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Can the spending of corporate social responsibility be offset? Evidence from pharmaceutical industry

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ABSTRACT

This study aims to investigate whether the costs spent on corporate social responsibility (CSR) can be offset, and identify the inflection point when financial returns from CSR exceed the spending. By using Principal Component Analysis, we developed the Carroll's CSR model to measure actual CSR spending. Drawing on data of 315 listed pharmaceutical firms from China, the quadratic effect was used to examine the inflection point, and the panel data regression was employed to examine the impact of CSR spending on current and subsequent financial performance. The results show that CSR spending cannot be offset in the short-term. After two years of CSR implementation, ethical-domain and overall CSR spending positively relate to return on assets (ROA), whereas legal-domain CSR spending positively affects ROA after three years of CSR implementation, all justifying that CSR spending can be offset in the long-term. This research contributes to literature by precisely recognizing the time-based inflection point in financial performance arises, which is less discussed in existing CSR studies. The study findings imply that corporate managers need to view CSR spending as capital investment rather than operating costs, and policy makers should mandate institutional arrangements to facilitate CSR.

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1. Introduction

In recent years, academic literature has emphasized the important role of Corporate Social Responsibility (CSR) where enterprise needs to keep an eye on the social and environmental consequences of its conduct. In the context of emerging economies, the public has attached increasingly concerns with the environmental pollution, poor production quality, child labor and occupational health abuse, expecting firms to care

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about the interests of corresponding stakeholders and contribute to corporate citizenship (McWilliams & Siegel, 2001; Lin, 2010; Zhu et al., 2016). Though, CSR practices may consume substantial financial resources, and need continuous support from labor, facilities and institutions. Capitalizing in CSR may also result in economic disadvantage, negatively affecting firms' profitability (Barnett & Salomon, 2012; Di Giuli & Kostovetsky, 2014; Lin et al., 2020; Smith et al., 2007). Firms were stepping up efforts to invest in CSR in the past decade. For instance, the philanthropic aspect of CSR spending for top 500 Chinese companies with best philanthropic performance was 27.56 billion Chinese yuan (approximately 3.92 billion U.S. dollars) in 2018, six times higher than the amount in 2009 which was only 4.42 billon Chinese yuan (Chinese Academy of Social Science, 2019).

The idea of CSR is not new, yet modern enterprises may feel difficulties in aligning social expectations with profit maximization (Carroll, 2008; Matten & Moon, 2008). Due to the voluntary nature, management discretion toward socially responsible practices depends upon the economic consequence of CSR and its impact on firms (Yang et al., 2019). At first glance, CSR is resource-consuming at the beginning stage where firms need to invest extensive capital to hire experienced employees and purchase costly materials and equipment. This adverse influence of CSR is also found by Barnett and Salomon (2012), which reported that better CSR is associated with the higher its costs and the lower its financial performance. However, Barnett (2007) and Wang et al. (2016) emphasized the importance of stakeholder relationship management when considering CSR, and pointed out that corporate ability to earn financial returns is relied on their stakeholder influence capacity through CSR practices. In this vein, the debate on whether CSR is financially worth investing, and when financial returns coming from CSR can eventually offset the spending is still an open question in academia, and needs to be further justified.

As a concept initially emerged in the West, CSR may present differently in China where the political, socioeconomic and culture environment is different than that of developed countries (Griesse, 2007; Tang et al., 2015). Chinese enterprises often stress on profit maximization, given the widespread attention toward economic development in the country (Chen et al., 2018). Executives from China may not take CSR for granted relative to their developed country counterparts who always view CSR as a part of corporate strategy. Some scholars have begun to shed light on CSR in the Chinese context (Gao, 2011; Zhu et al., 2016). Yet, there are not many papers addressing CSR spending in this particular country, in which an increasing number of socially responsible investments arise in recent years (Weber & Lin, 2015). The last ten years China has also seen certain serious socially irresponsible cases related to medication quality and occupational injuries, and illness. Specifically, pharmaceutical industry was often criticized by violating the 'financially doing well, ethically doing good' principle due to the negative CSR incidents in respect of harmful vaccines and toxic capsules (Yang & Maresova, 2020).

In consonance with afore-mentioned arguments, the aim of this study is to deepen the understanding of the 'CSR spending – financial performance' relationship by examining whether CSR spending can be offset, and identifying the inflection point when financial returns from CSR exceeds its spending for a typical industry, i.e.,

pharmaceutical sector, in China. The current study seeks to make contributes in the following ways. First, while extant studies always used CSR score as the proxy of CSR spending and resulted in biased conclusions (Bhattacharyya & Rahman, 2019), we employed the actual CSR expenditures extracted from corporate financial data rather than the rating by independent agencies. Second, though existing studies largely investigated CSR spending in developed countries, there is a dearth of research focusing on emerging economies and the unique industry setting, making our study fill this gap by providing empirical evidence of the Chinese pharmaceutical sector.

The rest of the paper is organized as follows: Section 2 displays the literature review and hypotheses. Section 3 describes the research method. Section 4 reports the results. Section 5 unfolds the discussion. The last section concludes the study.

2. Literature review and hypotheses development

2.1. Three-domain in measuring CSR spending

The concept of CSR emerged in 1953 when Bowen emphasized social responsibility of business is a set of actions that connect to the lives of citizens (Bowen & Johnson, 1953). Since then, scholars began to develop various definitions of CSR, consisting of two school of thoughts (Carroll, 1999). The first thought concerns with the maximation of profit within the boundaries of law and minimum demand of ethics (Friedman, 1970); the second expands to a wider spectrum of obligation toward the society (Carroll, 1979; McGuire et al., 1988). Given the competing view in CSR, the Carroll's CSR model employs four domains, including the economic, legal, ethical and philanthropic domain, to bridge the gap, and was regarded as one of the most commonly used CSR definitional framework for decades (Carroll, 1979; Visser, 2006).

To be specific, the economic domain requires firms to be sustained as being profitable (Carroll, 2016). Shareholders, owners, and managers always attach greater concerns with economic responsibility due to the rewards received from firms' profitability. This domain is fundamental and natural for firms otherwise they can hardly survive in a competitive market (Aupperle et al., 1985). The legal domain illustrates that business needs to perform in a manner consistence with laws and regulation, and complies with legal obligations to societal stakeholders (Carroll, 1979). The ethical domain expects firms to operate under full range of social norms, ethical values and principles (Carroll, 1979). Public also requires firms to being as corporate citizens that goes beyond the scope of legal compliance (Carroll, 1991). Philanthropic domain is of voluntary or discretionary nature because business giving is commonly not mandated, and even not necessary in an ethical sense. Even so, modern enterprises are expected to participate in a variety of philanthropic activities, including momentary giving, community development and volunteer services of employees (Carroll, 2016).

The Carroll's CSR model is often shown as the CSR pyramid (Aupperle et al., 1985; Carroll, 1991; Clarkson, 1995; Crane & Matten, 2007). The foundation of the pyramid is the economic domain where firms need to be financially sustainable. The next two layers are the legal and ethical domains, all requiring firms to obey the law and perform ethically, and present 'expected' sense in the society. The top of pyramid

Source: Carroll (1991)

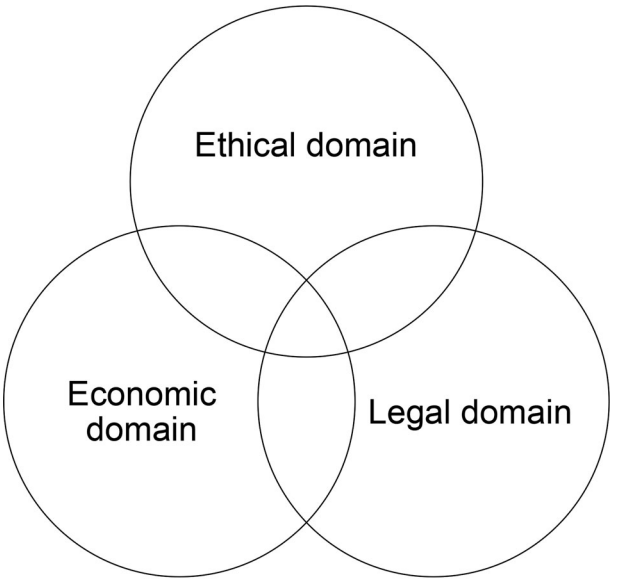
Figure 1. The CSR pyramid.

is the philanthropic domain, labelling as 'desired' level. (Carroll, 1991). The CSR pyramid is shown in Figure 1.

