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Corporate Social Responsibility and Innovation Input: An Empirical Study Based on Propensity Score-Matching and Quantile Models

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Abstract: Social responsibility performance and innovation investment are two important aspects of corporate strategy, and there is no consensus as to whether they are competing or complementary goals in an enterprise. Using propensity score-matching, ordinary least squares, and quantile regression, the study shows that the voluntary disclosure of social responsibility by enterprises will increase innovation investment. In other words, corporate social responsibility has a significant positive impact on innovation and investment; however, with the increase in enterprise innovation investment, this impact gradually weakens.

Keywords: corporate social responsibility; innovation input; tendency score-matching; quantile regression

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1. Introduction

Innovation-driven development strategies have become the guiding principle of business enterprises in many areas of China. For the business community, striving to turn technological innovation into a new driver for sustainable development is an important strategic option for firms wishing to gain a competitive advantage [1,2]. At the same time, the academic community has also conducted in-depth discussions on enterprise innovation investment. In general, such research mainly revolves around two main lines: one is the relationship between innovation investment and firm performance, and most existing studies have reached a relatively consistent conclusion on this, believing that the two have a positive relationship [3]; the second concerns the influencing factors of enterprise innovation investment [4], regarding which scholars have carried out exploratory analyses from different perspectives. For example, Paik and Woo (2017) [5] focused on the impact of a company's venture capital, founder's responsibilities, etc. on R&D investment strategies, while Pan et al. (2021) [6] discussed the heterogeneous impacts of carbon dioxide emission reduction policies on innovation investment, from the perspective of corporate ownership.

Meanwhile, corporate social responsibility (CSR) and corporate performance also garnered significant attention. In their seminal work on CSR, McWilliams and Siegel (2000) [7] found that the omission of innovation input variables was an important reason for the inconsistencies between CSR and corporate performance in the existing literature; they revealed a possible positive relationship between CSR and innovation investment, from the perspective of corporate strategy theory. Since then, some scholars have emphasized the potentially positive role of CSR in stimulating corporate product innovation [8], but they have yet to conduct an empirical analysis of the relationship between the two. In

recent years, some empirical studies have emerged, but there is still no consensus on the relationship between corporate social responsibility and innovation investment [9–12].

For example, Gallego-Álvarez et al. (2011) [13] conducted a two-way discussion on CSR and innovation investment, based on the resource-based theory, and found that these two types of corporate decision-making showed a negative relationship. Subsequently, Bocquet et al. (2013) [14] used a questionnaire method to investigate Luxembourg companies; they divided CSR into its strategic and responsive dimensions to test their respective relationships with research and development (R&D) innovation. The results show that the performance of corporate strategic social responsibility has a positive impact on the innovation of products and processes, while responsive social responsibility hinders the R&D of enterprises. Bocquet et al. (2019) [14] further showed that implementing strategic CSR via nationality diversity led to technological innovations among small- and medium-sized enterprises. Luo and Du (2015) [15] enabled an enterprise to enhance its relationship with its stakeholders; this relationship helped facilitate the exchange of knowledge between the two parties, which led to further R&D investment and stronger innovation.

The inconsistent findings in past empirical research studies may be due to the macroeconomic conditions and other factors of the countries of the enterprises studied, as well as model selection. Most studies have been conducted on enterprises outside China [13,16,17]. In contrast, the empirical literature on the direct role of CSR regarding innovation investment in China is relatively rare, and most of the CSR indicators in similar studies use individually selected financial indicators, which lack the necessary persuasiveness and universality. On the other hand, from a practical point of view, enterprises need to obtain various factors of production from society; therefore, establishing explicit or implicit contracts with resource providers (stakeholders) is inevitable, besides meeting the consumers' expectations [18–20]. In order to obtain continuous support from stakeholders and consumers, enterprises must strive to meet their demands for product and service quality and for corporate engagement in social and environmental causes [21–23]. At the same time, increasing the intensity of innovation investment, enhancing the product or service quality, improving enterprise competitiveness, and obtaining the recognition of consumers are the ultimate goals for the existence and growth of enterprises [24,25]. Therefore, social responsibility and innovation investment are important parts of the strategic framework of enterprises [26]; in light of their limited resources and financial constraints, enterprises must balance their decisions between pursuing CSR, to foster good will and attract external support, and focusing on research and development to enhance the enterprise's competitiveness. Should an enterprise rely on a social responsibility strategy via the active fulfillment of social responsibility, in exchange for stakeholders' support, and then create a harmonious environment for enterprise development? Alternatively, should an enterprise rely on a high-risk, high-reward innovation-driven strategy to foster product competitiveness? Should it pursue both social responsibility and innovation?

In view of the current theoretical research background and the empirical questions of current enterprise practice, this paper first uses the propensity score-matching method to test the impact of the voluntary disclosure of social responsibility information on innovation investment because "voluntary disclosure" is a decision-making arrangement of enterprises that is based on certain factors, rather than the result of random behavior. The use of ordinary regression methods is prone to a resulting bias, while the propensity score-matching method can be solved effectively, based on the "counterfactual" research framework. In addition, regarding the sample of "voluntary disclosure" and taking the relatively authoritative Runling Social Responsibility Rating index as the proxy variable of corporate social responsibility, this paper uses the ordinary least squares (OLS) method and the quantile regression model to explore the impact of social responsibility performance on innovation investment. The OLS model is limited to examining the impact of CSR performance on the mean value of innovation input, while the quantile model can further analyze the marginal effect of social responsibility performance at the main quantiles of innovation input. In summary, the improvement of research methods may be beneficial

for discussion of the relationship between CSR and innovation input so as to facilitate the conclusion of more accurate and reliable research conclusions, in order to bring useful enlightenment to strategic decisions on topics such as corporate social responsibility and innovation investment.

2. Theoretical Analysis and Hypothesis

2.1. Voluntary Release of a Social Responsibility Report and Corporate Social Responsibility

Since the middle and late 1970s, Western enterprises have reported information such as employee development and corporate environmental initiatives, in addition to disclosing their financial situation, showing the rudiments of enterprises publishing social responsibility information. Guthrie and Parker (1989) [27] wrote that in the early 1980s, the Australian Broken Hill Proprietary Company not only disclosed its financial data but also information on employee development and community involvement in its annual report; it began to pay attention to the performance of corporate social responsibility. Due to the sluggish development of China's capital market, an imperfect market mechanism, the non-standard supervision system during the economic transition period, and the general lack of public awareness of CSR, all sectors of society had mostly ignored the disclosure of social responsibility information for many years [28,29]. At the turn of the century, however, China's business and academic circles began to pay attention to this issue. The Shenzhen Stock Exchange, Shanghai Stock Exchange, state-owned Assets Supervision and Administration Commission of the State Council (SASAC), and other government departments have successively given more specific guidance and suggestions on the disclosure content, form, and mechanism of CSR reports. Since then, increasingly more publicly listed companies have begun to pay attention to the disclosure of social responsibility information.

