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The Impact of Corporate Social Responsibility on Firms' Innovation in China: The Role of Institutional Support

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Abstract: Corporate Social Responsibility (CSR) literature in developed countries indicates that there are two types of CSR (i.e., proactive CSR and reactive CSR), and only the proactive one can boost innovation. However, recent studies from emerging economies such as China show that both types of CSR can enhance innovation. Such inconsistent results may be created by, on the one hand, the heterogeneity of innovation types, and on the other hand, the heterogeneity of mechanisms through which CSR impacts innovation in different countries. Accordingly, this paper theoretically explores the impacts of two types of CSR (i.e., proactive CSR and reactive CSR) on two of innovation types (exploratory innovation and exploitative innovation). This paper further reveals the mechanisms through which CSR impacts innovation in China by investigating the moderating role of institutional support (i.e., government support and social support) on the relationship between CSR and innovation. Using a panel dataset (2008–2016) of 286 Chinese public listed firms from research and development (R&D)-intensive industries (e.g., information technology, pharmaceutical and biological products; and chemicals, etc.), our findings show that: (1) proactive CSR promotes exploratory innovation; (2) reactive CSR promotes exploitative innovation; (3) government support strengthen the relationship between proactive CSR and exploratory innovation as well as the relationship between reactive CSR and exploitative innovation; (4) social support weaken the relationship between proactive CSR and exploratory innovation. This paper enriches our understanding on the relationship between CSR and innovation, and provides implications for practitioners and policymakers.

Keywords: proactive CSR; reactive CSR; exploratory innovation; exploitative innovation; institutional support; China

1. Introduction

After decades of rapid economic development, sustainable economic growth has become an essential topic in China in consideration of population growth and environmental degradation. As the most populous country, the largest manufacturer, and the largest non-renewable resources consumer in the world [1,2], China has adopted a series of practices to transform its national development strategy in recent years, from an economic-growth-oriented strategy to a more long-term and balanced economic-social development strategy [3–5]. Such transformation in the national strategy has encouraged firms to engage in corporate social responsibility (CSR) and thereby grow in sustainable ways [6].

Innovation has been widely regarded as one of the key pathways through which CSR balances social and financial performance of firms, thus achieving sustainable goals [7–13]. To resolve the

question of how CSR promotes firms' innovation, research grounded in developed countries indicates that there are two types of CSR, i.e., proactive CSR and reactive CSR, and only the proactive one can promote innovation [14–18]. However, recent studies from emerging economies, such as China, show evidence that both types of CSR can enhance innovation [19–22]. These disparate results create grounds for further investigation.

Such inconsistent results may be caused by the heterogeneity of innovation types. Given that different CSR types serve different strategic purposes and bring distinct benefits [14–18,23], CSR may create different types of innovation. According to prior studies [24–27], there are in general two innovation types, namely, exploratory and exploitative innovation, which are divergent in terms of strategic objectives, research and development (R&D) investments and learning patterns [28,29]. Current studies mainly focus on the impacts of the different types of CSR on general innovation performance [14–19]. How different CSR types affect different innovation types has been under-researched.

The equivocal results may be also created by heterogeneity of mechanisms through which CSR impacts innovation in different countries. Recent studies suggest that the mechanisms through which CSR affects innovation in emerging economies (e.g., China) may be different from those in developed countries [20,22]. Institutional forces are the key drivers of CSR across developed countries and emerging economies [6,30], and such factors are more salient in emerging economies [22]. Unlike developed countries, weak market mechanisms and legal frameworks create barriers for firms to acquire resources from market in emerging economies [31–33]. With the growing public and government concerns on social and environmental issues in emerging economies, being socially responsible has become an important way to respond to institutional pressures and acquire institutional support such as tax rebates and subsidies [7,34]. From the perspective of institutional theory, firms' strategies and their outcomes are influenced by formal and informal institutions in which they are embedded [35,36]. In response to institutions, firms can gain institutional support, which can bring necessary resources for firms' survival and growth [7,37], and may enhance financial performance [38] as well as innovation capabilities [39,40]. Therefore, institutional support may play key roles in the relation between CSR and innovation (hereafter the CSR–Innovation relationship) in the context of emerging economies such as China. Yet how institutional support impact the CSR–Innovation relationship has received little attention.

This study, therefore, focusses on the CSR–Innovation relationship in China, and targets at exploring following questions:

- (1) Do different types of CSR affect different innovation types?
- (2) How do institutional support impact the CSR–Innovation relationship?

To address the above research questions, this paper builds on institutional theory to examine the impacts of CSR (i.e., proactive CSR and reactive CSR) on innovation (i.e., exploratory innovation and exploitative innovation) and the moderating role of institutional support (i.e., government support and social support) in these effects. Specifically, drawing on the innovation literature [24–27], we conceptualize firms' innovation into exploratory and exploitative innovation, and quantitatively separate them based on the patent analysis. We argue that different CSR types could promote different types of innovation, respectively. Based on the framework of formal and informal institutions [35,36], we categorize institutional support into government support and social support. We argue that different institutional support can impact the CSR–Innovation relationship in different ways. The theoretical framework is empirically tested based on a panel dataset (2008–2016) of 286 publicly traded Chinese firms in R&D-intensive industries, including information technology, pharmaceutical and biological products; and chemicals, etc.

This paper contributes to the CSR–Innovation literature in two ways. First, this paper contributes to the understanding of CSR–Innovation relationship by establishing the links between the two types of CSR (i.e., proactive CSR and reactive CSR) and the two types of innovation (i.e., exploratory innovation and exploitative innovation). This paper is an early attempt to conceptually and empirically investigate

the impacts of different types of CSR on different types of innovation. Second, this paper further reveals the mechanism through which CSR impacts innovation in China by exploring the moderating role of institutional support (i.e., government support and social support) in the CSR–Innovation relationship. Our findings will motivate industrial practitioners in emerging economies like China to engage in sustainable activities by explaining how different CSR facilitate different innovations. This paper also provides implications for policymakers who are trying to push firms to grow in sustainable ways.