Nevertheless, some criticisms of the CSR pyramid appeared due to the misunderstanding of the philanthropic domain (L'Etang, 1994; Schwartz & Carroll, 2003). Philanthropy can be hardly recognized as a responsibility of firms because it is not an obligation for firms, and the lack of charitable giving cannot be treated as unethical (Schwartz & Carroll, 2003; Shaw & Post, 1993). In this vein, a revised model proposed by Schwartz and Carroll (2003) tried to incorporate the philanthropic domain into the ethical and/or economic domain, and thus generalized a so-called three-domain CSR model with amended economic, legal and ethical domain. The economic domain relates to activities that exert direct or indirect financial influence on firms, and account for the largest proportion of corporate activities in total. The legal domain refers to firms' compliance with the law, avoidance of civil litigation and anticipation of changes to legislation. The ethical domain associates with moral behaviors including the care for community and the environment. The three-domain CSR model is shown in Figure 2.

2.2. CSR Spending: is it worth?

Extant literature has two contrasting views regarding the spending of CSR (Brammer & Millington, 2008; Wood & Jones, 1995; Ullmann, 1985). The positive thought, namely the 'stakeholder value maximization', suggests that externalities connected to internal and external parties may exert pressure on firms, while CSR help firms manage relationship to these parties and improve their welfare (Freeman, 1984; Maignan & Ferrell, 2000). Today, stakeholder relationship management become one of the most important corporate goals that firms can retain and create key resources which are crucial for long-term success (Freeman & Phillips, 2002; Lång & Ivanova-Gongne, 2019). The notion of 'doing well by doing good' enables firms to obtain greater level of commitment from stakeholders and raise their willingness to support corporate activities (Luo & Du, 2015). Using a five-point score to measure corporate efforts toward CSR, Maignan and Ferrell (2000) found that CSR can yield better economic



Source: Schwartz and Carroll (2003)

Figure 2. The three-domain CSR model.

performance proxied by return on assets (ROA), return on investment (ROI), profit growth and sales growth. Clarkson et al. (2004) used the environmental capital expenditure to assess CSR spending, and concluded that low pollution firms with greater CSR expenditure have higher firm performance. In the context of mandatory CSR setting in India, Bhattacharyya and Rahman (2019) found that CSR spending can contribute to better firm performance measured by ROA and cash flow from operations. Su et al. (2020) contended that CSR investments in the community are positively associated with firm performance in Chinese resource-intensive industries.

In contrast, the negative perspective, termly the 'shareholder profit maximization', emphasizes the adverse impact of CSR spending on the organization. The first criticism is the financial burden when implementing charitable donations, employee day care, paid parental leave and environmental infrastructure (Barnett & Salomon, 2006). Capitalizing in CSR is contradictory to profit maximization, and thus firms are not necessary to conduct in voluntary ways (Mcwilliams & Siegel, 1997). For small and medium-sized enterprises, CSR spending is substantially costly, inevitably distracting valuable corporate resources. Furthermore, technical inefficiency and ineffectiveness may arise (DiMaggio & Powell, 1983). Taken employee aspect of CSR as an example, socially responsible practices toward workplace protection may cultivate a safer climate that workers may feel puzzled by complicated instructions and therefore slow down the speed of manufacture (Fan & Lo, 2012). Empirical evidences were found in supporting the negative effect of CSR spending. For instance, Lin et al. (2020) concluded that the negative facet of CSR is detrimental to financial performance measured by ROA, Return on Equity (ROE) and Tobin's Q. Bhattacharyya et al. (2021)

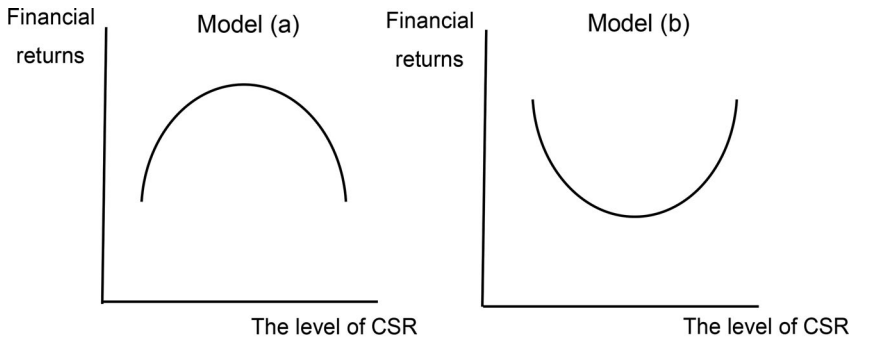
found that CSR spending negatively impacts performance indicators proxied by stock market return. Using an independent CSR rating as the proxy, Di Giuli and Kostovetsky (2014) pointed out that CSR engagement is significantly related to negative future stock returns and declines in ROA. As a summary, the debate regarding whether CSR is worth investing and the benefits coming from CSR can ultimately reflect in financial performance indicator is still inconclusive.

A recent trend in CSR literature is to examine the economic consequences of CSR in different geographic contexts or different sectors. With a focus of electronic firms in Taiwan, Hou (2019) found that socially responsible firms have better financial performance than those of firms which do not pursue CSR initiatives. In the context of Chinese stated-owned enterprises, Zhu et al. (2016) reported that financial performance is positively related to a set of CSR dimensions including labor practices, community involvement, supply chain, and political responsibility. Chen and Wang (2011) empirically concluded that CSR enhances both short-term and long-run financial performance among firms in China. In other emerging economies, Smith et al. (2007) suggested that environmental performance of Malaysian firms is negatively related to ROA. In terms of Brazilian firms, Crisóstomo et al. (2011) found a significant inverse association between CSR and firm value. As for different industry sectors, Wang et al. (2016) explored the international construction industry and found that there is a curvilinear relationship between CSR and financial performance. With respect to the banking industry, Wu and Shen (2013) asserted that CSR positively relates to financial performance measured by ROA, ROE, net interest income, and non-interested income, but negatively associates with non-performance loans.

Regarding pharmaceutical industry, firms are under substantial pressures to cut costs as resource-intensive clinical research and development and increased scrutiny on medical product safety (Lowman et al., 2012; Min et al., 2017). The industry has been criticized by overcharges of drugs, irresponsible animal testing and safe handling of unused medicine, where firms need to seek for a balance between CSR and economic profit (Džupina & Džupinová, 2019; O'riordan & Fairbrass, 2008). There are not many papers addressing the outcome of CSR in pharmaceutical industry, yet existing literature showed mixed results. Mehar and Rahat (2007) suggested an insignificant association between CSR and financial performance in Pakistan. Yang et al. (2019) focused on Chinese pharmaceutical industry, and empirically confirmed the positive relationship. Min et al. (2017) used data of the top 50 global pharmaceutical firms, and found that CSR implementation can add value to business performance.

2.3. The inflection point: does it exist?

When analyzing the relationship between CSR and financial performance, a debate regarding the time horizon of the link may emerge. Recent literature claim that there is a nonlinear relationship, which mainly relies on the timing of CSR spending and CSR benefit (Brammer & Millington, 2008). An inflection point may arise if the link between CSR and financial performance presents as either an inverse U-shaped or a U-shaped behavior.



Source: Brammer and Millington (2008), Wang et al. (2016)

Figure 3. The inflection points in the relationship between CSR and financial returns.

The inverse U-shaped relationship arise because CSR benefit can be expected to increases at first while gradually level off after reaching a certain point of time (Wang et al., 2008). Initial CSR implementation can generate sound stakeholder relationship, enabling firm to possess critical resources residing in various stakeholders that contributes to increased financial performance. Nevertheless, stakeholders are unable to constantly control those crucial resources, limiting them to provide continuous support for CSR practices. In addition, CSR implementation is likely to create both administrative costs and agency costs that may further offset the benefit coming from CSR (McWilliams & Siegel, 2001). Taken together, the marginal advantage of CSR eventually reduces as the level of CSR increase (Wang et al., 2008). The inverse U-shaped relationship with the highest inflection point is shown in Model (a) of Figure 3.

Conversely, scholars argued that there is a U-shaped relationship where a lowest inflection point arises in the association between CSR and financial returns. CSR initiatives always requires firms to make substantial investment at the beginning, distracting valuable resources including cash, product, facilities and human resources (Brammer & Millington, 2008). The consumption of resources triggers a considerable amount of costs, forming the initial downward slope of the U shape (Wang et al., 2016). As stakeholders increasingly perceive firms are socially responsible, firms may have sufficient capacity to influence their stakeholders in the long-run, and thus offset and ultimately exceed the inherent costs (Bhattacharya & Sen, 2004). Wang et al. (20162004) further justified that after passing the inflection point, CSR practices can gradually facilitate the accessibility of critical resources and learning curve, enabling firms to gain greater financial returns. The U-shaped relationship with the lowest inflection is depicted in Model (b) in Figure 3.