At present, social responsibility reports have become a link between enterprises and stakeholders and are also a comprehensive embodiment of CSR [30]. the releases of social responsibility, especially voluntary releases, can show the outside world the efforts made by enterprises in social causes, and highlight to stakeholders the responsibility of enterprises and the enterprise's intent to contribute to societal goals. At the same time, studies have shown that the disclosure of information such as social responsibility (environmental responsibility) represents the degree of fulfillment of the corresponding responsibilities of enterprises [31].

2.2. CSR and Innovation Input, according to the Viewpoint of Stakeholder Theory

According to stakeholder theory, enterprises must not only assume responsibility to internal stakeholders such as shareholders and employees but also fulfill their responsibilities to external stakeholders, such as consumers, suppliers, creditors, governments, communities, and the general public. The demand for responsibility from internal and external stakeholders constitutes internal pressure for enterprises to increase their investment in innovation. Specifically, this includes the care taken by enterprises to support their employees by creating a safe and tidy working environment and a comfortable working atmosphere [32,33]; however, taking responsibility for shareholders, creditors, and suppliers means that enterprises must continue to enhance their competitiveness and profitability as a necessary assurance of stakeholders' interests. This responsibility to the government, the community, and the general public requires enterprises to adopt new, environmentally friendly, and cleaner production operations, and to continuously improve in terms of reducing pollution emissions and strengthening waste recycling. In a market with intense competition, this is necessary in order to avoid consumers "voting with their feet" [34].

In other words, CSR is instrumental in fostering and strengthening the relationships between firms and their stakeholders, and such strong relationships, in turn, enable firms to leverage the pool of external knowledge among their stakeholder networks, including their customers. In fact, consumers are the direct audience of enterprise products or services; their perceptions and expectations of products could influence the outcomes of a firm's performance [35]. For example, a consumer's "warmth and perceptions" about a firm are

influenced by the firm's CSR efforts and initiatives [35]. A firm's CSR efforts help personify the image of the firm, draw consumers toward the products or services, and even identify with the firm's CSR positions [35,36]. Consumer feedback and insights are conducive to enterprise innovation as they convey information on market preferences, trends, and potential needs [37]. Possessing external market knowledge and information is key to broadening the firm's knowledge base and supporting new product development [15].

In addition, they will also actively explore the development and supply of new materials, such as for energy conservation and environmental protection, and even participate in early product design in enterprises. The government and the public can express their own demands to the enterprise before a product is launched, to avoid an embarrassing situation regarding complaints after the product has been launched. The biggest reward to the employees of an enterprise is mainly reflected in the sense of ownership [32,33] and high enthusiasm for participating in product development and process updates. The above favorable conditions will induce enterprises to carry out and strengthen their innovation activities. Furthermore, the network of shareholders and creditors may not only help enterprises via knowledge and information-sharing but also provide necessary financial support for enterprises to develop and innovate [15,35].

Additionally, the fulfillment of social responsibility can help enterprises to burnish their images and generate goodwill. As an important intangible asset of an enterprise, reputation takes a long time to build, but it is very easily ruined and can be lost in a short time due to "careless moves" [38]. Based on this finding, companies with excellent social responsibility performance can send a positive message to the market and are more likely to attract potential consumers. The favor of the market has become an inexhaustible driving force for enterprises wishing to maintain this virtuous circle and competitive advantage, which is conducive to encouraging enterprises to continue to innovate and produce more high-quality and inexpensive products. The promotion of the R&D innovation of enterprises has also become an important path for CSR to create business value [39]. Based on the above analysis, this study examines the following hypotheses:

H1: *Compared with enterprises that do not publish social responsibility reports, enterprises that voluntarily publish them make a greater investment in innovation.*

H2: *For companies that voluntarily disclose their social responsibility reports, the more active the social responsibility performance, the higher the investment in innovation.*

The resource-based theory points out that fulfilling social responsibilities and implementing innovative activities are the key options for enterprises to achieve differentiated operations. Companies can focus their limited resources on social responsibility, or they can focus on R&D innovation or other channels. For enterprises with high investment in innovation and more successful R&D activities, the high-quality products (services) that they provide to the market give them a competitive edge over their competitors in the same industry. According to the empirical evidence presented by Hull and Rothenburg (2007) [27], the impact of social responsibility performance on the performance of innovation-active enterprises is weaker than on those with low innovation levels. Following the resource-based theory, the following hypothesis is formulated:

H3a: *Based on the resource-based view, with the increase in innovation investment, the impact of social responsibility performance on an enterprise's innovation investment gradually weakens.*

That means that if H3a were true, one would expect the effect of social responsibility performance on innovation investment to be smaller for enterprises with low innovation investments, and larger for those enterprises with high innovation investments.

Conversely, the knowledge-based theory and organizational learning theory give a diametrically opposite view. From the perspective of knowledge-learning processes, such as enterprise knowledge acquisition, identification, absorption, and transformation, we can

explain the driving effect of innovation investment intensity on enterprise learning ability. Because of investment activity that promotes technological progress [40], enterprises will accumulate successful experience and cultivate the necessary R&D skills and innovation awareness via this kind of practice. Even if the innovative project fails, companies can learn from it to avoid similar mistakes in subsequent R&D innovations. This means that innovation activities improve the learning ability of enterprises. Cohen and Levinthal (1990) [41] pointed out that enterprises with high R&D investment are more likely to absorb and utilize external knowledge because they have certain technical reserves and knowledge reserves. Social responsibility provides opportunities for companies to carry out innovative activities [42]. High-innovation enterprises are more capable of acquiring and identifying constructive ideas from stakeholders and putting them into practice in research and development than those with low innovation inputs. Based on the above analysis, the following hypothesis is proposed:

H3b: *According to the knowledge-based view, the impact of social responsibility performance on an enterprise's innovation investment increases with the level of innovation investment.*

That means that the higher the level of innovation investment, the larger the effect is of social responsibility performance on innovation investment. The knowledge-based hypothesis is the opposite of the resourced-based hypothesis, H3a.