2. Literature Review and Hypothesis Development

2.1. CSR–Innovation Research

CSR refers to ‘the broad array of strategies and operating practices that a firm develops in its efforts to deal with and create relationships with its numerous stakeholders and the natural environment’ [41] (p. 10). CSR–Innovation research is generated from the CSR–firm performance literature, and suggests that CSR can benefit firm performance by promoting innovation capabilities [8,9,42]. Early CSR–Innovation research focuses primarily on one specific dimension of CSR, i.e., environmental practices [43,44]. More recent studies have extended the notion of CSR beyond the environmental dimension to a broader concept to examine the question of how CSR in general promotes firms’ innovation. For instance, based on the supply and demand framework, McWilliams and Siegel [8] recognize CSR as resource investments that can stimulate innovation to fulfil the potential demands of customers. However, relevant empirical studies show that the CSR–Innovation relationship is equivocal [45]. Some studies have found a positive relationship between the two constructs [13,42,46], while others have shown nonsignificant associations between them [47].

To resolve this problem of inconsistency, the CSR–Innovation literature attempts to explore the impacts of the different types of CSR on innovation [14–18]. There are various types of CSR that have been identified in the traditional CSR research [48]. Some studies attempt to categorize CSR based on the kind of responsibilities that firms take when engaging in CSR [49]. For instance, Carroll [50,51] categorizes CSR into four groups: economic, legal, ethical and philanthropic. Other research intends to categorize CSR based on the evolutionary perspective [10,16,52], indicating that there are generally two types of CSR, namely, reactive CSR and proactive CSR. Based on this conceptual framework, CSR–Innovation research finds that only the proactive one can benefit innovation [14–18].

Proactive CSR refers to efforts made by a firm on integrating its business strategies with the goal of sustainability and building the shared value with various stakeholders; whereas reactive CSR refers to efforts made by a firm with regard to legal compliance and risk management [14–18,52]. As Ho [53] notes, proactive CSR and reactive CSR reflect different stages of CSR evolution. Proactive CSR is more common in developed countries [54]. On the contrary, in emerging economies, CSR is to a large extent still in its reactive stage or early proactive stage [54].

Existing CSR–Innovation research is mainly based on developed countries. Some recent studies have investigated the CSR–Innovation relationship in emerging economies, such as China, where market mechanisms and legal frameworks are less mature compared with those in developed countries [31–33]. Their findings have shown that reactive CSR can promote innovation [19–22]. For instance, Wei et al. [19] indicated that both proactive and reactive CSR can enhance innovation, which is contrary to previous conclusions in developed countries. However, given that CSR–Innovation research in the context of emerging economies is still at the early stage [45], few studies have explained the reason behind these disparate results. Drawing on innovation literature and the contingent theory, this paper argues that such differences may be caused by the heterogeneity of innovation types, as well as the heterogeneity of mechanisms through which CSR impacts innovation across developed countries and emerging economies.

2.2. The Impacts of Proactive and Reactive CSR on Exploratory and Exploitative Innovation

According to the innovation literature [24–27], there are two distinct types of innovation, i.e., exploratory innovation and exploitative innovation. Exploratory innovation refers to efforts made by firms towards identifying or generating new knowledge that is beyond the scope of the current knowledge base and reflects significant leaps in technological development. Exploitative innovation refers to efforts made by firms towards improving or modifying existing knowledge utilized for current business and reflects minor changes in extant technological domains [27,55].

We argue that proactive CSR can promote exploratory innovation. First, implementing proactive CSR helps firms capture new market opportunities by addressing environmental and social issues [8–14]. For instance, Husted and Allen [10] indicated that customers would be willing to pay a price premium for products with social or environmental attributes. In China, with the growing public concern regarding social and environmental issues, recent evidence indicates that there is increasing scale of customer groups who are willing to support firms' CSR activities and pay a higher price for their products [56]. For better capturing the market opportunities, proactive CSR can enable firms to adopt new organizational structure or management system [57–59], leading managers to consider sustainable goals in the decision-making process [60] and sparking organizational learning process [14]. Proactive CSR could also cause firms to put more investments into developing new products or processes, which help firms enter new market segments [8–10]. Second, proactive CSR is an effective instrument for firms to cultivate relationships with various stakeholders, who possess valuable resources which are key elements for firms' survival and sustainable development [13,14]. Such wide connections enable firms to access new information, ideas, or new knowledge [13,14], which can be utilized to enter new technological domains [25,27]. According to the Triple Helix model [61,62], the interactions among industries, universities and governments are critical enablers of generation and diffusion of new knowledge as well as disruptive innovation. Given the fact that proactive CSR can reduce information asymmetry via the transparent communications between the focal firm and stakeholders [42], it can create more opportunities for firms to cooperate with government bodies and universities, thus promoting innovation performance. Therefore, proactive CSR can boost exploratory innovation.

Hypothesis 1a (H1a): *Proactive CSR is positively related to exploratory innovation.*

We further argue that reactive CSR can promote exploitative innovation. Prior studies suggest that reactive CSR cannot enhance innovation, because this kind of CSR is not in line with a firm's core business, and thus is not able to effectively capture market opportunities and knowledge from various stakeholders [14–18]. However, implementing reactive CSR can help firms acquire legitimacy, which could enable firms to gain external resources, such as talent, and financial and governmental support [37]. These external resources are crucial for developing and implementing technologies [55]. Adopting reactive CSR can also enhance firms' social reputation [23], which is an intangible resource of great importance [42]. For instance, reactive CSR, such as making efforts towards reducing carbon emissions or supporting local communities, could help firms to establish a reliable image of committing to the long-run of business [63]. Therefore, CSR could also help firms to gain external resources, including information and knowledge. Moreover, for the purpose of legal compliance, reactive CSR tends to push firms to adopt end-of-pipe solutions, which can improve and refine current technology domains and products [15]. Therefore, reactive CSR can boost exploitative innovation.