2.4. Hypotheses development

As the current study aims to investigate when firms' spending of CSR can be eventually offset, we examine the impact of CSR spending on financial performance of the current year and subsequent years. Referring to the three-domain CSR model

(Schwartz & Carroll, 2003), the economic domain requires firms to be financially accountable towards shareholders and customers, inevitably causing greater level of operating costs in the short-term (Barnett & Salomon, 2012). For instance, the excessive payout for shareholders, and higher level of R&D and advertisement costs may result in economic disadvantage (Cheung et al., 2018; McWilliams & Siegel, 2000). In respect of the legal domain, proactively reaching litigation support enables firms to minimize sanction risks while sacrificing short-term profit. Some firms may also consume more finance to purchase safety facilities in order to decrease work accidents or fines imposed by regulatory authorities (Lingard & Rowlinson, 2005). Because of legitimacy pressure, some firms may adopt certain management system standard like ISO 9001 and ISO 45001, of which the standardization is costly at the start (Hernandez-Vivanco et al., 2019). As for the ethical domain, charitable donations may significantly reduce current cash flow, and the welfare or philanthropic programs served to local community also incur substantial direct expenditures, adversely impacting firms' financial performance (Lu et al., 2017). As a summary, CSR practices are hardly implemented without momentous capital and management support. CSR spending is costly, competing for limited and valuable financial resources. The inherent costs may exceed financial returns coming from CSR, and thus cannot be offset in the short run (Wang et al., 2008). In this vein, the first hypothesis is formulated as follows:

Hypothesis 1. CSR spending cannot be offset in the short-term among pharmaceutical firms in China

The second hypothesis associates with whether the spending of CSR can be offset in the long run. In terms of the economic domain, CSR may release a confident signal to socially concerned shareholders and customers that firms have sufficient financial resources and can going-concern, and therefore help them get access to more capital (Orlitzky et al., 2003; Tong et al., 2018). As far as the legal domain, being law-abiding corporate citizens can capture more opportunities in lobbying for tax reductions or bargaining with governmental subsidies. The reduced mandated expenditures can consolidate firms' financial advantage (Godfrey, 2005). Providing competitive payroll also enables firms to attract, retain and motivate employees that facilitates labor productivity (Fan & Lo, 2012; Greening & Turban, 2000). With respect to the ethical domain, corporate environmental and social stewardship can generate valuable goodwill, helping firms build reputational and moral capital. Such capital is linked with positive corporate image where firms can buffer from unforeseen risks and even generate more new opportunities (Du et al., 2011; Orlitzky et al., 2003). To sum up, in the long-term, CSR spending can facilitate stakeholder cooperation with reduced firms' transaction costs (Jones, 1995). Firms can earn adequate stakeholder influence capacity, and access to critical resources residing in stakeholder network (Barnett, 2007; Bhattacharya & Sen, 2004; Greening & Turban, 2000; Wang et al., 2016). The benefits of CSR through improved stakeholder relationship may exceed the spending, and eventually materialized in financial performance indicators. In this vein, the second hypothesis is proposed as follows:

Hypothesis 2. CSR spending can be offset in the long-term among pharmaceutical firms in China

3. Research design

3.1. Sample and data selection

The data of CSR spending and financial performance indicators were drawn from the China Stock Market and Accounting Research (CSMAR) database, a leading capital market information provider that offers extensive data of Chinese listed enterprises for academia. There are three stages for sampling procedures. First, we screened out 346 listed firms which have an exclusive code of 'Pharmaceutical Manufacturing' based on the 'Industry Classification Guideline' mandated by the China Securities Regulatory Commission (CSRC). Second, we excluded firms which are labeled with 'Special Treatment (ST)' under the CSRC's stipulation because these firms have experienced abnormal financial performance in consecutive years. Third, we removed firms with no actual CSR spending in donation or social and community expenses during the study period. Eventually, the final sample of this study consists of 315 firms with a total of 2835 observations over a nine-year period between 2010 and 2018.

3.2. Measurement of variables

3.2.1. Measuring CSR spending

CSR spending is the independent variable of this study. The measurement was constructed based on the three-domain CSR model (Schwartz & Carroll, 2003). We firstly introduced a total of nine third-class indices to respectively measure CSR spending in the economic, legal and ethical domain. To be specific, there are three indices in the economic domain, including dividend payout, R&D spending, and advertising spending. The existing literature has claimed that firms with higher level of dividend payout, R&D and advertising expenses tend to spend more costs on CSR activities (Cheung et al., 2018; McWilliams & Siegel, 2000; Wieser, 2005). With respect to the indices of legal domain, we employed payroll spending, tax expenses, and subscription and membership expenses based upon the study of Chauhan and Amit (2014). In terms of the ethical domain, three indices including donation, social and community expenses, and environment and pollution control were used as the measurement (Chauhan & Amit, 2014; Weber, 2008).

By using the principal component analysis (PCA) method, the abovementioned nine third-class indices were descended into three second-class indices, which are the economic, legal, and ethical domain CSR spending. After that, these second-class indices were further descended into a first-class index, namely overall CSR spending. The details of CSR spending measurement are presented in Table 1.

3.2.2. Financial performance and control variables

To assess whether the benefits coming from CSR can exceed its spending, and such benefits can eventually materialize in financial indicators, we used financial performance as the dependent variable. We employed both market-based and accounting-based measures as they frequently appeared in prior CSR studies (Cheng et al., 2016; Lys et al., 2015; Waddock & Graves, 1997; Wang et al., 2016; Ullmann, 1985).

Table 1. CSR spending measurement.

First-class index	Second-class index	Third-class index
Overall CSR spending	Economic domain CSR spending	Dividend payout = Dividends paid / net income
		R&D spending to sales = R&D spending / total sales revenue
		Advertising to sales = Advertising spending / total sales revenue
	Legal domain CSR spending	Payroll to sales = Payroll in cash / total sales revenue
		Tax expenses to assets = (Tax payment – tax refund) / total assets
		Subscription & membership expenses to sales = Subscription, membership and certification spending / total sales revenue
	Ethical domain CSR spending	Donation to sales = Charitable donation spending / total sales revenue
		Social & community expenses to sales = Social & community spending / total sales revenue
		Environment & pollution control expenses to sales = Environmental & pollution control spending / total sales revenue

Source: Author's own work.

Table 2. Construct of the variables.

Variables	Measurement
Econ	Economic-domain CSR spending
Legal	Legal-domain CSR spending
Ethical	Ethical-domain CSR spending
CSR	Overall CSR spending
Tobin's Q	Tobin's Q = total market value of firm / total assets
ROA	Return on assets = net income / total average assets
LNTA	Natural logarithm of total assets

Source: Author's own work.

Though accounting-based measures such as ROA are commonly used in the literature (McGuire et al., 1988; Orlitzky et al., 2003; Wang & Sarkis, 2017), market-based measures like Tobin's Q are less affected by accounting rules and managerial discretion because they associate with investors' estimation and assessment of a firm's performance (Jo & Harjoto, 2011; Scholtens, 2007). Based on this, we adopted ROA and Tobin's Q as the proxies of financial performance indicators. As for the control variable, we introduced the natural logarithm of total assets to modulate the size of sample firms. The constructs of variable measurements are presented in Table 2.

3.3. Model specification

Due to fact that the sample consists of both time series and cross-sectional data, the panel data analysis was selected to empirically test the hypotheses. We initially ran the Likelihood-ratio test and the Hausman specification test to examine fixed or random effects and determined the most appropriate econometric approach. To test Hypothesis 1, we propose the regression model (1):

$$\begin{aligned} &Financial\ performance\ (ROA,\ Tobin's\ Q)_{i,t} \\ &\quad = \beta_0 + \beta_1 Spending\ (Econ + Legal + Ethical,\ CSR)_{i,t} + \beta_2 LNTA_{i,\ t} + \varepsilon_{i,\ t} \end{aligned} \quad (1)$$

Where, $Financial\ performance_{i,t}$ stands for the two equations related to ROA and Tobin's Q of firm i in year t. $Spending_{i,t}$ denotes the two equations of CSR spending including three-domain and overall CSR spending of firm i in year t. Of which, *Econ* is the economic domain, *Legal* is the legal domain, *Ethical* is the ethical domain, and *CSR* is overall CSR spending. $LNTA_{i,t}$ is the natural logarithm of total assets of firm i in year t, and ε_{it} is the disturbance term.

To test Hypothesis 2, we initially investigated whether there is an inflection point in the relationship between CSR spending and financial returns. We employed a quadratic specification model (2), which is a commonly used econometric approach to examine curvilinear relationship and identify the turning point for dependent variable (Richmond & Kaufmann, 2006; Wooldridge, 2010). We then introduced maximum three-year lagged terms for independent variables in model (3) in order to specifically investigate when CSR spending can be offset in the long run.

$$\begin{aligned} &Financial\ performance\ (ROA,\ Tobin's\ Q)_{i,t} \\ &\quad = \beta_0 + \beta_1 Spending\ (Econ + Legal + Ethical,\ CSR)_{i,t} \\ &\qquad + \beta_2 Spending^2 (Econ + Legal + Ethical,\ CSR)_{i,t} + \beta_3 LNTA_{i,\ t} + \varepsilon_{i,\ t} \end{aligned} \tag{2}$$

$$\begin{aligned} &Financial\ performance\ (ROA,\ Tobin's\ Q)_{i,t} \\ &\quad = \beta_0 + \beta_1 Spending\ (Econ + Legal + Ethical,\ CSR)_{i,t-m} + \beta_2 LNTA_{i,\ t} + \varepsilon_{i,\ t} \end{aligned} \tag{3}$$

Where, $Spending^2_{i,t}$ is the quadratic effect of CSR spending. m is the lagged term represented by 1, 2, 3. Other notations remain the same as in model (1).