3. Research Design

3.1. Propensity Score-Matching Model

In order to test the impact of CSR information disclosure on innovation input, traditional regression methods usually face two limitations in solving this problem. First, they can only show that information disclosure is correlated with innovation input, but there is not sufficient reason to prove that the former has a leading effect on the intensity change of the latter. More importantly, the decision of enterprises to voluntarily disclose social responsibility information is affected by many factors, such as enterprise size, the asset–liability ratio, and organizational redundancy, which means that whether enterprises voluntarily disclose social responsibility information is not a random event. Under such circumstances, traditional methods may lead to biased estimation results due to sample selection bias and may even confound the evaluation of the information disclosure effect.

Propensity score matching (PSM), proposed by Rosenbaum and Rubin (1985) [43], is a classic counterfactual research model that is often used to measure the consequences of a given policy or event. The PSM model can transform multiple variables that affect CSR information disclosure and innovation input into one-dimensional conditional probability values that are treated, in short, this model can combine multiple dimensions to form a score; it can then match each voluntary disclosure enterprise (treatment group) with the closest probability score of the non-disclosure sample (control group). Therefore, except for the difference in the disclosure of responsible information, the two groups of samples have similar characteristics in other aspects, so the difference in innovation input between the samples can be attributed to the disclosure of responsible information. Therefore, PSM is a causality measurement method that can mitigate the effect of the non-random distribution of samples and is suitable for measuring the impact of voluntary CSR announcements on innovation input. Following the relevant studies [44,45], the PSM model is divided into the following main steps:

(1) The main factors affecting the voluntary posting of social responsibility announcements are selected as the covariates of sample-matching between the voluntary group and the unpublished group.

(2) A Logit model was used to reduce the selected multidimensional covariates into one dimension, that is, the probability value of "voluntary release of social responsibility report (volun)", depicted as:

$$Pscore(Z) = P(Z) = \Pr[volun = 1|Z] = E[volun|Z]. \quad (1)$$

In Formula (1), Z represents the covariates affecting whether the enterprise releases its social responsibility report voluntarily, and $Pscore(Z)$ represents the tendency score value if the enterprise releases the social responsibility report voluntarily.

(3) We calculate the probability value of the social responsibility report being released voluntarily by each enterprise, select an appropriate matching method for the samples of the treatment group, and form a new control group with successfully matched samples from the original control group.

(4) After passing the common support test and the balance test, the average processing effect of releasing a social responsibility report on innovation input was calculated (the average effect of treatment on the treated ATT):

$$\begin{aligned} ATT &= E[RD_{1i} - RD_{0i}|volun_i = 1] \\ &= E\{E[RD_{1i} - RD_{0i}|volun_i = 1, P(Z_i)]\} \\ &= E\{E[RD_{1i}|volun_i = 1, P(Z_i)] - E[RD_{0i}|volun_i = 0, P(Z_i)]|volun_i = 1\} \end{aligned} \quad (2)$$

where RD_{1i} and RD_{0i}, respectively, refer to the innovation input level of enterprises that voluntarily release a social responsibility announcement and those that do not release a social responsibility announcement.

3.2. Quantile Regression Model

In order to explore the impact of CSR performance on innovation input, and to further examine the change in the effect intensity of this relationship at the different levels of the dependent variable, quantile regression is necessary because the traditional ordinary least squares (OLS) method analyzes only the influence of independent variables on the conditional expectation of the dependent variable. When facing more complex relational measures, the mean regression method shows obvious deficiencies. In addition, given the data distribution of the dependent variable, the estimation results of ordinary least squares will be meaningless if thick tails and heteroscedasticity violate the basic OLS assumptions. Conversely, quantile regression (QR) combines the traditional regression method with the conditional quantile. This model is an extension and expansion of traditional regression. It selects different quantiles between (0,1) to fit the specific linear relationship of the explanatory variables. Used to measure the marginal effect of the explanatory variable on a particular quantile of the dependent variable, quantile regression thus helps to estimate the underlying relationship between the two variables more fully. Moreover, unlike OLS regression, quantile regression does not need to satisfy the normal distribution assumption of the residual in the conditional quantiles. Quantile regression allows the use of local information to explore the entire distribution of the dependent variable function [46,47], thereby allowing us to observe the varying effects of corporate social responsibility on innovation input at different sub-points.

The basic model of quantile regression is as follows:

$$Quantile_p(\mathrm{Y}|\mathrm{X}) = X'\beta(p), \quad (3)$$

where Y and X represent the dependent variable and a vector of explanatory variables, respectively, p represents the quantile level, β represents the vector of regression coefficients. The regression coefficients at different quantiles can be estimated by minimizing the absolute deviation [48].

3.3. Sample Selection

In view of the fact that manufacturing enterprises and information transmission, software, and information technology service enterprises (referred to as the information industry) belong to technology-intensive industries that tend to place high importance on R&D activities, this paper takes the manufacturing and information listed by companies in Shanghai and Shenzhen A-share markets in 2014 as the primary sample. To mitigate

the lag of the effect of independent variables on R&D investment, this paper defines the measurement of the independent variable as 2013.

The enterprises in these two industries that voluntarily release their social responsibility reports are defined as the voluntary group (processing group), while the enterprises that do not release their social responsibility reports are classified as the non-release group (control group). ST stocks are the "specially treated" stocks of companies with abnormal financial or other conditions. On 22 April 1998, the Shanghai and Shenzhen Stock Exchanges announced that they would carry out special treatment on the stock trading of these companies. After deleting the ST stock class and missing data, a total of 1912 sample observations were obtained, including 186 observations of the voluntary group and 1726 observations of the control group.

3.4. Description of Variables

Following Chen and Tang (2012) [4], the natural logarithm of enterprise innovation expenditure is used to represent the dependent variable innovation input.

The voluntary release of social responsibility reports is a dummy variable, where CSR = 1 for enterprises that voluntarily release social responsibility reports and CSR = 0 for enterprises that do not release social responsibility reports. The CSR score of the Runling Global Rating Agency was used as a proxy variable for the CSR performance of enterprises that voluntarily issued CSR reports.

Using the method of Caliendo and Kopeinig (2008) [44], this paper selects those variables that simultaneously affect the voluntary release of CSR reports, along with the innovation input of enterprises for matching. Referring to similar studies [49,50], variables such as financial leverage, enterprise size, enterprise age, ownership attributes, operating performance, enterprise growth, organizational redundancy, ownership concentration, free-cash-flow level, and industry were selected as the screening basis. Following the example of Lian et al. (2011) [51], "voluntary release of social responsibility report" is taken as the dependent variable of the logit model, and the combination of variables with the highest quasi-R^2 and the area under the receiver operating characteristic (ROC) curve, or the area under the ROC, is selected as the covariate of the propensity score-matching model. See Table 1 for details of the covariates, outcome variables, and explanatory variables.

Table 1. Variable descriptions.