Hypothesis 1b (H1b): *Reactive CSR is positively related to exploitative innovation.*

2.3. The Moderating Roles of Government and Social Support

To grow and survive, a firm should establish legitimacy from various stakeholders [6]. With the increasing public and government concerns regarding environmental and social issues, being socially responsible has become an important way to acquire legitimacy in China [6,20,22,34]. Building

legitimacy is the condition for gaining necessary resources, such as technologies, financial resources and government support [37]. According to institution theory, there are formal and informal institutions which could impact firms' strategies and behaviors [35,36]. Formal institutions include laws, rules and standards, which are normally created by the government [37]. Informal institutions include norms, ethics and cultures, which are embedded in the social system and upheld by the public and communities [20]. By responding to formal and informal institutions, firms can acquire institutional support, such as entering the business network and financial support [64].

According to the framework of formal and informal institutions, institutional support could be categorized into government support and social support. Government support refers to the extent to which a firm gains assistance such as subsidies, tax rebates, and interest discount loans from government bodies [65]. Social support refers to the social perception of the desirability, acceptance or appropriateness of a firm's efforts on dealing with social and environmental issues [66].

Firms can acquire government support by complying or aligning their strategies with the expectations of the government [65]. As the largest manufacturer and energy consumer in the world [1,2], the Chinese government has directed many efforts towards balancing economic and social/environmental development [3–5]. Accordingly, CSR engagement has become an important way to gain government support [34]. In China, government bodies have controlled various important resources, such as market entry, land, financial resources, and investment ratification [33,34]. Therefore, government support can provide political advantages for firms that engage in CSR [6,34]. In particular, given that the Chinese government has established the targets of becoming a “innovation-oriented society” and a world technology superpower, it has made huge investments in innovation. Accordingly, government support would guild firms to put more inputs in R&D. Therefore, government support would leverage the CSR–Innovation relationship, and we propose the following hypotheses:

Hypothesis 2a (H2a): *Government support strengthens the relationship between proactive CSR and exploratory innovation.*

Hypothesis 2b (H2b): *Government support strengthens the relationship between reactive CSR and exploitative innovation.*

Firms can acquire social support when they behave congruently with social values, norms, and expectations [66]. Social support includes assistance from various stakeholders, such as suppliers, customers, employees, investors, etc. Some studies indicate that customers in developing countries are normally price-sensitive and may not be willing to pay a price premium for products with CSR attributes [67]. However, recent evidence shows that there is a growing number of customers who would be willing to pay a price premium for products with social and environmental attributes [56]. Therefore, with the increasing public concerns on social and environmental issues, complying with expectations of stakeholders or building the shared value among stakeholders have become effective ways for firms to acquire social support. Social support can provide more opportunities for firms to enter the new market [37] and gain external resources, including financial resources, information, and knowledge [13,14], which could benefit both exploratory and exploitative innovation. Therefore, we propose the following hypotheses:

Hypothesis 3a (H3a): *Social support strengthens the relationship between proactive CSR and exploratory innovation.*

Hypothesis 3b (H3b): *Social support strengthens the relationship between reactive CSR and exploitative innovation.*

Figure 1 presents the impacts of proactive and reactive CSR on exploratory and exploitative innovation respectively, and the moderating roles of government and social support.

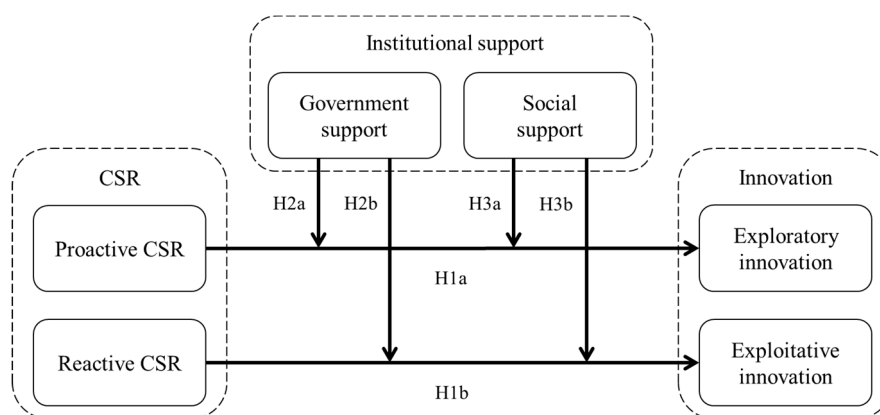


Figure 1. Conceptual model.

3. Methodology

3.1. Sample and Data

Our initial sample is constructed based on the firms that were publicly traded on the Shanghai or Shenzhen Stock Exchanges from 2008 to 2016. Our panel dataset begins in 2008, which is the year immediately after China's stock exchanges issued the guidelines on CSR reports in 2007. We choose 2016 as the ending year of the dataset, because the data for measuring the term of government support only covers the time period from 2008 to 2016. The initial sample included 851 firms selected from firms that had issued CSR reports. According to the Chinese Industry Classification Guidelines for Listed Companies, the Rankins CSR Ratings (an independent rating agency with a focus on the evaluation of CSR reports produced by Chinese firms) and Belderbos et al. [26], we choose firms from five R&D-intensive industries: (1) electronics; (2) machinery, equipment and instrument manufacturing; (3) information technology; (4) pharmaceutical and biological products; and (5) chemicals. We then obtained a final sample of 286 firms.