4. Results

4.1. Descriptive statistics

The descriptive statistics of all variables is shown in Table 3. With respect to measures of CSR spending, *Legal* shows 9.671 in the skewness, suggesting that the distribution is right-skewed and the data are more likely to scatter on the left of the mean value. The median value of *Econ* is positive in 0.011, indicating that at least half of the data are higher than the mean value. All measures of CSR spending, including *Econ*, *Legal*, *Ethical* and *CSR* conform to the normal distribution. In terms of

Table 3. Descriptive statistics.

Variables	No. of Obs.	Mean	Median	Min.	Max.	S.D.	Skewness
Econ	2835	−0.009	0.011	−1.460	0.984	0.314	−0.750
Legal	2835	0.001	−0.189	−0.379	11.059	0.676	9.671
Ethical	2835	0.004	−0.201	−2.154	2.434	0.661	1.115
CSR	2835	−0.002	−0.063	−0.733	1.533	0.321	1.201
ROA	2835	0.069	0.066	−0.298	0.494	0.064	0.232
Tobin's Q	2835	3.112	2.577	0.000	16.854	2.278	1.680
LNTA	2835	21.716	21.670	19.032	25.019	1.002	0.143

Source: Author's own work.

Table 4. Correlation analysis.

	Econ	*Legal*	*Ethical*	*CSR*	*ROA*	*Tobin's Q*	*LNTA*
Econ	1						
Legal	−0.209 **	1					
Ethical	−0.057	0.159 **	1				
CSR	0.253 **	0.570 **	0.527 **	1			
ROA	−0.216 **	−0.076 *	0.190 **	−0.509 **	1		
Tobin's Q	0.229 **	−0.128 **	−0.053	0.033	0.346 **	1	
LNTA	−0.214 **	0.567 **	0.205 **	0.497 **	0.067 *	−0.347 **	1

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

financial performance indicators, *ROA* shows negative sign in the minimum value, revealing that some of sample firms suffered losses over the analyzed period.

The correlation matrix for the dependent and independent variables is shown in Table 4. The results demonstrate that ROA is significantly and positively correlated to Ethical at the 0.05 significance level, and negatively correlated to *Econ*, *Legal*, and *CSR*. In terms of *Tobin's Q*, it significantly and positively related to *Econ*, but negatively associated with *Legal*. In addition, *Tobin's' Q* has no statistically significant correlation with *Ethical* and *CSR*.

4.2. Empirical results

Regarding the suitable econometric approach, fixed effects model was selected based on the following criteria. First, we ran the Hausman specification test and the results suggested that the individual effects correlate to the explanatory variables, and thus we cannot reject the use of fixed effects model. Second, we only engaged time-variant factors in independent variables without considering time-invariant factors such as industry and country. To confirm whether multicollinearity problems exist, we also employed the variance inflation factor (VIF) test. The results suggest that the VIF value of all independent variables were far less than the threshold of ten, indicating that there was no serious multicollinearity problem in our regressions.

To test hypothesis 1, we examined the influence of CSR spending on financial performance indicators of the current year. Table 5 presents the estimates of both three-domain and overall CSR spending. The results relating to the accounting-based measures indicate that over the analyzed period and between firms, *ROA* decreases as the increase of *Econ*, *Legal* and *Ethics*. The coefficients on three-domain CSR spending are significantly negative for *ROA* (-0.0733, $p = 0.0070$ on *Econ*; −0.0662, $p = 0.0000$ on *Legal*; −0.0680, $p = 0.0004$ on *Ethics*), implying that CSR costs spent on the economic domain, legal domain and ethics domain cannot be offset, and the benefit coming from CSR does not reflect in firms' ROA in the short-term. Meanwhile, *ROA* also decreases as the increase of *CSR*, and the coefficient of *CSR* is −0.1258 ($p = 0.0257$). This finding indicates that overall CSR spending leads to adverse accounting-based performance of the current year, and thus such spending cannot be covered in the short run. With respect to market-based performance, *Econ*, *Legal* and *Ethics* has no statistically significant relationship with *Tobin's Q*, while *CSR* is significantly and negatively related to contemporaneous *Tobin's Q* (-0.1089, $p = 0.0783$). Inconsistent with extant CSR spending studies which proposed the

Table 5. Regression results for Hypothesis 1: investigating short-term effect.

	Dependent variable	
	ROA	Tobin's Q
Panel A		
Econ	−0.0733***	0.0018
Legal	−0.0662***	0.0034
Ethical	−0.0680***	0.0103
LNTA	−0.5227***	−0.0106***
Intercept	0.3018***	14.6011***
Adjusted R2	0.5552	0.5661
F-statistics/Chi^2	9.1846***	9.7659***
Durbin–Watson	1.3942	1.6478
Observations	2835	2835
Panel B		
CSR	−0.1258**	−0.1089 *
LNTA	−0.5421***	−0.0216 *
Intercept	0.5397***	15.0231
Adjusted R^2	0.5562	0.6329
F-statistics	9.3453 ***	12.7684 ***
Durbin–Watson	1.3924	1.6579
Observations	2835	2835

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

positive impact of CSR spending on ROA of the current year (Bhattacharyya & Rahman, 2019; Pan et al., 2014), our findings confirmed a negative relationship between CSR spending and ROA. Thus, corporate costs spent on CSR practices cannot be offset by financial returns in the short-term, so Hypothesis 1 is supported.

To test Hypothesis 2, we firstly added the quadratic item of CSR spending to examine whether there is an inflection point in the relationship between CSR spending and financial performance indicators. With respect to three-domain CSR spending, the results shown in Table 6 demonstrate that $Econ^2$ and $Legal^2$ have no significant effect on ROA, whereas $Ethical^2$ is positively related to *ROA*, with the coefficient in 0.2179 ($p = 0.0135$). No significant quadratic effects of three-domain CSR spending are found for *Tobin's Q*. These results suggest that there is a U-shaped relationship between ethical-domain CSR spending and accounting-based measure proxied by *ROA*, confirming the emergence of the inflection point. In terms of overall CSR spending, the quadratic term of CSR^2 has significant effect on *ROA*, but is not significantly associated with *Tobin's Q*. The U-shaped relationship is also found for *ROA*, indicating an inflection in the relationship between overall CSR spending and accounting-based measure.

We then examined long-term effects of CSR spending on financial performance indicators through introducing maximum three-year lagged terms for independent variable. The results shown in Table 7 report that over the analyzed period and between firms, the one-year lagged *Econ*, *Legal* and *Ethics* significantly and negatively affect *ROA*, with the coefficients in −1.7654 ($p = 0.0000$), −0.3690 ($p = 0.0339$) and −0.2117 ($p = 0.0104$), respectively. The one-year lagged *CSR* is also negatively related to *ROA*, with the coefficient in −0.3236 ($p = 0.0376$). As for market-based measure, both one-year lagged *Econ* and *Legal* is negatively related to *Tobin's Q* (-0.0051, $p = 0.0802$ on *Econ*; −0.0003, $p = 0.0596$ on *Legal*), whereas one-year lagged *Ethics*

Table 6. Quadratic effect results for Hypothesis 2: examining inflection point.

	Dependent variable	
	ROA	Tobin's Q
Panel A		
$Econ^2$	−0.0015	−0.0063
$Legal^2$	0.0002	−0.0018
$Ethical^2$	0.2179**	−0.0003
LNTA	−0.7413***	−0.0058***
Intercept	0.6185***	2.2126***
Adjusted R^2	0.4475	0.5225
F-statistics/Chi^2	8.3599***	12.1430***
Durbin–Watson	1.8024	2.1942
Observations	2835	2835
Panel B		
CSR^2	0.0794*	−0.0005
LNTA	−0.9831***	−0.0108
Intercept	0.2340***	7.6591*
Adjusted R2	0.4215	0.4193
F-statistics	7.9056	7.7627
Durbin–Watson	1.8212	1.7329
Observations	2835	2835

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

Table 7. Regression results for Hypothesis 2: investigating long-term effect.