Variable Type	Variables	Variable Description	Incorporated into the Model
Outcome Variable	Innovation Input	Natural logarithm of innovation expenditure	
Research Variable	Voluntary social responsibility announcement	Enterprises that voluntarily disclose social responsibility are assigned a value of 1, while those that do not disclose social responsibility are assigned a value of 0	
Covariates	Social Responsibility Performance	Runling Global Social Responsibility Rating Index	
	Financial Leverage	Asset–liability ratio	Yes
	Enterprise Scale	Natural log of the number of employees	Yes
	Enterprise Age	Difference between the current year and the establishment year of the enterprise	Yes
	State-owned	If the enterprise is a state-owned enterprise, the value is set to 1; otherwise, the value is 0	Yes

Table 1. *Cont.*

Variable Type	Variables	Variable Description	Incorporated into the Model
	Operating Performance	Rate of return on total assets	Yes
	Enterprise Growth	The growth rate of enterprise operating income	Yes
	Organizational Redundancy	Ratio of current assets to current liabilities	Yes
	Shareholding Concentration	The largest shareholder shareholding ratio	No
	Free Cash Flow	Ratio of free cash flow to operating income	No
	Sector Type	The value is 1 for the manufacturing enterprise and 0 for the information enterprise	No

4. Empirical Results

4.1. Propensity Score-Matching Hypothesis Test and Empirical Results

4.1.1. Matching Effect Test of the Voluntary Group and Control Group

Two preconditions must be satisfied for the empirical test when using the propensity value-matching method: the common support hypothesis and the balance hypothesis. In this paper, the nonparametric K-density distribution method was used to describe the propensity distribution of the voluntary group and the control group. Figure 1 shows the kernel density distributions of the propensity scores of the matching voluntary group and control group before and after the match. Before matching, the control group (dashed line) has the highest frequency, around a propensity score of 0.06, and the mode of the voluntary groups' propensity score (solid line) is about 0.12. The gap between the two density curves suggests a significant difference between the groups. After matching, in Figure 1, the two density distributions moved significantly closer to each other, indicating that the matching process to alleviate the differences in the two groups has relatively ideal match results.

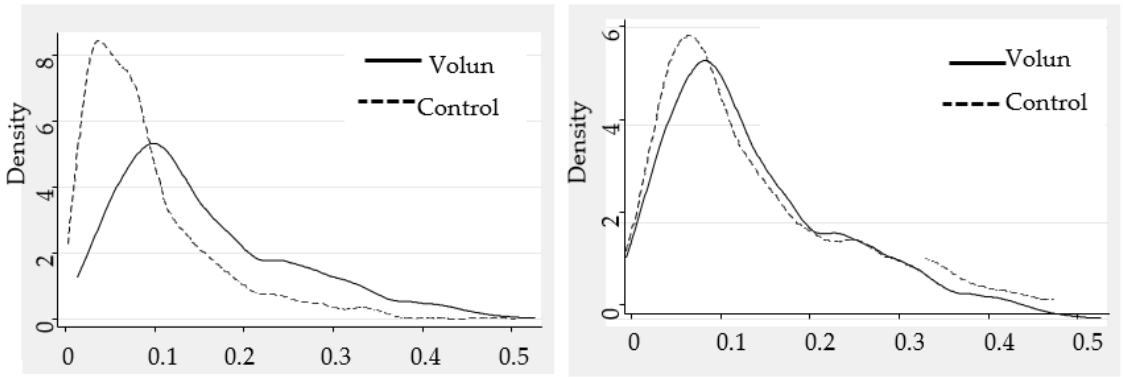

Figure 1. Propensity score before and after matching.

In addition, after calculating the propensity scores of enterprises to release social responsibility reports voluntarily, it is necessary to further examine the post-matching distribution of each covariate of the two groups of samples. Only when the propensity distribution of the voluntary group and the control group is balanced and there is no systematic difference can the externality of "voluntary release of social responsibility" be addressed. The statistical method of a T-distribution test (bilateral) was used to compare the inter-group differences of sample covariates between the two groups, before and after matching, so as to evaluate the balance effect of matching. Table 2 shows the results of the balance test; the absolute deviation of financial leverage, enterprise age, business

performance, enterprise growth, organizational redundancy, and other variables after matching is less than 5%, and there is no statistical significance between the voluntary group and the control group. There were significant differences between the voluntary group and the control group before pairing, and the deviations were reduced to 8.8% and 10.7%, respectively, after treatment; there were no significant differences between the two groups. According to Rosenbaum and Rubin (1985) [43], matching can be considered effective if the absolute deviation is less than 20%.

Table 2. The covariate balance test.

Variable	Matching	Voluntary Mean	Control Mean	Bias %	*T* Value	*p*-Value
Financial Leverage	Before	0.393	0.385	3.7	0.49	0.623
	After	0.393	0.388	1.9	0.18	0.855
Enterprise Scale	Before	7.873	7.192	67.1	8.45	0.000
	After	7.859	7.769	8.8	0.84	0.400
Enterprise Age	Before	16.720	15.131	34.9	4.24	0.000
	After	16.719	16.491	5.0	0.48	0.632
State-owned	Before	0.376	0.148	53.6	7.98	0.000
	After	0.373	0.327	10.7	0.92	0.359
Operating Performance	Before	4.815	7.403	−33.8	−3.67	0.000
	After	4.837	4.917	−1.1	−0.12	0.905
Enterprise Growth	Before	0.159	0.158	0.1	0.02	0.987
	After	0.160	0.163	−0.6	−0.04	0.967
Organizational Redundancy	Before	3.415	3.111	4.5	0.72	0.471
	After	3.429	3.283	2.1	0.18	0.857

4.1.2. Matching Results Analysis of the Voluntary Group and the Control Group

In this paper, the kernel matching method is used to explore the average processing effect of voluntary CSR reporting; the corresponding T value is reported in Table 3. The pre-matching effect is about 0.624, which decreases to 0.237 after matching, indicating that the OLS model may lead to a high estimation coefficient due to endogeneity, while the PSM method makes the results more accurate because it addresses the problem of sample self-selection. In addition, the ATT values of a pair of two-nearest-neighbor matching and radius (caliper) matching robustness test change slightly.

Table 3. The treatment effect of a voluntary social responsibility announcement.

Matching Method	Matching	Voluntary Group	Treatment Group	*ATT*	*T* Value
Nuclear Match	Before	17.889	17.265	0.624 ***	6.20
	After	17.869	17.633	0.237 **	2.23
A Pair of Two Nearest Neighbors	Before	17.889	17.265	0.624 ***	6.20
	After	17.869	17.640	0.230 *	1.78
Radius (caliper) Matching	Before	17.889	17.265	0.624 ***	6.20
	After	17.869	17.621	0.248 **	2.34

Note: *** represents $p < 0.01$; ** represents $p < 0.05$; * represents $p < 0.1$.