The dataset was constructed from multiple data sources. We obtained data regarding proactive and reactive CSR based on firms' CSR reports. We collected patent data as a measurement of innovation from the Derwent World Patents Index (DWPI, the most comprehensive patent database). Following prior research [34,68,69], we use marketization index collected from the Marketization of China's Provinces: NERI Report 2018 as a proxy for government support. Following prior studies [70,71], we measured social support based on the China Core Newspapers Full-Text Database, which is one of the largest Chinese news databases, including more than 500 national and local newspapers. For other firm-level data, we employed the OSIRIS database, which consists of comprehensive information about publicly listed firms around the world [72].

Using patents as innovation indicators has several advantages [26,73–75]: patent data is objective, because it has been processed and acknowledged by patent examiners; patent data is publicly accessible; and patent data contains detailed information regarding the technologies. In our research, we used patent application data rather than patent grant data to measure innovation. This serves to capture the timing of a firm's patenting activities, as well as to avoid any potential uncontrolled factors involved in the patent-granting process [73].

Current empirical CSR–Innovation research mainly uses structural equation modelling to analyze the cross-sectional data from surveys [14,17,18]. This paper adopts the fixed effect model to analyze the panel data constructed from multiple sources. On the one hand, the fixed effect model is widely used in the longitudinal analysis, since it can control unobserved variables that have impacts on dependent variables. On the other hand, although cross-sectional data could provide more details regarding research objectives compared to the panel data, using panel data constructed from multiple sources

can provide time series information and effectively avoid common method bias that usually happens in survey data [55].

3.2. Variables

3.2.1. Dependent Variables: Exploratory Innovation and Exploitative Innovation

According to the International Patent Classification System (IPC), each patent is classified into at least one technological field. There are a total of 628 IPC four-digit classes (used in this paper) that represent different technology domains, as well as more than 10,000 subclasses. Following Belderbos et al. [26], we treat a patent as an exploratory innovation if its technical domains cover a new field of technology. A new field of technology is defined as one in which the firm has not had any patent filings during the past five years. Otherwise, the patent is categorized as an exploitative innovation. Moreover, once a firm enters a new technology domain, any patent filing that includes the new domains is treated as exploratory for three consecutive years. We choose a five-year window because with the R&D cycle getting shorter, technical knowledge might lose most of its technical and economical relevance within five years [26]. We have developed a python program to distinguish exploratory and exploitative innovations. In total, our dataset is composed of 116,845 patent applications. Most of the patents are classified as exploitative (81.63%), and the total number of exploratory patents is 21,462 (18.37%).

3.2.2. Independent Variable: Proactive CSR and Reactive CSR

In line with extant studies [7,10–12,14,16–18,23,76,77], we separate CSR into proactive CSR and reactive CSR based on the content analysis on the CSR report. Given that firms implement proactive CSR to align business strategies with the needs of stakeholders and building the shared value with them [11,12,14,23], proactive CSR usually not only involves the changes of governance structure which can support and audit social and environmental initiatives [23,76,77], but also includes environmental and social initiatives, such as investing new technologies and integrating the voice of stakeholders into the process of new product development [7,11,12,14,16,43]. Accordingly, we adopt five items to measure proactive CSR to address its characteristics based on prior studies. Given that firms implement reactive CSR to comply with legal requirements and gain legitimacy, we adopt five items to measure reactive CSR to address its characteristics based on prior studies. Items are shown in Table 1. We score the values of proactive and reactive CSR in year *t* from 0 to 5 based on the number of the items that could be verified by a firm's CSR reports. The more items that are verified from the reports, the higher the scores.

Table 1. Measurements of proactive and reactive CSR.

Category	Items	References
Proactive CSR	1 There are departments for auditing or guiding corporate social responsibility (CSR) activities.	Burke and Logsdon [7]; Sharma and Vredenburg [14]; Sharma [16]; Husted and Allen [10]; Clarkson et al. [76]; Hanke and Stark [23]; Porter and Kramer [11,12]; Rahman and Post [77]; Bocquet et al. [17,18]
	2 Using Global Reporting Initiative (GRI) as CSR report guidelines	
	3 There are investments in CSR-related innovations.	
	4 Stakeholders (e.g., non-profit organizations) are involved in the process of new product development or setting CSR policies	
	5 ISO14001 is implemented at the firm level	
Reactive CSR	1 There are statements regarding compliance with environmental standards	Burke and Logsdon [7]; Sharma and Vredenburg [14]; Sharma [16]; Husted and Allen [10]; Clarkson et al. [76]; Hanke and Stark [23]; Porter and Kramer [11,12]; Rahman and Post [77]; Bocquet et al. [17,18]
	2 There is a summary of cost savings arising from green initiatives to the firm	
	3 There are statements regarding philanthropic or community support activities	
	4 There are statements on improving production system for implementing CSR policies	
	5 There are statements regarding health and safety initiatives	

NVIVO 11 software is used to collect sentences about proactive and reactive CSR from firms' CSR reports. To enhance the construct reliability of the measurement, two researchers are independently responsible for the content analysis work, and a third researcher is responsible for dealing with differences in evaluations.

3.2.3. Moderating Variables: Government Support and Social Support

We use the marketization index from the NERI Report as a proxy for the variable of government support. The marketization index is scaled from 0 to 10, the higher the score, the higher the degree of marketization. As Marquis and Qian [34] note, higher marketization scores reflect more resources that government bodies have accumulated, and thus, the governments can give more support to firms that adopt CSR programs.

We measure social support based on the content analysis on news reports regarding firms' CSR performance. There are 82,598 relevant news articles related to the sample firms. According to prior studies [70,71], this paper categorizes collected news reports into three subgroups: positive, negative and neutral groups. We define a news report as positive when it mentions a sample firm's environmental or social contributions or efforts. When a news report is related to a sample firm's negative environmental or social impacts, such as environmental punishments, we category it as a negative one. We treat the rest of news reports as neutral ones. Again, for enhancing the construct reliability of measurement, two researchers are arranged to the content analysis work independently, and there is a third researcher who deals with differences in evaluations. After that, this paper employs the equation of Janis-Fadner coefficient (J-F coefficient, see Equation (1)) to calculate social support.

$$J - F = \begin{cases} \frac{e^2 - ec}{t^2} & \text{if } e > c \\ \frac{ec - e^2}{t^2} & \text{if } e < c \\ 0 & \text{if } e = c \end{cases} \quad (1)$$

where 'e' is the sum of positive news reports, "c" is the sum of negative reports, "t" is the sum of all reports. The index of J-F coefficient ranges from 1 to −1; a higher J-F coefficient indicates more legitimacy and social support that a firm have received.