	Dependent variable					
	ROA	Tobin's Q	ROA	Tobin's Q	ROA	Tobin's Q
Time lag	*t*-1		*t*-2		*t*-3	
Panel A						
$Econ_{t-1}$	−1.7654***	−0.0051*				
$Legal_{t-1}$	−0.3690**	− 0.0003*				
$Ethical_{t-1}$	−0.2117**	−0.0057				
$Econ_{t-2}$			−0.5276*	−0.0283		
$Legal_{t-2}$			−0.2397	−0.0159		
$Ethical_{t-2}$			0.0885*	0.0038		
$Econ_{t-3}$					−0.2515**	−0.0036
$Legal_{t-3}$					0.0505***	−0.0167
$Ethical_{t-3}$					0.0519***	−0.0029
LNTA	−0.0762**	−0.3861**	−0.0015**	−0.6792*	−0.0036**	−1.2943*
Intercept	0.2345***	11.5334**	0.0977**	18.1179*	0.1419***	31.9127*
Adjusted R^2	0.5715	0.5851	0.6877	0.5669	0.5854	0.6644
F-statistics/Chi^2	8.7949***	8.4234***	7.8755***	7.7068***	9.5826***	8.5029***
Durbin–Watson	1.8344	1.4566	2.0370	1.7103	1.8984	2.0131
Observations	2835	2835	2835	2835	2835	2835
Panel B						
CSR_{t-1}	−0.3236**	0.0200				
CSR_{t-2}			0.0013*	−0.0159		
CSR_{t-3}					0.0087*	−0.0406
LNTA	−0.0875**	−0.3646**	−0.0002**	−0.6551*	0.0003**	−1.2764*
Intercept	0.2595***	11.0811**	0.1283**	17.5746*	0.1447***	31.4685*
Adjusted R^2	0.5728	0.5589	0.5820	0.5855	0.6945	0.6634
F-statistics	8.9582***	8.3004***	7.8950***	7.8147***	10.0027***	8.5876***
Durbin–Watson	1.9164	1.4499	2.0494	1.7011	1.9218	1.9955
Observations	2835	2835	2835	2835	2835	2835

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

and *CSR* show no statistically significant effect on *Tobin's Q*. These results suggest that if firms spent costs on CSR practices in year *t*-1, they still have ROA disadvantage in year *t*.

When two-year lagged terms were introduced, mixed results were found in the relationship between three-domain CSR spending and *ROA* because the coefficient on *Econ* is significantly negative (-0.5276, $p = 0.0742$), and on *Ethics* is positive (0.0885, $p = 0.0791$), but on *Legal* is not statistically significant. Meanwhile, the two-year lagged *CSR* present positive impact on *ROA*, with the coefficient in 0.0013 ($p = 0.0593$). Though, there is no statistical evidence showing that *Tobin's Q* is significantly affected by *Econ*, *Legal*, *Ethics*, and *CSR*. Our findings suggest that both ethical-domain CSR spending and overall CSR spending in year *t*-2 can be offset, reflecting in the harvested ROA benefits in year *t*.

Referring to three-year lagged terms, the results relating to *ROA* show that the coefficient on *Econ* is significantly negative (-0.2515, $p = 0.0323$), and on *Legal* and *Ethics* are both positive (0.0505, $p = 0.0002$ on *Legal*; 0.0519, $p = 0.0000$ on *Ethics*). The three-year lagged CSR also has significant and positive effect on ROA, with a coefficient in 0.0087 ($p = 0.0624$). Similar to two-year lagged terms, *Tobin's Q* shows no significant relationship with three-year lagged *Econ*, *Legal*, *Ethics*, and *CSR*. Thus, we confirm that as firms incur legal-domain, ethical-domain and overall CSR spending in year t-3, these spending will be offset by financial returns in year t.

As a summary, the afore-mentioned results corroborate that CSR spending can be offset in the long-term, which is consistent with Hypothesis 2. Our findings are in line with Barnett and Salomon (2012), in which ROA declines at first, but then increase continuously as the raise of CSR. Nevertheless, our study does not align with the inverse curvilinear estimation proposed by Wang et al. (2008), in which philanthropic spending is positively related to ROA and Tobin's Q at the initial stage, and in turn negatively associated with financial performance indicators once the spending reaches a certain level.

4.3. Further analysis

4.3.1. Using corporate philanthropy as a proxy for CSR spending

To obtain results so far in the current paper, we have employed three-domain CSR spending and a PCA-based overall score to respectively generate measures of CSR spending. Given that corporate philanthropy is generally perceived as the larger domain of CSR and frequently described as purely voluntary nature (Hemingway & Maclagan, 2004), we use actual spending of corporate philanthropy as an alternative proxy for CSR spending. The level of corporate philanthropy is assessed by the amount of charitable donation by a firm in a given year, divided by the firm's sale in the same year (Wang et al., 2008). The results shown in Table 8 depict that corporate philanthropy has a significant and negative effect on *ROA* of the current year. In terms of the long-term effect, the one-year lagged philanthropy is still negatively related to ROA, but such charitable giving can be gradually offset as both two-year lagged and three-year lagged corporate philanthropy significantly and positively affect ROA. No significant effects are found for Tobin's Q in both short-run and long-run. Our findings are robust to alternative proxy of CSR spending, and consistent with previous finding which suggests a quicker offsetting time for ethical-domain CSR spending.

Table 8. Regression results for using corporate philanthropy as a proxy of CSR spending.

	Dependent variable							
	ROA	Tobin's Q	ROA	Tobin's Q	ROA	Tobin's Q	ROA	Tobin's Q
Time lag	*t*		*t*-1		*t*-2		*t*-3	
Philanthropy $_{t}$	−0.1265**	0.08974						
Philanthropy $_{t-1}$			−0.5187*	−0.0041				
Philanthropy $_{t-2}$					0.0349*	−0.0137		
Philanthropy $_{t-3}$							0.0166**	−0.0018
LNTA	−0.7628***	−0.0916***	−0.0849***	−0.0243**	−0.0120***	0.5261**	0.0579***	−0.9727**
Intercept	0.2426***	9.2311***	0.0164***	9.1385**	0.0369***	14.9486**	0.0787***	8.236*
Adjusted R^2	0.4612	0.3385	0.5637	0.4501	0.6267	0.5758	0.6184	0.5850
F-statistics	7.8733	8.4085	9.8131	8.6614	9.2366	8.0942	7.3575	8.7444
Durbin–Watson	1.8569	1.7241	1.8250	1.7638	2.0357	1.6778	1.7937	1.8930
Observations	2835	2835	2835	2835	2835	2835	2835	2835

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

Table 9. Regression results for food industry and financial industry.

	Dependent variable							
	ROA	Tobin's Q	ROA	Tobin's Q	ROA	Tobin's Q	ROA	Tobin's Q
Time lag	t		t-1		t-2		t-3	
Panel A: Food industry								
Econ	−0.0084**	−0.0017*	0.0056	−0.0053*	0.0176	−0.973	0.1374	−3.261
Legal	−0.0638*	0.0014	−0.0031	−0.0027	−0.0462	−0.1053	−0.5025*	−0.8348
Ethical	−0.0011**	−0.0945	0.1518***	0.1961	0.01243*	0.0457	0.0799*	0.0653
CSR	−0.0053**	−0.0129	−0.0008**	−0.0175	0.0163**	0.0182	0.0184*	−1.564
Observations	1035	1035	1035	1035	1035	1035	1035	1035
Panel B: Financial industry								
Econ	0.1170***	0.0375	0.0951***	0.2188	0.4873*	−0.03035	0.1599*	−0.0477
Legal	0.0232	0.0329	0.0082	−0.0926	0.2463	−0.0029	0.0677	−0.1976
Ethical	0.5465***	0.1947*	0.0693***	0.1424	0.9243***	0.0554	0.0352**	−0.3183
CSR	0.1276***	0.0418	0.0215***	0.0093	0.1937**	−0.0087	0.04608*	−0.0255
Observations	909	909	909	909	909	909	909	909

Note: ***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$.
Source: Author's own work.

4.3.2. Extending to other industry sectors

So far, our results demonstrate that CSR spending in pharmaceutical industry can be ultimately offset in the long-term. Nevertheless, the current study has not shed light on other industry sectors, limiting the generalizability to a broader context. In order to justify whether industry characteristics affects empirical result, we address this important question using data of food industry and financial industry. We choose these two sectors as food safety is constantly considered as the ultimate CSR concern in China, whilst financial institutions are required to offer feedback to the community more often than other industries (Kong, 2012; Wu & Shen, 2013). The results depicted in Table 9 indicate that comparing with pharmaceutical industry, both food industry and financial industry have greater capacity to generate sufficient financial returns, and thus can offset CSR spending more quickly. The one-year lagged *Ethical* for food industry starts to positively affect *ROA*, whereas in pharmaceutical industry such positive relationship arises since the two-year lagged *Ethical*. We also find that CSR benefit in financial industry can be easier to be harvest as both *Ethical* and *CSR* have significant and positive impact on current and subsequent *ROA*. These findings

further justify that pharmaceutical firms may prioritize valuable corporate resources to innovation and new clinical product development (Lowman et al., 2012), while costly CSR practices become dilemma for executives and need deliberate management discretion (Yang et al., 2019).