4.2. The Empirical Test of Social Responsibility Performance and Innovation Investment

Table 4 reports the mean value, standard deviation, and correlation coefficient of each variable. In the correlation between the two variables, CSR performance is significantly positively correlated with innovation input ($\rho = 0.312$, $p < 0.01$), which preliminarily conforms to the presented hypothesis. In addition, financial leverage, firm size, firm attributes, organizational redundancy, and other control variables are significantly correlated with the dependent variable of innovation input, and there is not a high correlation between the two variables. Innovation input is reported in logarithmic terms; investment in innovation averaged about CNY 43.1 million per enterprise. Note that the average performance of

CSR is about 37.580 (full marks is 100), indicating that the social responsibility of listed companies in China is at a low average development stage.

Table 4. Description statistics and correlation coefficient matrix (N = 186).

	1	2	3	4	5	6	7	8	9
Innovation Input (1)	1								
CSR Performance (2)	0.312 ***	1							
Financial Leverage (3)	0.273 ***	0.136 *	1						
Enterprise Scale (4)	0.537 ***	0.250 ***	0.483 ***	1					
Enterprise Age (5)	0.064	0.142 *	0.125 *	0.201 ***	1				
State-owned (6)	0.152 **	0.131 *	0.452 ***	0.392 ***	0.205 ***	1			
Operating Performance (7)	0.047	−0.015	−0.507 ***	−0.123 *	−0.087	−0.318 ***	1		
Enterprise Growth (8)	0.043	0.077	−0.126 *	−0.088	−0.092	−0.176 **	0.126 *	1	
Organizational Redundancy (9)	−0.123 *	0.016	−0.372 ***	−0.228 ***	0.100	−0.169 **	0.145 **	0.015	1
Mean	17.890	37.580	0.393	7.872	16.720	0.376	4.815	0.159	3.415
Std. Dev.	1.351	7.631	0.207	0.979	4.152	0.486	5.294	0.360	8.168

Note: *** represents $p < 0.01$; ** represents $p < 0.05$; * represents $p < 0.1$.

4.3. Analysis of the Regression Results

We took the enterprises that voluntarily issued CSR reports as samples and considered innovation input and CSR performance, respectively, as the dependent variable along with one of the independent variables in the OLS multiple linear regression and quantile regression models. The OLS regression results in column 1 of Table 5 show that the estimated coefficient of CSR performance is about 0.033 ($p < 0.01$), indicating that CSR has a significant positive impact on innovation input, and the innovation input is roughly 3.3 percentage points higher for every one-point increase in the social responsibility performance index. Thus, hypothesis H2 can be verified. Column 2 of Table 5 shows that the regression coefficients of independent variables at 20% of the innovation input are about 0.060 ($p < 0.01$); similarly, the estimated coefficients on social responsibility performance at the 40th, 50th, and 60th percentiles of the dependent variable are 0.032 ($p < 0.01$), 0.030 ($p < 0.01$) and 0.020 ($p < 0.05$), respectively. The results show that social responsibility performance at these percentiles had a positive effect on innovation investment and that the positive effect gradually decreased with the increase in innovation input percentiles. At the 80th percentile, the coefficient estimate of social responsibility performance fell to about 0.001, and the result is not significant. This is plausibly due to the product or service superiority of high-innovation enterprises, and these firms tend to focus more on innovation. Thus, the social responsibility performance of such enterprises does not result in a significant effect on innovation. Based on the discussion of quantile regression, the original hypothesis H3a can be verified, indicating that with the increase in innovation input, the positive effect of CSR performance on innovation input gradually weakens.

As a robustness check, this paper also employs Tobit regression, using the overall sample of enterprises that do not disclose social responsibility and those that voluntarily disclose social responsibility. We use the left-censored processing method; that is, the social responsibility performance of an enterprise that does not disclose responsibility information is regarded as 0. The results show that CSR performance has a significant positive impact on innovation investment ($p < 0.01$). Financial leverage and enterprise age have a significant weakening effect on innovation investment ($p < 0.01$). Variables such as growth and organizational redundancy still have a positive leading effect on the dependent variables (the p-value of the organizational redundancy variable is 0.03, and the regression coefficient p-value of other variables is less than 0.01). The model is also significant as a whole ($p < 0.01$) (see Table 6 for details). This result shows no substantial change compared to the OLS regression results above, implying that the conclusion for

hypothesis H2 is relatively robust; that is, the performance of CSR can have a positive impact on innovation investment.

Table 5. OLS and quantile regression results (N = 186).

Variable	OLS	Quantile				
		0.2	0.4	0.5	0.6	0.8
CSR Performance	0.033 ***	0.060 ***	0.032 ***	0.030 ***	0.020 **	0.001
	(0.011)	(0.017)	(0.012)	(0.011)	(0.009)	(0.017)
Financial Leverage	0.820	1.060	0.905	1.034	1.640 *	1.259
	(0.564)	(0.826)	(0.954)	(0.955)	(0.907)	(0.935)
Enterprise Scale	0.668 ***	0.239	0.580 ***	0.599 ***	0.721 ***	0.841 ***
	(0.103)	(0.183)	(0.103)	(0.095)	(0.108)	(0.110)
Enterprise Age	−0.016	−0.058	0.010	0.013	0.005	0.019
	(0.021)	(0.047)	(0.023)	(0.022)	(0.016)	(0.015)
State-owned	−0.146	0.040	−0.086	−0.153	−0.175	−0.152
	(0.200)	(0.431)	(0.229)	(0.182)	(0.179)	(0.210)
Operating Performance	0.037 **	0.053	0.040	0.038 *	0.034 **	0.031
	(0.018)	(0.038)	(0.027)	(0.021)	(0.017)	(0.024)
Enterprise Growth	0.208	0.143	0.052	0.063	0.088	0.460
	(0.234)	(0.385)	(0.240)	(0.180)	(0.184)	(0.386)
Organizational Redundancy	0.001	0.006	−0.006	−0.007	−0.005	−0.009
	(0.011)	(0.030)	(0.022)	(0.017)	(0.050)	(0.070)
R^2	0.349	0.142	0.237	0.266	0.282	0.319

Note: Standard errors are reported in brackets below the coefficient estimates. *** represents $p < 0.01$; ** represents $p < 0.05$; * represents $p < 0.1$.

Table 6. Tobit regression result.