3.2.4. Control Variables

To capture other influences on innovation, we control for the following variables based on prior research [13,26,42,55,72,78,79]: (1) we control firm size measured by the natural logarithm of total assets; (2) we control firm age measured by years since a firm is registered; (3) we control firms' R&D expenses measured by the natural logarithm of R&D expenses plus 1; (4) we control the current ratio that measures a firm's ability to pay short-term obligations. A high current ratio reflects low operational risk of distress or default, and a firm has high current ratio could have more resources available for innovation investments; (5) we control the return on assets ratio (ROA), which measures a firm's financial performance; (6) we control the proportion of independent directors on board (IDB), which measures the performance of corporate governance and has been found that could impact innovation performance [79]; (7) we control the managerial ownership measured by the percentage of total equity owned by the chief executive officer (CEO). Managerial ownership is another indicator of corporate governance [78]. A high managerial ownership would cause managers to have more incentives to promote long-term investments, such as innovation [78]. Moreover, we control industry (five R&D intensive industries) dummies and year (2008–2016) dummies to avoid the impacts of industry characteristics and the economic cycles. Table 2 presents the measurements and data sources of all variables.

Table 2. Measurements of all variables.

	Variables	Measurements	Data sources
Dependent variables	Exploratory innovation	The number of exploratory patent applications in year t	Derwent World Patents Index
	Exploitative innovation	The number of exploitative patent applications in year t	
Independent variables	Proactive CSR	Content analysis. Please refer to Table 1	CSR reports
	Reactive CSR		
Moderating variables	Government support	Marketization index	Marketization of China's Provinces: NERI Report 2018
	Social support	Please refer to Equation (1) for details	China Core Newspapers Full-text Database
Control variables	Firm size	Ln (total assets)	OSIRIS
	Firm age	Years since a firm is registered	
	R&D	Ln (R&D expense +1)	
	Current ratio	Current ratio	
	ROA	Return on assets	
	IDB	The proportion of independent directors	
	Managerial ownership	The percentage of total equity owned by the CEO	
	Industry dummies	Industry (five R&D intensive industries) dummies	
	Year dummies	Year (2008–2016) dummies	

Notes: CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors.

3.3. Model Specification

We use a negative binomial specification to quantitatively analyze the effects of CSR on innovation, as well as the moderating roles of government support and social support in these effects. A negative binomial model can interpret the count nature of the patent data [73]. Specifically, we construct the following fixed effect model to test H1a and H1b after the Hausman test:

$$Innovation_{it} = B_0 + B_1 CSR_{i,t-1} + B_k Controls_{i,t-1} + FixedEffects_{i,t-1} + \varepsilon_{it} \quad (2)$$

where $Innovation_{it}$ denotes the dependent variables in question (exploratory and exploitative innovation). $CSR_{i,t-1}$ indicates a row vector of one-year lagged independent variables (proactive CSR and reactive CSR). $Controls_{i,t-1}$ indicates row vectors of one-year-lagged control variables and moderating variables.

We construct the following fixed effect model to test H2a, H2b, H3a, H3b:

$$\begin{aligned}
 Innovation_{it} = & B_0 + B_1 CSR_{i,t-1} \\
 & + B_2 Moderator_{i,t-1} + B_3 CSR_{i,t-1} \times Moderator_{i,t-1} \\
 & + B_k Controls_{i,t-1} + FixedEffects_{i,t-1} + \varepsilon_{it}
 \end{aligned} \quad (3)$$

where $Moderator_{i,t-1}$ indicates row vectors of one-year-lagged moderating variables, i.e., government support and social support. $CSR_{i,t-1} \times Moderator_{i,t-1}$ indicates row vectors of one-year-lagged interactions. To test moderating effects, we create interaction terms using proactive and reactive CSR, and government support and social support. We standardize every variable in the interaction terms.

4. Results

4.1. Descriptive Statistics

Table 3 Panel A shows the descriptive statistics for the variables. The values of proactive and reactive CSR range from 0 to 5, and the median values of proactive CSR and reactive CSR are less than their mean value, which indicates that in China, firms' efforts towards CSR, especially proactive CSR, are still limited [69]. According to Panel A and B, the mean and median values of reactive CSR are higher than those of proactive CSR, indicating that on average, firms invest more in reactive CSR than in proactive CSR. These results are in line with Visser [54] and Ho [53], who argue that in developing countries, CSR is to a large extent still in its reactive stage or early proactive stage.

Table 3. Descriptive statistics of all variables.

Panel A Descriptive statistics.						
Variables	Mean	Median	Maximum	Minimum	SD	Observations
Proactive CSR	1.25	1	5	0	1.06	1728
Reactive CSR	2.68	2	5	0	1.28	1728
Exploratory innovation	17.72	6	1012	0	56.12	1728
Exploitative innovation	83.91	7	6322	0	389.24	1728
Government support	7.67	7.91	9.95	0	1.58	1728
Social support	0.42	0.33	1	−1	0.45	1728
Firm size	8.63	8.50	13.33	4.52	1.29	1728
Firm age	16.78	16	62	1	1.68	1728
R&D	4.36	4.32	9.15	0.01	0.07	1728
Current ratio	2.63	1.66	57.28	0.16	3.53	1728
ROA	6.48	5.70	75.96	−58.65	7.17	1728
IDB	0.42	0.39	0.58	0.33	0.05	1728
Managerial ownership	0.53	0.35	0.81	0	12.51	1728
Panel B Mean values of dependent and independent variables across years.						
Year	Observations	Proactive CSR	Reactive CSR	Exploratory innovation	Exploitative innovation	
2008	11	0	1.51	29.66	52	
2009	38	0	1.68	14.38	198.42	
2010	159	0.56	1.89	14.25	63.66	
2011	198	0.73	2.11	20.15	66.91	
2012	243	0.95	2.23	21.65	73.63	
2013	260	1.36	2.76	18.86	79	
2014	273	1.68	2.66	15.49	98.71	
2015	274	1.48	2.85	17.82	115.63	
2016	272	1.87	3.01	21.40	126.67	

Notes: CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors.