5. Discussion

Extant socio-economic literature has a long-pursed debate regarding whether CSR is worthy to invest and can generate better financial performance, given that scholars persistently emphasized profitability as the fundamental corporate objective. Most of previous studies used rankings or scores to measure CSR, and these proxies were generally built in light of agency's self-determination or CSR information disclosure which can hardly reflect firms' actual amount of CSR spending (Bhattacharyya & Rahman, 2019; Lys et al., 2015). There are fruitful research concluding a positive relationship between CSR and financial performance, where a vast body of them did not discuss CSR from its costs' perspective. Our study supplements current CSR studies by considering actual amount of CSR spending and examining the inflection point in financial performance arises. Unlike extant literature frequently using Carroll's four-dimension of CSR (Aupperle et al., 1985; Hamid et al., 2020), we employed the revised Schwartz and Carroll (2003)'s three-domain model which incorporates the philanthropic domain into the ethical and/or economic domain. According to this, we comprehensively measured CSR spending in the economic, legal and ethical domain, and thus add richness to Wang et al. (2008), wherein only the dollar amount of charitable giving was assessed, and Bhattacharyya and Rahman (2019), in which the evaluation of CSR spending was solely based on economic factors.

Consistent with our hypothesis, we found that CSR spending cannot be offset in the short-term. This finding is supported by Friedman (19702019)'s famous viewpoint as the 'shareholder profit maximization', which argued that CSR is at the expense of profitability and does not align with firm objectives. CSR incur immediate costs for pharmaceutical firms in medications quality promotion, pollution reduction, employee benefits, community involvement, charity and other forms of CSR practices (Yang et al., 2019). Recognizing these spending, Barnett and Salomon (2012) referred them as the 'inherent costs of CSR' that may distract firms' valuable resources (Wang et al., 2016). Campbell (2007) suggested that CSR practices are motivated when firms have surplus resources, and CSR investments are similar with the spending on business philanthropy where firms may not require more profits from CSR. Besides, some indirect CSR expenditures need to be identified, which are opportunity costs including time and risks (Barnett, 2007). For instance, CSR perceives the importance of employee protection and workplace safety, whereas the establishment of safe climate inevitably deteriorates the speed of manufacturing, and results in technical inefficiency and ineffectiveness (DiMaggio & Powell, 1983; Fan & Lo, 2012). The short-term greenwashing or window dressing of CSR may also increase corporate risks and decrease risk-adjusted returns (Barnett, 2007).

On the other hand, we found that CSR spending can be offset in the long-term, which is in congruence with Freeman (1984)'s widespread notion of 'stakeholder

value maximization'. CSR practices can be seen as underlying mechanisms that improve trusting relationship with various stakeholders (Jones, 1995). Stakeholders may often perceive socially responsible firms as credible, thus business can get access to crucial resources controlled by stakeholders, and increase their willingness to support corporate actions (Waddock & Graves, 1997). Firms with advanced level of CSR can, for example, retain and attract skilled employees (Greening & Turban, 2000), receive growing demand from goods and services (Navarro, 1988), generate goodwill for buffering unfavorable legal impacts (Godfrey, 2005), and have better corporate image and reputational capital (Orlitzky et al., 2003). All these positive factors can facilitate the arise of financial performance (Bhattacharya & Sen, 2004). Indeed, we found that the positive outcomes of CSR are not immediate. This argumentation is consistent with Wang et al. (2016) which suggested that firms may have reduced financial performance as CSR increases when the level of CSR is relatively low. Business may have insufficient resources at the early stage of CSR program, of which valuable resources such as cash, facilities and human resources are prioritized to enhance financial performance. Similarly, building on 'stakeholder influence capacity' theoretical concept, Barnett and Salomon (2012) supported the gradual process of CSR influence on financial performance, and emphasized the importance of 'capacity' in which firms can create such capacity to influence stakeholders and transform CSR investment into financial returns. We replenish the extant research by shedding light on pharmaceutical sector in emerging economies, and empirically confirm that CSR can yield better financial performance for firms after two years of CSR implementation. Although CSR spending of pharmaceutical firms can be ultimately offset, we argue that certain industries such as food sector and financial sector can more easily cultivate CSR benefit that offset CSR spending more rapidly.

When comparing CSR spending among the economic, legal and ethical domain, we found that the spending on the ethical domain can be offset at the earliest, a year ahead to the legal domain. This finding is theoretically supported by Carroll (1991)'s CSR pyramid which suggested that the ethical domain is at 'expected' sense in the society, while the economic and legal domain are both at 'required' sense. Complementing by Brammer and Millington (2008), CSR practices toward the ethical domain, such as corporate charitable giving, play significant role in offering a visible demonstration of firms' responsiveness to their stakeholder environment. Given that pharmaceutical industry is often considered to have a particular ethical responsibility toward the public (Nussbaum, 2009), we justified that pharmaceutical firms can more easily profit from improved stakeholder relationship through ethically responsible practices and have greater capacity to harvest financial returns that offset ethical-domain CSR spending.

Following Wang et al. (2016) and Orlitzky et al. (2003), we also found that CSR is more highly correlated with accounting-based performance indicators proxied by ROA than market-based measures proxied by Tobin's Q. This is probably because market-based measures are value relevant for the market and more subject to bias from other factors which go beyond corporate level such as macroeconomic fluctuations (Ullmann, 1985), and investors' individual evaluation (McGuire et al., 1988). Thus, we argued that the benefits of CSR are more easily to reflect in accounting-

based performance indicators which are less affected by external and unpredictable factors.

6. Conclusions

Because CSR practices incur significant costs and inevitably decentralize valuable corporate resources, understanding whether the benefits coming from CSR can offset these costs is essential. In this study, we examined the relationship between CSR spending and financial performance, and explored the inflection point when financial returns exceed the spending. Used a dataset of 315 listed pharmaceutical firms in China for the period 2010-2018, we found that CSR spending cannot be offset in the short-term, as both three-domain CSR spending, termly the economic, legal and ethical domain, and overall CSR spending, have negative effect on accounting-based performance indicator measured by ROA. With respect to the long-term effect of CSR spending, both ethical-domain and overall CSR spending positively relate to ROA after two years of CSR implementation, whereas legal-domain CSR spending positively impacts ROA after three years of CSR implementation. These findings demonstrate that in the long run pharmaceutical firms have better financial performance that offset CSR spending.

Our study contributes to the CSR literature by identifying corporate actual CSR spending through Carroll's famous CSR model. We also complement the CSR spending research by precisely recognizing the time-based inflection point, of which financial returns can exceed CSR costs. In fact, the inflection point was previously confirmed in Wang et al. (2008), Barnett and Salomon (2012) and Wang et al. (2016)'s studies, but their estimations of inflection point were mainly based on empirical results of the quadratic model, and the discussions regarding what the inflection point exactly means were still insufficient. Hence, our study contributes to the literature by determining the turning point in time, and specializing in the Chinese pharmaceutical industry.

We provide several implications for policy makers and corporate managers. In respect of policy makers, we suggest that it is no longer suitable for emerging economies like China to solely advocate economic development that does not consider the critical issues of CSR. Given business may be financially motivated by the raise of subsequent financial performance, we justify that government authorities need to facilitate requisite CSR engagements and mandate CSR initiatives and guidelines. These institutional arrangements include sets of key indices, road maps and best practices of benchmarking. Our implications are also valuable for pharmaceutical industry, in which CSR are frequently violated by negative incidents related to toxic medication, wastewater pollution and occupational injuries. For corporate managers, our findings demonstrate the importance of CSR in strengthening trusting relationship with stakeholders. At first glance, CSR implementation is costly and may be perceived as a burden to the firm. However, managers should view CSR spending as capital investments instead of operating costs because of the better financial performance coming from CSR over time.

Our study also has a series of limitations. First, because accounting-based performance indicators often refer to historical financial information of the firms, ROA may also affect CSR spending to some extent that may generate a reverse causality problem. Future studies can replace such endogenous variable by exogenous market-based measures such as market value added (MVA) and abnormal returns. Second, we were unable to accurately and comprehensively measure all aspects of CSR spending, due to the simply employ of Carroll's well-known CSR model as the assessment tool. Future studies are suggested to address this concern by incorporating other CSR evaluation indices such as Kinder, Lydenberg, and Domini (KLD), and designing sets of comprehensive indicators. Third, this study only contained listed pharmaceutical firms, implying an insufficiency to represent the whole sector. Future studies can include small and medium-sized enterprises, and extend to different industry sectors.