	(1)
VARIABLES	Innovation Input
CSR Performance	0.007 ***
	(0.00230)
Financial Leverage	−0.648 ***
	(0.159)
Enterprise Scale	0.717 ***
	(0.0277)
Enterprise Age	−0.0206 ***
	(0.00550)
State-owned	0.0491
	(0.0745)
Operating Performance	0.0165 ***
	(0.00303)
Enterprise Growth	0.115 ***
	(0.0407)
Organizational Redundancy	0.0113 **
	(0.00522)
Constant	12.48 ***
	(0.210)
Chi2	671.51 ***
Observations	1912

Note: *** represents $p < 0.01$; ** represents $p < 0.05$.

5. Conclusions

In this paper, manufacturing and IT-related publicly listed companies in the Shanghai and Shenzhen A-share markets were selected as the overall research samples, and the samples were divided into the voluntary group and control group, according to whether they voluntarily issued social responsibility reports. The propensity score-matching method is used to empirically test the impact of a voluntary social responsibility report on innovation input. The results show that in the voluntary group, it has a positive effect, and the innovation input of the voluntary group is significantly higher than that of the control group. This conclusion shows that the active release of social responsibility information by enterprises has a positive effect on innovation input, possibly due to the stakeholders' increased attention and recognition. Enterprises may use R&D and innovation as a response strategy to meet the demands of stakeholders. At the same time, trust and feedback from stakeholders will also offer effective incentives for enterprises to strengthen innovation investment. This conclusion is contrary to the research findings of Pan et al. (2021) [6], and this may be related to the choice of variables. Pan et al. (2021) [6] took one dimension of corporate social responsibility (carbon emissions) as a proxy variable and found that it has a weakening impact on R&D investment. Additionally, our findings also differ from those of Mithani (2016) [49], which suggest that enterprises' efforts in the ecological environment will weaken the positive effects on R&D. Mithani's sample is based on the Indian market, and the study focuses on the environmental dimension of CSR. Thus, the differing conclusions likely arise from the different institutional backgrounds and variable measurements. On the other hand, our finding is consistent with some of the existing literature [15,52], and our study further provides empirical evidence for the positive relationship between CSR and R&D intensity.

In addition, we discussed the relationship between CSR performance and innovation investment in the voluntary group; the OLS regression results showed that CSR performance contributed to the increase in average R&D investment. This conclusion is in contradiction to the research results of Pan et al. (2021) [6], although their study was also based on a sample of Chinese firms in the context of economic transition, which showed a significant weakening effect of corporate carbon dioxide emission reduction policies on the intensity of R&D investment as the policy may lead to higher cost effects, thus affecting the intensity of innovation investment. In contrast, the apparently opposite findings are not contradictory, as carbon dioxide reduction is only one aspect of corporate social responsibility, and there are many other dimensions of corporate social responsibility. After gaining positive responses from stakeholders through the implementation of comprehensive social responsibility, companies will have more motivation to sustain development in R&D and innovation. In addition, the study by Gallego-Álvarez et al. (2011) [13] also presents the opposite conclusion to this paper, selecting 500 European companies and 500 non-European companies for their study; the conclusion shows that CSR has a significant negative impact on R&D investment. On the one hand, this may be due to the global scope of the study sample and the large differences in the degree of marketization of firms across countries (regions). On the other hand, the study defines CSR as a dummy variable, compared to the CSR variables measured by the score rating method, which can provide a more accurate picture of CSR performance.

The findings of the study are more similar to those of Ho et al. (2016) [26], who chose the Kinder Lydenburg Domini (KLD) rating index as a proxy variable for CSR, which covers a more comprehensive and extensive content and has high credibility and reference value in Western capital markets [53], and found that the social responsibility performance of companies in European and American capital markets has an R&D investment intensity that has a significantly positive predictive effect. In addition, the findings of this paper are consistent with the view of Husted and Allen (2007) [42] that "CSR provides opportunities for innovation". The above discussion indicates that after more than a decade of development, the development of CSR in China is becoming more and more mature; favorable CSR performance is becoming a medium of interaction between enterprises

and their stakeholders, and it is gradually becoming an important driving force for R&D innovation and competitiveness.

At the same time, the quantile model was also used to explore the effect of CSR performance on the different quantiles of innovation input. We found that with an increase in innovation input, the effect of CSR performance on innovation input gradually diminishes. This result is in line with the expected assumption of the resource-based theory. Under the premise of limited resources, enterprises with high innovation investment tend to attract customers and other stakeholders through high-quality differentiated products, and such enterprises lack the pressure and motivation to "please" stakeholders through social responsibility. In contrast, enterprises with insufficient investment in innovation and low product differentiation tend to practice social responsibility, which is a prudent way to convey the message of "benevolence" to society.

Meanwhile, in the Tobit model of Table 6, we find that corporate financial leverage has a significant negative effect on innovation investment, which finding is similar to previous research [4], in which the asset-liability ratio indicates a firm's external financing capacity. The lower the asset-liability ratio, the more funds a firm can borrow, and the more investment it will make in its innovation activities [4]; firms with a low asset–liability ratio usually have a large amount of potentially redundant resources, which can help enterprises in the process of selecting R&D projects, alleviate the urgency of pursuing immediate short-term results, and motivate enterprises to try high-risk strategies and innovation projects; in addition, the R&D innovation of enterprises is usually coherent and the projects are interrelated. The existence of redundant resources enables enterprises to invest in new projects when faced with environmental changes, thus ensuring the continuity of R&D. Moreover, the age of the firm has a significant negative effect on innovation investment, which is consistent with the random effects model of Ju et al. (2013) [54]. With the growth of enterprise survival time, enterprise knowledge and experience and organizational systems may become more and more solidified; all kinds of organizations face the problem of organizational inertia and this inertia will continue to increase over time, which is manifested in the organization's operation of conformity and the old-fashioned over-reliance on the original resources, thus affecting positive enthusiasm for R&D and innovation investment [55].

Compared with the existing literature, the value of this paper may be reflected in the following aspects. First, the application of the propensity score-matching model alleviates the endogenous bias caused by the self-selection of samples in traditional regression methods and adds more convincing empirical evidence when discussing the relationship between CSR and innovation investment. Second, the use of a quantile regression model on innovation input helps shed light on the varying or unequal effects of CSR performance, given the level of innovation input. In particular, our results reject the knowledge-based view and conclude that higher social responsibility performance is not statistically associated with higher innovation investment.

