

Is a firm's financial risk associated with corporate social responsibility?

Feng Jui Hsu

*Department of Insurance and Finance,
National Taichung University of Science and Technology,
Taichung, Taiwan, and*

Yu-Cheng Chen

Department of Finance, National Chung Hsing University, Taichung, Taiwan

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Abstract

Purpose – The purpose of this paper is to examine whether socially responsible firms behave differently from other firms in terms of financial risk using US-based firms from 1991 to 2012.

Design/methodology/approach – The authors used the KLD social performance rating scores as the measure of corporate social responsibility (CSR) performance and obtained an initial sample of 38,158 firm-year observations from 1991 to 2012. The authors obtained the monthly consensus earnings forecast for fiscal year one and the monthly dispersions for these earnings forecasts from I/B/E/S, and the bond spread from DataStream database. Specifically, the authors question whether firms that exhibit CSR obtain market approval to reduce financial risk, thereby providing investors and regulators with more reliable and transparent financial information, as opposed to firms that do not meet the same criteria.

Findings – The authors find that social responsible firms usually perform better in terms of their credit ratings and have lower credit risk, in terms of loan spreads when compared to corporate bond spreads, and in terms of distance to default. The results control for various measurements for CSR and time periods, consider various CSR dimensions and components, and use alternative proxies to improve the quality of financial risk estimates.

Originality/value – The findings demonstrate the importance of considering both positive and negative CSR performance. Positive CSR ratings are associated with reduced financial risk while negative CSR performance scores lead to increased financial distress. Investors respond to positive CSR ratings.

Keywords Governance, Social responsibility, Accounting information, Financial information

Paper type Research paper

1. Introduction

Over the past two decades, corporate social responsibility (CSR) has emerged as an increasingly important topic, and corporations are increasingly under pressure to behave responsibly. Independent third parties, such as Kinder, Lydenberg, Domini (KLD) Research and Analytics Inc., track and rate the annual CSR performance of 3,000 large US-based firms, and make this information available to investors. The rapid increase in demand for CSR disclosure raises several questions: what benefits do firms gain by securing a high CSR rating, and how does CSR relate to a firm's financial performance? Several studies have sought to address these questions through investigating aspects including cost of capital (Derwall and Verwijmeren, 2007; Di Giulio *et al.*, 2007; Dhaliwal *et al.*, 2011; El Ghoul *et al.*, 2011; Reverte, 2012), lower cost of equity (Girerd-Potin *et al.*, 2014), shareholder value (Godfrey *et al.*, 2009; Barnea and Rubin, 2010; Du *et al.*, 2010), stakeholders' trust (Antonia Garcia-Benau *et al.*, 2013),



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consumer behavior and satisfaction (Pivato *et al.*, 2008; Marin *et al.*, 2009), customer loyalty (Albuquerque *et al.*, 2014), financial performance (Scholtens, 2008; Lin *et al.*, 2009; Nelling and Webb, 2009; Surroca *et al.*, 2010), firm market value (Lo and Sheu, 2007), and cost of borrowing (Goss and Roberts, 2011). This study focusses on how CSR relates to a firm's financial risk (i.e. credit risk, bond spreads, and distance to default (DD)) because it plays an important role in a firm's financing and general operations decisions. Specifically, this study poses two research questions:

RQ1. Does CSR performance reduce financial risk?

RQ2. Does the relation between CSR performance and financial risk change with CSR rating rank?

We build upon several prior studies in addressing these questions. With respect to the first research question, CSR performance has been found to influence a firm's corporate credit ratings (Avramov *et al.*, 2009; Chatterji *et al.*, 2009; Attig *et al.*, 2013). We then examine the link between CSR and loan debt to assess differences in lender loan spreads for high-quality and low-quality CSR borrowers (Menz, 2010; Goss and Roberts, 2011). Finally, we compute DD for individual firms and assess the effect of default risk on CSR performance (Chan-Lau and Sy, 2007; Bharath and Shumway, 2008).