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References

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. (1985). An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal*, *28*(2), 446–463. https://doi.org/10.5465/256210

Barnett, M. L. (2007). Stakeholder influence capacity and the variability of financial returns to corporate social responsibility. *Academy of Management Review*, *32*(3), 794–816. https://doi.org/10.5465/amr.2007.25275520

Barnett, M. L., & Salomon, R. M. (2006). Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance. *Strategic Management Journal*, *27*(11), 1101–1122. https://doi.org/10.1002/smj.557

Barnett, M. L., & Salomon, R. M. (2012). Does it pay to be really good? Addressing the shape of the relationship between social and financial performance. *Strategic Management Journal*, *33*(11), 1304–1320. https://doi.org/10.1002/smj.1980

Bhattacharya, C., & Sen, S. (2004). Doing better at doing good: When, why, and how consumers respond to corporate social initiatives. *California Management Review*, *47*(1), 9–24. https://doi.org/10.2307/41166284

Bhattacharyya, A., & Rahman, M. L. (2019). Mandatory CSR expenditure and firm performance. *Journal of Contemporary Accounting & Economics*, *15*(3), 100163. https://doi.org/10.1016/j.jcae.2019.100163

Bhattacharyya, A., Wright, S., & Rahman, M. L. (2021). Is better banking performance associated with financial inclusion and mandated CSR expenditure in a developing country? *Accounting & Finance*, *61*(1), 125–161. https://doi.org/10.1111/acfi.12560

Bowen, H. R., & Johnson, F. E. (1953). *Social responsibility of the businessman*. Harper.

Brammer, S., & Millington, A. (2008). Does it pay to be different? An analysis of the relationship between corporate social and financial performance. *Strategic Management Journal*, *29*(12), 1325–1343. https://doi.org/10.1002/smj.714

Campbell, J. L. (2007). Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of Management Review*, *32*(3), 946–967. https://doi.org/10.5465/amr.2007.25275684

Carroll, A. B. (1979). A three-dimensional conceptual model of corporate performance. *Academy of Management Review*, *4*(4), 497–505. https://doi.org/10.5465/amr.1979.4498296

Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, *34*(4), 39–48. https://doi.org/10.1016/0007-6813(91)90005-G

Carroll, A. B. (1999). Corporate social responsibility. *Business & Society*, *38*(3), 268–295. https://doi.org/10.1177/000765039903800303

Carroll, A. B. (2008). A history of corporate social responsibility: Concepts and practices. In *The Oxford handbook of corporate social responsibility* (Vol. 1). Oxford University Press.

Carroll, A. B. (2016). Carroll's pyramid of CSR: Taking another look. *International Journal of Corporate Social Responsibility*, *1*(1), 1–8. https://doi.org/10.1186/s40991-016-0004-6

Chauhan, S. & Amit, (2014). A relational study of firm's characteristics and CSR Expenditure. *Procedia Economics and Finance*, *11*, 23–32. https://doi.org/10.1016/S2212-5671(14)00172-5

Chen, H., & Wang, X. (2011). Corporate social responsibility and corporate financial performance in China: An empirical research from Chinese firms. *Corporate Governance: The International Journal of Business in Society*, *11*(4), 361–370. https://doi.org/10.1108/14720701111159217

Chen, Y. C., Hung, M., & Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: Evidence from China. *Journal of Accounting and Economics*, *65*(1), 169–190. https://doi.org/10.1016/j.jacceco.2017.11.009

Cheng, S., Lin, K. Z., & Wong, W. (2016). Corporate social responsibility reporting and firm performance: Evidence from China. *Journal of Management & Governance*, *20*(3), 503–523. https://doi.org/10.1007/s10997-015-9309-1

Cheung, A. W., Hu, M., & Schwiebert, J. (2018). Corporate social responsibility and dividend policy. *Accounting & Finance*, *58*(3), 787–816. https://doi.org/10.1111/acfi.12238

Chinese Academy of Social Science. (2019). *Blue book of CSR of China in 2019*. China Social Science Press.

Clarkson, M. E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, *20*(1), 92–117. https://doi.org/10.5465/amr.1995.9503271994

Clarkson, P. M., Li, Y., & Richardson, G. D. (2004). The market valuation of environmental capital expenditures by pulp and paper Companies. *The Accounting Review*, *79*(2), 329–353. https://doi.org/10.2308/accr.2004.79.2.329

Crane, A., & Matten, D. (2007). *Business ethics: Managing corporate citizenship and sustainability in the age of globalization* (2nd ed.). Oxford University Press.

Crisóstomo, V. L., De Souza Freire, F., & De Vasconcellos, F. C. (2011). Corporate social responsibility, firm value and financial performance in Brazil. *Social Responsibility Journal*, *7*(2), 295–309. https://doi.org/10.1108/17471111111141549

Di Giuli, A., & Kostovetsky, L. (2014). Are red or blue companies more likely to go green? Politics and corporate social responsibility. *Journal of Financial Economics*, *111*(1), 158–180. https://doi.org/10.1016/j.jfineco.2013.10.002

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*(2), 147. https://doi.org/10.2307/2095101

Du, S., Bhattacharya, C. B., & Sen, S. (2011). Corporate social responsibility and competitive advantage: Overcoming the trust barrier. *Management Science*, *57*(9), 1528–1545. https://doi.org/10.1287/mnsc.1110.1403

Džupina, M., & Džupinová, Z. (2019). Dimensions of CSR in online communication of pharmaceutical companies: A comparative study. *International Journal of Entrepreneurial Knowledge*, *7* (2), 41–52. https://doi.org/10.37335/ijek.v7i2.92

Fan, D., & Lo, C. K. (2012). A tough pill to swallow?. *Journal of Fashion Marketing and Management: An International Journal*, *16*(2), 128–140. https://doi.org/10.1108/13612021211222798

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

Freeman, R. E., & Phillips, R. A. (2002). Stakeholder theory: A libertarian defense. *Business Ethics Quarterly*, *12*(3), 331–349. https://doi.org/10.2307/3858020

Friedman, M. (1970, September 13). The social responsibility of business is to increase its profits. New York Times Magazine, 32–33.

Gao, Y. (2011). CSR in an emerging country: A content analysis of CSR reports of listed companies. *Baltic Journal of Management*, *6*(2), 263–291. https://doi.org/10.1108/17465261111131848

Godfrey, P. C. (2005). The relationship between corporate philanthropy and shareholder wealth: A risk management perspective. *Academy of Management Review*, *30*(4), 777–798. https://doi.org/10.5465/amr.2005.18378878

Greening, D. W., & Turban, D. B. (2000). Corporate social performance as a competitive advantage in attracting a quality workforce. *Business & Society*, *39*(3), 254–280. https://doi.org/10.1177/000765030003900302

Griesse, M. A. (2007). The geographic, political, and economic context for corporate social responsibility in Brazil. *Journal of Business Ethics*, *73*(1), 21–37. https://doi.org/10.1007/s10551-006-9194-2

Hamid, S., Riaz, Z., & Azeem, S. M. W. (2020). Carroll's dimensions and CSR disclosure: Empirical evidence from Pakistan. *Corporate Governance: The International Journal of Business in Society*, *20*(3), 365–381. https://doi.org/10.1108/CG-10-2018-0317

Hemingway, C. A., & Maclagan, P. W. (2004). Managers' personal values as drivers of corporate social responsibility. *Journal of Business Ethics*, *50*(1), 33–44. https://doi.org/10.1023/B:BUSI.0000020964.80208.c9

Hernandez-Vivanco, A., Domingues, P., Sampaio, P., Bernardo, M., & Cruz-Cázares, C. (2019). Do multiple certifications leverage firm performance? A dynamic approach. *International Journal of Production Economics*, *218*, 386–399. https://doi.org/10.1016/j.ijpe.2019.07.016

Hou, T. C. T. (2019). The relationship between corporate social responsibility and sustainable financial performance: Firm-level evidence from Taiwan. *Corporate Social Responsibility and Environmental Management*, *26*(1), 19–28. https://doi.org/10.1002/csr.1647

Jo, H., & Harjoto, M. A. (2011). Corporate governance and firm value: The impact of corporate social responsibility. *Journal of Business Ethics*, *103*(3), 351–383. https://doi.org/10.1007/s10551-011-0869-y

Jones, T. M. (1995). Instrumental stakeholder theory: A synthesis of ethics and economics. *Academy of Management Review*, *20*(2), 404–437. https://doi.org/10.5465/amr.1995.9507312924

Kong, D. (2012). Does corporate social responsibility matter in the food industry? Evidence from a nature experiment in China. *Food Policy.*, *37*(3), 323–334. https://doi.org/10.1016/j.foodpol.2012.03.003

Lång, S., & Ivanova-Gongne, M. (2019). CSR communication in stakeholder networks: A semiotic perspective. *Baltic Journal of Management*, *14*(3), 480–499. https://doi.org/10.1108/BJM-08-2017-0262

L'Etang, J. (1994). Public relations and corporate social responsibility: Some issues arising. *Journal of Business Ethics*, *13*(2), 111–123. https://doi.org/10.1007/bf00881580

Lin, L. W. (2010). Corporate social responsibility in China: Window dressing or structural change. *Berkeley Journal of International Law*, *28*, 64–100. https://doi.org/10.15779/Z38F35Q

Lin, W. L., Ho, J. A., Lee, C., & Ng, S. I. (2020). Impact of positive and negative corporate social responsibility on automotive firms' financial performance: A market-based asset perspective. *Corporate Social Responsibility and Environmental Management*, *27*(4), 1761–1773. https://doi.org/10.1002/csr.1923

Lingard, H., & Rowlinson, S. M. (2005). *Occupational health and safety in construction project management*. Taylor and Francis.