At the same time, the practical implications of this study lie in the following areas. First, both CSR and innovation investment are welfare-enhancing strategies for an enterprise. Specifically, innovation investment may entail the development and application of energy-saving and environmentally friendly technologies that increase the consumer's utility and improve the workers' working conditions, as well as increase the efficiency of resource use. This is the indirect embodiment of CSR. Therefore, an enterprise's innovation investment decision may be based on the specific needs and goals of the enterprise and its stakeholders, in order to optimize the overall effect of the two strategies. Second, because CSR and innovation investment have positive externalities, establishing common platforms to facilitate information-sharing in technology and management and helping enterprises to reduce the cost of social responsibility and the risk of failure in R&D and innovation. Such platforms could also help guide enterprises to develop complementary social responsibility and innovative investment strategies.

In spite of the aforementioned theoretical significance and practical enlightenment, however, there are still some imperfections in this paper. In future research, we will select multiple years to verify the above assumptions in this paper, using panel data samples. Meanwhile, we could also further explore the impact and mechanism of corporate R&D investment on corporate social responsibility, along with the boundary of contingency factors influencing the above two relationships.

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References

1. Qiu, L.; Jie, X.; Wang, Y.; Zhao, M. Green product innovation, green dynamic capability, and competitive advantage: Evidence from Chinese manufacturing enterprises. *Corp. Soc. Responsib. Environ. Manag.* **2019**, *27*, 146–165. [CrossRef]
2. Schilke, O. On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strateg. Manag. J.* **2013**, *35*, 179–203. [CrossRef]
3. Bosworth, D.; Rogers, M. Market Value, R&D and Intellectual Property: An Empirical Analysis of Large Australian Firms. *Econ. Rec.* **2001**, *77*, 323–337. [CrossRef]
4. Chen, S.; Tang, B. Top manager cognition and innovation investment: The moderating role of managerial discretion. *Stud. Sci. Sci.* **2012**, *30*, 1723–1734.
5. Paik, Y.; Woo, H. The Effects of Corporate Venture Capital, Founder Incumbency, and Their Interaction on Entrepreneurial Firms' R&D Investment Strategies. *Organ. Sci.* **2017**, *28*, 670–689. [CrossRef]
6. Pan, X.; Pan, X.; Wu, X.; Jiang, L.; Guo, S.; Feng, X. Research on the heterogeneous impact of carbon emission reduction policy on R&D investment intensity: From the perspective of enterprise's ownership structure. *J. Clean. Prod.* **2021**, *328*, 129532. [CrossRef]
7. McWilliams, A.; Siegel, D. Corporate Social Responsibility and Financial Performance: Correlation or Misspecification. *Strateg. Manag. J.* **2000**, *21*, 603–609. [CrossRef]
8. Bansal, P. Evolving sustainably: A longitudinal study of corporate sustainable development. *Strateg. Manag. J.* **2004**, *26*, 197–218. [CrossRef]
9. Abbas, J.; Sağsan, M. Impact of knowledge management practices on green innovation and corporate sustainable development: A structural analysis. *J. Clean. Prod.* **2019**, *229*, 611–620. [CrossRef]
10. Anser, M.K.; Zhang, Z.; Kanwal, L. Moderating effect of innovation on corporate social responsibility and firm performance in realm of sustainable development. *Corp. Soc. Responsib. Environ. Manag.* **2018**, *25*, 799–806. [CrossRef]
11. Bacinello, E.; Tontini, G.; Alberton, A. Influence of maturity on corporate social responsibility and sustainable innovation in business performance. *Corp. Soc. Responsib. Environ. Manag.* **2019**, *27*, 749–759. [CrossRef]
12. Bocquet, R.; Le Bas, C.; Mothe, C.; Poussing, N. CSR, Innovation, and Firm Performance in Sluggish Growth Contexts: A Firm-Level Empirical Analysis. *J. Bus. Ethics* **2015**, *146*, 241–254. [CrossRef]
13. Gallego-Álvarez, I.; Prado-Lorenzo, J.M.; García-Sánchez, I.M. Corporate social responsibility and innovation: A resource-based theory. *Manag. Decis.* **2011**, *49*, 1709–1727. [CrossRef]
14. Bocquet, R.; Le Bas, C.; Mothe, C.; Poussing, N. Are firms with different CSR profiles equally innovative? Empirical analysis with survey data. *Eur. Manag. J.* **2013**, *31*, 642–654. [CrossRef]
15. Luo, X.; Du, S. Exploring the relationship between corporate social responsibility and firm innovation. *Mark. Lett.* **2014**, *26*, 703–714. [CrossRef]
16. Briones-Peñalver, A.-J.; Conesa, J.A.B.; Nieto, C.D.N. Analysis of Corporate Social Responsibility in Spanish Agribusiness and its Influence on Innovation and Performance. *Corp. Soc. Responsib. Environ. Manag.* **2017**, *25*, 182–193. [CrossRef]
17. García-Piqueres, G.; García-Ramos, R. Is the corporate social responsibility–innovation link homogeneous?: Looking for sustainable innovation in the Spanish context. *Corp. Soc. Responsib. Environ. Manag.* **2019**, *27*, 803–814. [CrossRef]
18. Brown, J.A.; Forster, W.R. CSR and Stakeholder Theory: A Tale of Adam Smith. *J. Bus. Ethics* **2012**, *112*, 301–312. [CrossRef]