To investigate our research questions, we use CSR performance scores sourced from KLD STAT. We hypothesize a positive association between reduced financial risk and that this positive association is tempered by CSR disclosure. Consistent with prior research (Avramov *et al.*, 2009; Chatterji *et al.*, 2009; Attig *et al.*, 2013) we measure firm-level ratings of financial risk using Standard & Poor's (S&P) corporate debt ratings. For bond spreads we follow previous studies (Avramov *et al.*, 2007) to capture individual bond credit spreads from DataStream. Following Bharath and Shumway (2008), DD is calculated based on accounting materials from Compustat.

In the next section, we discuss the related literature and develop our hypotheses. Section 3 describes the methodology, while Section 4 discusses the empirical results. Findings are summarized in Section 5.

2. Related research and hypothesis development

The impact of CSR on firm performance is an interesting issue. McWilliams and Siegel (2001) define CSR as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" (p. 17). Thus, CSR measures include a wide variety of CSR activities such as support for local businesses or charities, firm reputation, social engagement, environmental responsibility, brand perception, ethics, development of recycling programs, minority, and female representation on the board of directors, product quality, illegal politicking, fair dealings with customers, and sustainability practices (Margolis and Walsh, 2001). Using *Fortune* magazine's rating of corporate reputation, McGuire *et al.* (1988) showed CSR is related with stock returns, accounting measures, and firm risk. Investing in CSR might provide financial benefits to firms and be associated with better long-run growth prospects (Gregory *et al.*, 2014); for example, firms which reduce waste avoid environmental disasters/lawsuits/consumer boycotts, and thus enjoy an increase in brand value and reputation, increased motivation among employees, and improved customer attraction and retention. In addition, for S&P 500 firms, Bouslah *et al.* (2013) found that employee diversity and corporate governance concerns positively affect a firm's risk, whereas community (diversity) strengths negatively (positively) affect a

firm's risk. Oikonomou *et al.* (2012) also showed some social concern components (community, employment, and environment) are significantly and positively related to measures of systematic risk. Even in controversial industry sectors (i.e. alcohol, tobacco, gambling, etc.), CSR engagement has a more statistically significant impact on firm risk for firms in controversial industries after controlling for various firm characteristics (Jo and Na, 2012). Again, Parast and Adams (2012) suggested the implementation of CSR in the petroleum industry is economically driven. Thus, engaging in CSR allows a company to maximize shareholder value, improve its reputation, and ensure its long-term viability. Investors and regulators pay attention to firm CSR activities in formulating their investment strategies and regulation policies.

Proponents argue that CSR fosters and promotes ethical behavior by managers, which has a positive impact on firm reputation and can thus indirectly enhance firm value and reduce financial risk. In addition, Becchetti *et al.* (2012) found that the impact of SR-related events has risen over time, and that the abnormal returns around the event date are significantly negative in the case of exclusion from the Domini Index. However, dissenters claim that CSR is expensive and inconsistent with the overriding goal of maximizing shareholder return. Prior studies have not found a clear correlation between socially responsible (SR) behavior and the financial performance of conventional mutual funds (Goldreyer and Diltz, 1999). In addition, firms with older assets have lower CSR ratings (Cochran and Wood, 1984) and CSR behavior results in increased costs, without providing a corresponding increase in benefits which indicate a negative corporate social performance (CSP)/corporate financial performance (CFP) relationship (Vance, 1975). Thus CSR has a negative impact on firm value. However, Griffin and Mahon (1997) concluded that there is a positive relationship between CSP and CFP and the relationship tends to be bidirectional and simultaneous (Orlitzky *et al.*, 2003). Thus, the association between CSR and financial risk is an empirical issue and calls for further examination.