Lowman, M., Trott, P., Hoecht, A., & Sellam, Z. (2012). Innovation risks of outsourcing in pharmaceutical new product development. *Technovation*, *32*(2), 99–109. https://doi.org/10.1016/j.technovation.2011.11.004

Lu, W., Webster, C., Peng, Y., Chen, X., & Zhang, X. (2017). Estimating and calibrating the amount of building-related construction and demolition waste in urban China. *International Journal of Construction Management*, *17*(1), 13–24. https://doi.org/10.1080/15623599.2016.1166548

Luo, X., & Du, S. (2015). Exploring the relationship between corporate social responsibility and firm innovation. *Marketing Letters*, *26*(4), 703–714. https://doi.org/10.1007/s11002-014-9302-5

Lys, T., Naughton, J. P., & Wang, C. (2015). Signaling through corporate accountability reporting. *Journal of Accounting and Economics*, *60*(1), 56–72. https://doi.org/10.1016/j.jacceco.2015.03.001

Maignan, I., & Ferrell, O. C. (2000). Measuring corporate citizenship in two countries: The case of the United States and France. *Journal of Business Ethics*, *23*(3), 283–297. https://doi.org/10.1023/A:1006262325211

Matten, D., & Moon, J. (2008). Implicit" and "explicit" CSR: A conceptual framework for a comparative understanding of corporate social responsibility. *Academy of Management Review*, *33*(2), 404–424. https://doi.org/10.5465/amr.2008.31193458

McGuire, J. B., Sundgren, A., & Schneeweis, T. (1988). Corporate social responsibility and firm financial ferformance. *Academy of Management Journal*, *31*(4), 854–872. https://doi.org/10.5465/256342

Mcwilliams, A., & Siegel, D. (1997). The role of money managers in assessing corporate social responsibility research. *The Journal of Investing*, *6*(4), 98–107. https://doi.org/10.3905/joi.1997.408440

McWilliams, A., & Siegel, D. (2000). Corporate social responsibility and financial performance: Correlation or misspecification? *Strategic Management Journal*, *21*(5), 603–609. https://doi.org/10.1002/(SICI)1097-0266(200005)21:5<603::AID-SMJ101>3.0.CO;2-3

McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review*, *26*(1), 117–127. https://doi.org/10.5465/amr.2001.4011987

Mehar, A., & Rahat, F. (2007). Impact of corporate social responsibility on firm's financial performance. *South Asian Journal of Management Sciences*, *1*(1), 16–24.

Min, M., Desmoulins-Lebeault, F., & Esposito, M. (2017). Should pharmaceutical companies engage in corporate social responsibility? *Journal of Management Development*, *36*(1), 58–70. https://doi.org/10.1108/JMD-09-2014-0103

Navarro, P. (1988). Why do corporations give to charity? *The Journal of Business*, *61*(1), 65. https://doi.org/10.1086/296420

Nussbaum, A. S. K. (2009). Ethical corporate social responsibility (CSR) and the pharmaceutical industry: A happy couple? *Journal of Medical Marketing*, *9*(1), 67–76. https://doi.org/10.1057/jmm.2008.33

O'riordan, L., & Fairbrass, J. (2008). Corporate social responsibility (CSR): Models and theories in stakeholder dialogue. *Journal of Business Ethics*, *83*(4), 745–758. https://doi.org/10.1007/s10551-008-9662-y

Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, *24*(3), 403–441. https://doi.org/10.1177/0170840603024003910

Pan, X., Sha, J., Zhang, H., & Ke, W. (2014). Relationship between corporate social responsibility and financial performance in the mineral industry: Evidence from Chinese mineral firms. *Sustainability*, *6*(7), 4077–4101. https://doi.org/10.3390/su6074077

Richmond, A. K., & Kaufmann, R. K. (2006). Is there a turning point in the relationship between income and energy use and/or carbon emissions? *Ecological Economics*, *56*(2), 176–189. https://doi.org/10.1016/j.ecolecon.2005.01.011

Scholtens, B. (2007). Financial and social performance of socially responsible investments in the Netherlands. *Corporate Governance: An International Review*, *15*(6), 1090–1105. https://doi.org/10.1111/j.1467-8683.2007.00633.x

Schwartz, M. S., & Carroll, A. B. (2003). Corporate social responsibility: A three-domain approach. *Business Ethics Quarterly*, *13*(4), 503–530. https://doi.org/10.5840/beq200313435

Shaw, B., & Post, F. R. (1993). A moral basis for corporate philanthropy. *Journal of Business Ethics*, *12*(10), 745–751. https://doi.org/10.1007/BF00881305

Smith, M., Yahya, K., & Marzuki, A. (2007). Environmental disclosure and performance reporting in Malaysia. *Asian Review of Accounting*, *15*(2), 185–199. https://doi.org/10.1108/13217340710823387

Su, R., Liu, C., & Teng, W. (2020). The heterogeneous effects of CSR dimensions on financial performance–a new approach for CSR measurement. *Journal of Business Economics and Management*, *21*(4), 987–1009. https://doi.org/10.3846/jbem.2020.12394

Tang, L., Gallagher, C. C., & Bie, B. (2015). Corporate social responsibility communication through corporate websites. *International Journal of Business Communication*, *52*(2), 205–227. https://doi.org/10.1177/2329488414525443

Tong, L., Liu, N., Zhang, M., & Wang, L. (2018). Employee protection and corporate innovation: Empirical evidence from China. *Journal of Business Ethics*, *153*(2), 569–589. https://doi.org/10.1007/s10551-016-3412-3

Ullmann, A. A. (1985). Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of U.S. firms. *Academy of Management Review*, *10*(3), 540–557. https://doi.org/10.5465/amr.1985.4278989

Visser, W. (2006). *Corporate citizenship in a development perspective*. Copenhagen Business School Press.

Waddock, S. A., & Graves, S. B. (1997). The corporate social performance–financial performance link. *Strategic Management Journal*, *18*(4), 303–319. https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G

Wang, H., Choi, J., & Li, J. (2008). Too little or too much? Untangling the relationship between corporate philanthropy and firm financial performance. *Organization Science*, *19*(1), 143–159. https://doi.org/10.1287/orsc.1070.0271

Wang, H., Lu, W., Ye, M., Chau, K., & Zhang, X. (2016). The curvilinear relationship between corporate social performance and corporate financial performance: Evidence from the international construction industry. *Journal of Cleaner Production*, *137*, 1313–1322. https://doi.org/10.1016/j.jclepro.2016.07.184

Wang, Z., & Sarkis, J. (2017). Corporate social responsibility governance, outcomes, and financial performance. *Journal of Cleaner Production*, *162*, 1607–1616. https://doi.org/10.1016/j.jclepro.2017.06.142

Weber, M. (2008). The business case for corporate social responsibility: A company-level measurement approach for CSR. *European Management Journal*, *26*(4), 247–261. https://doi.org/10.1016/j.emj.2008.01.006

Weber, O., & Lin, H. (2015). CSR reporting and its implication for socially responsible investment in China. In *Responsible investment banking* (pp. 417–426). Springer.

Wieser, R. (2005). Research and development productivity and spillovers: Empirical evidence at the firm level. *Journal of Economic Surveys*, *19*(4), 587–621. https://doi.org/10.1111/j.0950-0804.2005.00260.x

Wood, D. J., & Jones, R. E. (1995). Stakeholder mismatching: A theoretical problem in empirical research on corporate social performance. *The International Journal of Organizational Analysis*, *3*(3), 229–267. https://doi.org/10.1108/eb028831

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT Press.

Wu, M. W., & Shen, C. H. (2013). Corporate social responsibility in the banking industry: Motives and financial performance. *Journal of Banking & Finance*, *37*(9), 3529–3547. https://doi.org/10.1016/j.jbankfin.2013.04.023

Yang, M., Bento, P., & Akbar, A. (2019). Does CSR influence firm performance indicators? Evidence from Chinese pharmaceutical enterprises. *Sustainability*, *11*(20), 5656. https://doi.org/10.3390/su11205656

Yang, M., & Maresova, P. (2020). Adopting occupational health and safety management standards: The impact on financial performance in pharmaceutical firms in China. *Risk Management and Healthcare Policy*, *13*, 1477–1487. https://doi.org/10.2147/RMHP.S261136

Zhu, Q., Liu, J., & Lai, K. H. (2016). Corporate social responsibility practices and performance improvement among Chinese national state-owned enterprises. *International Journal of Production Economics*, *171*, 417–426. https://doi.org/10.1016/j.ijpe.2015.08.005