Table 4 presents correlations for the variables. The results indicate that the majority of the bivariate correlations are lower than 0.3. Moreover, we further check for collinearity with Variance Inflation Factors (VIF). The highest VIF is far less than the cut-off point of 10 for all the models. These results indicate that potential multicollinearity could not impact the coefficients of independent variables [72].

Table 4. Correlation analysis of variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Proactive CSR												
2. Reactive CSR	0.248											
3. Exploratory innovation	0.164	0.126										
4. Exploitative innovation	0.063	0.158	0.034									
5. Government support	0.140	0.052	0.027	−0.033								
6. Social support	0.361	0.312	0.304	−0.127	−0.006							
7. Firm size	0.125	0.053	0.007	−0.002	0.008	0.174						
8. Firm age	0.066	0.033	−0.003	0.042	0.010	0.091	0.048					
9. R&D	0.317	0.281	0.301	0.041	0.174	0.664	0.126	0.150				
10. Current ratio	0.095	0.075	0.049	0.251	0.042	0.456	0.084	0.015	0.127			
11. ROA	−0.019	0.105	0.035	0.001	0.006	0.018	−0.017	0.314	0.176	0.358		
12. IDB	0.089	0.031	−0.052	0.029	−0.005	−0.011	0.012	0.298	0.212	0.043	0.167	
13. Managerial ownership	0.298	0.075	0.062	0.173	0.276	0.069	0.150	0.202	0.196	0.037	0.083	−0.142

Notes: CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors.

4.2. Regression Analysis

Table 5 presents the results of estimating Equation (2) and Equation (3). Model 1 includes control variables. The coefficients of firms age, R&D and ROA are significant and positive as we predict. According to Model 2, the coefficient of proactive CSR is positive and significant at the 1% level. Therefore, H1a is supported. This result indicates that proactive CSR could promote exploratory innovation as we expect. Model 2 also indicates that reactive CSR is *NOT* able to enhance exploratory innovation. According to Model 3, the coefficient of the interaction term of proactive CSR and government support is positive and significant at 5%. Therefore, H2a is supported. This result indicates that government support has a positive moderating effect on the relationship between proactive CSR and exploratory innovation. According to Model 4, the coefficient of the standardized interaction term of proactive CSR and social support is significant but negative. Therefore, H3a is not supported. This result indicates that social support negatively moderate the relationship between proactive CSR and exploratory innovation.

Table 5. Fixed-effects negative binomial models predicting exploratory innovation (2008–2016).

Dependent Variables	Exploratory Innovation			
	Model 1	Model 2	Model 3	Model 4
Firm size	−0.065 (0.085)	−0.082 (0.086)	−0.083 (0.086)	−0.073 (0.088)
Firm age	0.048 * (0.020)	0.041 * (0.021)	0.041 * (0.021)	0.037+ (0.021)
R&D	0.118 * (0.053)	0.133 * (0.056)	0.129 * (0.057)	0.124 * (0.058)
Current ratio	−0.151 (0.126)	−0.173 (0.128)	−0.168 (0.128)	−0.166 (0.128)
ROA	0.013 * (0.006)	0.013 * (0.007)	0.012 * (0.007)	0.013 * (0.008)
IDB	−0.004 (0.013)	−0.004 (0.013)	−0.005 (0.015)	−0.004 (0.015)
Managerial ownership	0.002 (0.006)	0.002 (0.007)	0.002 (0.006)	0.001 (0.008)
Government support		1.496 (1.213)	1.533 (1.211)	1.577 (1.211)
Social support		0.116 * (0.051)	0.117 * (0.050)	0.118 * (0.052)
Proactive CSR		0.019 ** (0.007)	0.019 ** (0.007)	0.020 ** (0.008)
Reactive CSR		0.028 (0.033)	0.027 (0.033)	0.028 (0.035)
Proactive CSR*Government support			0.183 * (0.076)	0.186 * (0.077)
Proactive CSR*Socia support				−0.110 * (0.043)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Wald chi2	25.27	43.96	48.83	53.12
Log likelihood	−1801.50	−1782.38	−1765.37	−1758.16
Prob > chi2	***	***	***	***
Observations	1375	1375	1375	1375

Notes: (1) CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors; (2) All explanatory variables are one-year lagged; (3) The numbers in parentheses are standard errors; (4) +, *, **, and *** denote statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively.

Table 6 illustrates the results of estimating Equation (2) and Equation (3). Model 5 includes control variables. The coefficient of R&D is significant and positive as we predict. According to Model 6, the coefficient of reactive CSR is positive and significant at the 5% level. Therefore, H1b is supported. This result indicates that reactive CSR could enhance exploitative innovation as we expect. Model 6 also indicates that proactive CSR is not able to enhance exploitative innovation. According to Model 7, the coefficient of the standardized interaction term of reactive CSR and government support is positive and significant at 10%. Therefore, H2b is supported. This result indicates that government support have a positive moderating effect on the relationship between proactive CSR and exploitative innovation. Moreover, comparing Model 3 from Table 5 with Model 7 from Table 6, this result indicates that government support moderates the relationship between proactive CSR and exploratory innovation more strongly than the relationship between reactive CSR and exploitative innovation. According to Model 8, the coefficient of the standardized interaction term of reactive CSR and social support is not significant. Therefore, H3b is not supported. This result indicates that social support cannot moderate the relationship between reactive CSR and exploitative innovation.