2.1 Non-financial disclosure and firm credit rating

Credit ratings are commonly used by lenders to assess the default risk, because every credit is connected with a possible loss. According to Czarnitzki and Kraft (2007), for firms with weak ratings, interest rates must increase significantly to compensate for a possible loss in case of default. Therefore, they conclude that a credit rating has additional informational value for lenders. This study hypothesizes that CSR activities have influence on financial performance. A developing line of research influences considers these problems by checking the impact of CSR on a firm's cost of financing. Prior studies show CSR is associated with lower costs for equity capital (El Ghoul *et al.*, 2011), that there is a weak positive relationship between CSR and European bond spreads (Menz, 2010), and that firms with below-average environmental and social performance pay a modest premium on their cost of private bank debt (Goss and Roberts, 2011). Also, Albuquerque *et al.* (2014) showed that CSR decreases systematic risk and increases firm value. This study extends these lines of research by investigating the effects of CSR on firm credit ratings.

Ashbaugh-Skaife *et al.* (2006) found that a firm's corporate governance affects its credit rating and better governance can translate into significant debt costs savings. We argue that profitable CSR activities can improve a firm's credit rating by reducing the firm's perceived risk of financial distress in several ways. First, CSR performance can improve the relationship between the firm and its stakeholders, thus improving the firm's long-term sustainability. According to Waddock and Graves (1997a) and Fombrun and Shanley (1990), CSR activities enrich relationships with key stakeholder

groups, including consumers, employees, suppliers and regulators and excellent CSR performance have higher credit ratings (Kim and Kim, 2014). That is to say, by improving its relationships with its varied stakeholder groups, a firm creates a kind of intangible asset which is important to improving its competitive position and promoting its long-run financial performance (Roberts and Dowling, 2002; Whitehouse, 2006; Surroca *et al.*, 2010). In the Pakistani market, Butt and Asghar (2013) found a positive correlation between CSR and credit position in terms of the community service, employee service, and customer service dimensions. In particular, Jiraporn *et al.* (2014) found that a higher degree of CSR leads to more favorable credit ratings, with an increase in CSR by one standard deviation improving credit ratings by as much as 4.5 percent. Based on these arguments, we expect improved relationships between the firm and its stakeholders to improve the efficiency of resource utilization and decrease uncertainty. We therefore hypothesize CSR activities are a good predictor of a firm's rating outcome because the resulting improvements in long-term sustainability reduce the probability of default.

Second, investors are sensitive to possibility of firms incurring costly legal sanctions (Shane and Spicer, 1983). Prior studies also show that investors perceive socially irresponsible firms as having relatively higher levels of risk (Starks, 2009; El Ghoul *et al.*, 2011) and firms with poor CSR records are seen as particularly risky (El Ghoul *et al.*, 2011). Such firms may face reduced credit ratings or significantly higher idiosyncratic risk (Lee and Faff, 2009; Luo and Bhattacharya, 2009). In addition, "sin firms" also face higher litigation risk (Hong and Kacperczyk, 2009; Durand *et al.*, 2013) and adopting an environmentally proactive posture can significantly reduce that risk (Feldman *et al.*, 1997). Based on the above, we hypothesize that investment in CSR serves as a type of insurance against potentially dramatic costs that may arise as a result of socially irresponsible behavior.

McWilliams and Siegel (2001) define CSR as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" (p. 117). Thus, CSR measures include a wide variety of CSR activities such as support for local businesses or charities, building a firm's reputation for responsibility, social engagement, environmental responsibility, building brand perception, instituting codes of ethics, developing recycling programs, and instituting sustainability practices. In addition, Statman (2006) found that CSR stocks outperformed both non-CSR stocks and the S&P 500 during the late 1990s and are less likely to be financed by external funds (Surroca *et al.*, 2010). This suggests that investors assume that engaging in CSR practices allows a company to maximize shareholder value, improve its reputation, and ensure its long-term viability.

The above discussion suggests that CSR reduces the perceived risk of financial distress and therefore has a positive effect on firm credit ratings. We directly test whether investors or analysts use the information contained in CSR disclosures to assess credit worthiness. Thus our first hypothesis states:

H1. Ceteris paribus, CSR performance is positively associated with a firm's credit rating.

2.2 The relationship between CSR information and corporate bond spread

Advocates for CSR argue that good managers see the CSR as a valuable tool for managing risk, while the opponents claim that CSR investments represent a costly diversion of scarce resources. Shareholders may be reluctant to support CSR practices because doing

so may distract the firm from its core mission of maximizing shareholder wealth. On the other hand, firms may overinvest in CSR to satisfy the desire of managers to burnish their reputations at the expense of shareholder value (Barnea and Rubin, 2005).