19. Avetisyan, E.; Ferrary, M. Dynamics of Stakeholders' Implications in the Institutionalization of the CSR Field in France and in the United States. *J. Bus. Ethics* **2012**, *115*, 115–133. [CrossRef]
20. Lane, A.B.; Devin, B. Operationalizing Stakeholder Engagement in CSR: A Process Approach. *Corp. Soc. Responsib. Environ. Manag.* **2017**, *25*, 267–280. [CrossRef]
21. Yin, C.; Ma, H.; Gong, Y.; Chen, Q.; Zhang, Y. Environmental CSR and environmental citizenship behavior: The role of employees' environmental passion and empathy. *J. Clean. Prod.* **2021**, *320*, 128751. [CrossRef]
22. Kuzey, C.; Uyar, A.; Nizaeva, M.; Karaman, A.S. CSR performance and firm performance in the tourism, healthcare, and financial sectors: Do metrics and CSR committees matter? *J. Clean. Prod.* **2021**, *319*, 128802. [CrossRef]
23. Murcia, M.J. Progressive and Rational CSR as Catalysts of New Product Introductions. *J. Bus. Ethics* **2020**, *174*, 613–627. [CrossRef]
24. Brunk, K.H.; de Boer, C. How do Consumers Reconcile Positive and Negative CSR-Related Information to Form an Ethical Brand Perception? A Mixed Method Inquiry. *J. Bus. Ethics* **2018**, *161*, 443–458. [CrossRef]
25. Hur, W.; Moon, T.; Kim, H. When and how does customer engagement in CSR initiatives lead to greater CSR participation? The role of CSR credibility and customer–company identification. *Corp. Soc. Responsib. Environ. Manag.* **2020**, *27*, 1878–1891. [CrossRef]
26. Ho, S.S.; Li, A.Y.; Tam, K.; Tong, J.Y. Ethical image, corporate social responsibility, and R&D valuation. *Pac. -Basin Financ. J.* **2016**, *40*, 335–348. [CrossRef]
27. Guthrie, J.; Parker, L.D. Corporate Social Reporting: A Rebuttal of Legitimacy Theory. *Account. Bus. Res.* **1989**, *19*, 343–352. [CrossRef]
28. Lu, Y.; Abeysekera, I. What Do Stakeholders Care About? Investigating Corporate Social and Environmental Disclosure in China. *J. Bus. Ethics* **2015**, *144*, 169–184. [CrossRef]
29. Gong, G.; Xu, S.; Gong, X. On the Value of Corporate Social Responsibility Disclosure: An Empirical Investigation of Corporate Bond Issues in China. *J. Bus. Ethics* **2016**, *150*, 227–258. [CrossRef]
30. Xu, S.; Qiao, M.; Che, B.; Tong, P. Regional Anti-Corruption and CSR Disclosure in a Transition Economy: The Contingent Effects of Ownership and Political Connection. *Sustainability* **2019**, *11*, 2499. [CrossRef]
31. Du, X.; Jian, W.; Zeng, Q.; Du, Y. Corporate Environmental Responsibility in Polluting Industries: Does Religion Matter? *J. Bus. Ethics* **2013**, *124*, 485–507. [CrossRef]
32. Raza, A.; Farrukh, M.; Iqbal, M.K.; Farhan, M.; Wu, Y. Corporate social responsibility and employees' voluntary pro-environmental behavior: The role of organizational pride and employee engagement. *Corp. Soc. Responsib. Environ. Manag.* **2021**, *28*, 1104–1116. [CrossRef]
33. Zhao, H.; Zhou, Q.; He, P.; Jiang, C. How and When Does Socially Responsible HRM Affect Employees' Organizational Citizenship Behaviors Toward the Environment? *J. Bus. Ethics* **2019**, *169*, 371–385. [CrossRef]
34. Li, J.; He, H.; Liu, H.; Su, C. Consumer Responses to Corporate Environmental Actions in China: An Environmental Legitimacy Perspective. *J. Bus. Ethics* **2015**, *143*, 589–602. [CrossRef]
35. Du, S.; Bhattacharya, C.; Sen, S. Reaping relational rewards from corporate social responsibility: The role of competitive positioning. *Int. J. Res. Mark.* **2007**, *24*, 224–241. [CrossRef]
36. Bhattacharya, C.B.; Sen, S. Consumer—Company Identification: A Framework for Understanding Consumers' Relationships with Companies. *J. Mark.* **2003**, *67*, 76–88. [CrossRef]
37. Uzzi, B.; Lancaster, R. Relational Embeddedness and Learning: The Case of Bank Loan Managers and Their Clients. *Manag. Sci.* **2003**, *49*, 383–399. [CrossRef]
38. Lee, G.; Masulis, R.W. Do more reputable financial institutions reduce earnings management by IPO issuers? *J. Corp. Financ.* **2011**, *17*, 982–1000. [CrossRef]
39. Rexhepi, G.; Kurtishi, S.; Bexheti, G. Corporate Social Responsibility (CSR) and Innovation–The Drivers of Business Growth? *Procedia Soc. Behav. Sci.* **2013**, *75*, 532–541. [CrossRef]
40. Luo, X.; Bhattacharya, C. Corporate Social Responsibility, Customer Satisfaction, and Market Value. *J. Mark.* **2006**, *70*, 1–18. [CrossRef]
41. Cohen, W.M.; Levinthal, D.A. Absorptive capacity: A new perspective on learning and innovation. *Adm. Sci. Q.* **1990**, *35*, 128–152. [CrossRef]
42. Husted, B.W.; Allen, D.B. Strategic Corporate Social Responsibility and Value Creation among Large Firms: Lessons from the Spanish Experience. *Long Range Plan.* **2007**, *40*, 594–610. [CrossRef]
43. Rosenbaum, P.R.; Rubin, D.B. Constructing a Control Group Using Multivariate Matched Sampling Methods That Incorporate the Propensity Score. *Am. Stat.* **1985**, *39*, 33. [CrossRef]
44. Caliendo, M.; Kopeinig, S. Some Practical Guidance for the Implementation of Propensity Score Matching. *J. Econ. Surv.* **2008**, *22*, 31–72. [CrossRef]
45. Biswas, M. Are They Efficient in the Middle? Using Propensity Score Estimation for Modeling Middlemen in Indian Corporate Corruption. *J. Bus. Ethics* **2015**, *141*, 563–586. [CrossRef]
46. Chay, J.; Park, S.H.; Kim, S.; Suh, J. Financing hierarchy: Evidence from quantile regression. *J. Corp. Financ.* **2015**, *33*, 147–163. [CrossRef]
47. Krüger, S.; Rösch, D. Downturn LGD modeling using quantile regression. *J. Bank. Financ.* **2017**, *79*, 42–56. [CrossRef]

48. Kang, H.-H.; Liu, S.-B. Corporate social responsibility and corporate performance: A quantile regression approach. *Qual. Quant.* **2013**, *48*, 3311–3325. [CrossRef]
49. Mithani, M.A. Innovation and CSR—Do They Go Well Together? *Long Range Plan.* **2017**, *50*, 699–711. [CrossRef]
50. Szutowski, D.; Ratajczak, P. The Relation between CSR and Innovation. Model Approach. *J. Entrep. Manag. Innov.* **2016**, *12*, 77–94. [CrossRef]
51. Lian, Y.; Su, Z.; Gu, Y. Evaluating the effects of equity incentives using PSM: Evidence from China. *Front. Bus. Res. China* **2011**, *5*, 266–290. [CrossRef]
52. Kim, Y.; Brodhag, C.; Mebratu, D. Corporate social responsibility driven innovation. *Innov. Eur. J. Soc. Sci. Res.* **2014**, *27*, 175–196. [CrossRef]
53. Mattingly, J.E.; Berman, S. Measurement of Corporate Social Action. *Bus. Soc.* **2006**, *45*, 20–46. [CrossRef]
54. Ju, X.; Lo, D.; Yu, Y. Financing Constraints, Working Capital Management and the Persistence of Firm Innovation. *Econ. Res. J.* **2013**, *48*, 4–16.
55. Gilbert, C.G. Unbundling the Structure of Inertia: Resource Versus Routine Rigidity. *Acad. Manag. J.* **2005**, *48*, 741–763. [CrossRef]