Table 6. Fixed-effects negative binomial models predicting exploitative innovation (2008–2016).

Dependent Variables	Exploitative Innovation			
	Model 5	Model 6	Model 7	Model 8
Firm size	0.063 (0.070)	0.065 (0.071)	0.066 (0.071)	0.068 (0.072)
Firm age	0.001 (0.013)	−0.004 (0.013)	−0.005 (0.013)	−0.002 (0.013)
R&D	0.163 ** (0.061)	0.142 ** (0.061)	0.155 ** (0.061)	0.155 ** (0.061)
Current ratio	−0.221 * (0.097)	−0.138 (0.099)	−0.163 (0.101)	−0.163 (0.102)
ROA	0.011 (0.007)	0.012 (0.009)	0.012 (0.007)	0.012 (0.007)
IDB	0.051 ** (0.015)	0.048 ** (0.015)	0.046 ** (0.015)	0.046 ** (0.015)
Managerial ownership	−0.006 (0.008)	−0.008 (0.009)	0.008 (0.009)	−0.008 (0.009)
Government support		1.987 * (0.948)	1.985 * (0.952)	1.983 * (0.952)
Social support		0.068 (0.060)	0.070 (0.061)	0.071 (0.062)
Proactive CSR		0.008 (0.011)	0.010 (0.012)	0.010 (0.013)
Reactive CSR		0.036 * (0.015)	0.039 * (0.016)	0.039 * (0.016)
Reactive CSR*Government support			0.167+ (0.088)	0.166+ (0.089)
Reactive CSR*Social support				0.033 (0.047)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Wald chi2	152.83	168.70	172.95	173.01
Log likelihood	−1855.01	−1843.56	−1826.37	−1823.22
Prob > chi2	***	***	***	***
Observations	1251	1251	1251	1251

Notes: (1) CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors; (2) All explanatory variables are one-year lagged; (3) The numbers in parentheses are standard errors; (4) +, *, **, and *** denote statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively.

4.3. Test of Robustness

We test the robustness of findings in the following ways. First, we check the role of potential endogeneity. Prior studies indicate that there is the possible reverse causality in the CSR–Innovation relationship [42,47,80]. Strong innovation capabilities allow firms to integrate social and environmental attributes into products and services, such as developing and implementing eco-friendly materials [42]. Strong innovation capabilities could also enable firms to redesign the manufacturing processes to reduce carbon emissions or minimize the consumption of natural resources [42,80]. To test these possible feedback effects, according to Mishra [80], we regress innovation (exploratory and exploitative innovation) in Year *t* on CSR (proactive and reactive CSR) in Year *t*–4 (see Model 9 and 10 in Table 7). It is conceivable that the current innovation performance and the choice of CSR 4 years prior could have little possibility of being collectively impacted [80]. These results indicate that this paper’s main findings are upheld.

Table 7. Robust Tests (2008–2016).

Dependent Variables	Exploratory Innovation	Exploitative Innovation	Exploratory Innovation	Exploitative Innovation
	Model 9	Model 10	Model 11	Model 12
Proactive CSR t-4	0.023 * (0.011)	0.012 (0.013)		
Reactive CSR t-4	0.041 (0.066)	0.086+ (0.049)		
Proactive CSR			0.019 ** (0.008)	0.012 (0.015)
Reactive CSR			0.035 (0.041)	0.031+ (0.018)
One-year-lagged exploratory innovation			0.0012 ** (0.0004)	
One-year-lagged exploitative innovation				0.0003 *** (0.0001)
Proactive CSR*Government support	0.295+ (0.156)		0.192 * (0.078)	
Proactive CSR*Social support	−0.481+ (0.288)		−0.077+ (0.043)	
Reactive CSR*Government support		0.315+ (0.191)		0.196 * (0.090)
Reactive CSR*Government support		0.028 (0.132)		0.015 (0.051)
Control and moderating variables	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Wald chi2	23.51	132.18	48.77	188.79
Log likelihood	−1028.66	−1183.15	−1251.69	−1366.18
Prob > chi2	***	***	***	***
Observations	566	532	1382	1248

Notes: (1) CSR refers to corporate social responsibility; R&D refers to research and development; ROA refers to return on assets; IDB refers to the proportion of independent directors; (2) All control and moderating variables are one-year lagged; (3) The numbers in parentheses are standard errors; (4) +, *, **, and *** denote statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively.

Second, according to Belderbos et al. [26], we control one-year-lagged independent variables (exploratory and exploitative innovation) to avoid any uncontrolled variables, such as firms’ culture across firms (see Model 11 and 12 in Table 7). The results indicate that this paper’s main findings are upheld. Moreover, in unreported robust tests, according to Belderbos et al. [81], Zhang et al. [82], and Qiu et al. [83], we regress CSR (proactive and reactive CSR) in year *t* on innovation (exploratory and exploitative innovation) in year *t* and *t*–1 to rule out possible feedback effects. Empirical results show

that none of these predictors is statistically significant, indicating that potential endogeneity is unlikely to appear in our data set.

5. Discussion and Conclusions

5.1. Discussion

This paper conceptualizes the impacts of CSR (i.e., proactive and reactive CSR) on innovation (i.e., exploratory and exploitative innovation) and the moderating effects of institutional support (i.e., government and social support) on the relationships. Based on an empirical analysis of 286 firms in China that were publicly listed between 2008 and 2016, this study has following findings.

First, proactive CSR can promote exploratory innovation. This result is in line with previous studies, which argue that proactive CSR can create firm value by enhancing innovation capabilities [8–19]. Our findings show that in China, even proactive CSR is still in its early stage [53,54], and it could also enhance exploratory innovation.

