of the name, field, region, and beneficiaries when carrying out public welfare and charity projects. The strategic preference for the selection of public welfare and charity project names, service areas, service regions, and service targets may be the intermediary path that affects the supply chain business relationship between the listed company and the foundation.

The research shows that listed companies investing in the establishment of foundations and engaging in public welfare and charitable activities can obtain certain commercial benefits for listed companies and improve their supply chain business relationships. When there is a close relationship between a listed company and its invested foundation, the listed company can achieve greater improvement in the supply chain business relationship by influencing the selection decision of the foundation's charitable projects. The regression results of this paper confirm the existence and characterization of the trust Principal–agent problem problem of public welfare foundations of listed companies, which has a certain reference significance for the regulatory direction and focus of public welfare foundations, and provides a path to improve the supply chain business relationship of listed companies in the area of public welfare charity. Further research is needed on how to truly leverage the charitable role of public welfare foundations.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Author contributions

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