Second, reactive CSR can promote exploitative innovation. This result is different from the previous literature, which suggested that reactive CSR was not able to enhance innovation performance [14–18]. Our findings show that although reactive CSR could not promote exploratory innovation, it could boost exploitative innovation, which requires less R&D investments than exploratory innovation, to refine current technological domains and products [24–27].

Third, government support strengthens the relationship between proactive CSR and exploratory innovation, as well as the relationship between reactive CSR and exploitative innovation. These results are in line with prior contributions, which argue that government bodies have played important roles in popularizing CSR concepts and stimulating CSR adoption at the firm level [6,20,22,30,34]. Our findings enrich these contributions by further revealing that in China, both proactive CSR and reactive CSR can help firms to gain government support, which can benefit firms' exploratory and exploitative innovation, respectively.

Fourth, social support weakens the relationship between proactive CSR and exploratory innovation, and its influence on the relationship between reactive CSR and exploitative innovation is not significant. These results are in line with previous research, which indicates that introducing radical new technologies would challenge the status quo of the current market [20,66]. Our findings show that although some evidence indicates that there is a growing number of lead users who would like to pay price premium for innovations with CSR attributes, exploratory innovation may still be not well accepted by the existing social norms and values.

5.2. Theoretical Contributions

Our findings contribute to the literature in the CSR–Innovation relationship in two ways. First, it enriches the scholarly understanding of the CSR–Innovation relationship via establishing the links between the two types of CSR (i.e., proactive CSR and reactive CSR) and the two types of innovation (i.e., exploratory innovation and exploitative innovation). Different from the traditional view that reactive CSR is not able to enhance innovation performance [14–18], this paper shows that reactive CSR can also enhance innovation, specifically, exploitative innovation, and proactive CSR can only promote exploratory innovation. Our findings advocate the arguments that CSR, as a means of cultivating stakeholder relationships, can exert more power on 'creative leaps' (i.e., absorbing and recombining different knowledge factors), which results in pioneering innovation [13]. In fact, different CSR types serve different strategic objectives, and the reactive one may also benefit innovation, which targets at refining current technological domains and enhancing the quality of products [24–27]. Moreover, from the open innovation perspective, our findings make an alternative explanation for the inconclusive views on the relationship between proactive CSR and financial performance [84]. That is, because exploratory innovation is long-term and risky [24–27], proactive CSR may not stimulate financial

performance immediately by promoting exploratory innovation. Therefore, reactive CSR should be taken into consideration when firms begin to grow in sustainable ways.

Second, the present paper reveals the mechanism through which CSR impacts innovation in China by exploring the moderating role of institutional support (i.e., government support and social support) in the CSR–Innovation relationship. Previous studies suggest that CSR can enhance innovation by strengthening firms’ relationships with multiple stakeholders [13]. However, the underlying mechanisms through which CSR impacts innovation have received little attention. Based on institutional theory, this paper shows that engaging in CSR can help a firm to gain government support, which can provide necessary resources in the firm’ innovation process. Such mechanism particularly exists in China, where market mechanisms and the legal framework are weak [31–33], additionally, government bodies control many resources [23–25]. As Marquis and Qian [34] note, being socially responsible has become an important way to strengthen the business-government relationship, which can bring political advantages for firms. This paper also reveals the fact that social support is not able to strengthen the CSR–Innovation relationship. As Duanmu et al. [67] note, implementing CSR may not gain support from stakeholders from the market in developing countries such as China, which is contrary to that in developed countries.

5.3. Managerial Implications

Our findings provide managerial implications for practitioners. Adopting CSR programs could lead to additional costs, because it requires the adoption of new governance structures or the improvement of current management systems. In developing countries, the weak legal frameworks may not effectively punish unethical practices [85,86] and CSR may not gain sufficient support from the market [67], making domestic firms hesitant to launch environmental or social initiatives. Our findings should encourage industrial practitioners to engage in CSR by showing that both proactive and reactive CSR can enhance innovation, which can promote firm value in the short term (exploitative innovation) and in the long term (exploratory innovation). Therefore, being socially responsible should be a viable option for firms to enhance innovation performance. Moreover, our findings indicate that government support could positively moderate the CSR–Innovation relationship. Therefore, firms should rely on the government to implement CSR programs.

This paper also provides important policy implications for policymakers. To achieve the goal of sustainable economic growth, the Chinese government has encouraged a wide range of industries to grow in sustainable ways in recent years. Prior studies indicate that CSR in developing countries such as China is largely motivated by government forces [6,30]. Through engaging CSR programs, firms may avoid potential punishments [6] and cultivate good relationships with government bodies [34]. Our findings further show that government bodies can guide firms to grow in sustainable ways by providing support, which can strengthen the effects of CSR on innovation. Therefore, policymakers should encourage firms’ CSR programs by providing necessary resources, such as training and tax rebates. Moreover, our findings show that social support may not effectively enhance the CSR–Innovation relationship. Accordingly, policymakers should also put more efforts on cultivating markets, such as setting product standards to enhance market demands for pro-environmental and pro-social technologies and products.

5.4. Limitations and Future Research

This paper has the following limitations. First, according to institutional theory, there are three types of institutional pressures: regulative pressure, normative pressure, and cognitive pressure [36]. In this paper, we only consider regulative pressure and normative pressure, and argue that CSR is an important way to respond to these two pressures in order to gain government support and social support. Therefore, future research is suggested to explore the role of cognitive pressure in the CSR–Innovation relationship. Second, according to prior studies, there is the heterogeneity of government support [39,40]. Different government support may have different effects on the

CSR–Innovation relationship. Therefore, future research is needed to further explore the roles of the different types of government support in the CSR–Innovation relationship. Third, this paper analysis publicly traded firms and ignore the small and medium-sized enterprises (SMEs) groups. In China, SMEs are commonly short of necessary resources; therefore, whether and how CSR programs could benefit SMEs require further investigation.

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