Menz (2010) investigated corporate bonds and found a weak positive relationship between CSR and European bond spreads. However, Sharfman and Fernando (2008) showed that firms with good environmental performance face higher bond yields but enjoy lower capital costs. In contrast, Oikonomou *et al.* (2014) showed that good CSR performance is rewarded and corporate social/environmental transgressions are, respectively, penalized through lower and higher corporate bond yield spreads. Furthermore, according to Goss and Roberts (2011), banks require higher spreads for low-CSR firms and provide loans with shorter maturity, while high-CSR borrowers face no such penalties. According to Webb (2005), firms with stronger CSR ratings, particularly in the areas of diversity and environment, have more debt financing and lower cost of debt financing than do firms with low CSR ratings. Besides, Comeig *et al.* (2014) also exhibited low-success probability borrowers finance its projects without collateral and with high interest rates, whereas high-success probability borrowers accept loans with real estate collateral and low-interest rates. Chang *et al.* (2013) also found that firms with higher CSR ratings tend to have a lower average rate of bank loans. Banks are fundamentally different from other stakeholders in that they use internal information to make initial lending decisions and, after the loan contract is struck, to monitor the firm to ensure repayment. The open corporate debt market provides another mechanism to supervise corporate financials. The public lending market includes bank lenders, institutional lenders, and private investors; these parties can engage in more detailed monitoring, which may leave them relatively more sensitive to any impact CSR may have on credit worthiness. Thus we posit that corporate bonds may be the most suitable proxy for assessing the value of firm-level CSR initiatives and that assessment will be reflected in loan spread terms.

Based on above, we interpret this as responsible firms having easier access to debt financing and face lower spreads. Therefore, we expect a negative relation between CSR and bond spread. We propose the following hypothesis:

H2. Ceteris paribus, CSR performance is negatively associated with firms' bond spread.

2.3 Firm default risk and CSR performance

Although credit ratings already account for risk measure factors, Elton *et al.* (2004) showed credit ratings are insufficient to influence bond prices on their own and showed that default risk, liquidity, tax liability, recovery rate, and bond age provide better estimates of spot curves and for pricing bonds. The key criterion for bank lending decisions is the ability of the borrower to repay the loan, which can thus be treated as the borrower's default risk. Furthermore, Longstaff *et al.* (2005) found that the majority of corporate bond spreads is due to default risk, results which hold for all rating categories and for the definition of the riskless curve. So, to further observe the relation between CSR and funding costs, this study uses DD as a proxy to understand the connection between CSR and default risk.

Spicer (1978) reviewed the literature on CSR and risk and found that, by controlling and reducing pollution outputs, firms can effectively improve profits, and can reduce total and systemic risk while improving their P/E ratio. Boutin-Dufresne and Savaria (2004) showed that the adoption of CSR codes of conduct can help diminish a firm's overall business risk,

and can even improve long-term risk-adjusted performance. Lee and Faff (2009) suggested that firms with high-CSP exhibit significantly lower idiosyncratic risk and that such risk might be priced by the broader global equity markets. Orlitzky and Benjamin (2001) also found that increased CSR correlates with reduced financial risk. Verwijmeren and Derwall (2010) noted that specific CSR factors such as employee well-being can significantly reduce the probability of bankruptcy and improve firm credit ratings.

Chang *et al.* (2013) showed there is a negative and significant association between CSR score and forward default probability. In addition, good CSR companies have very low short-term default probability and forward default probability. Goss (2009) found that a firm's CSR activity is a significant determinant of distress, even after controlling for previously identified drivers of firm distress. Consistent with Goss (2009), we used the DD as the primary measure of distress as calculated from observed firm variables. Goss (2009) shows that "good" firms – those in the top quartile of KLD scores – are 11 percent less likely to experience a takeover or default, while those in the bottom quartile are 11 percent more likely to default or be exposed to the external market discipline.

Bassen *et al.* (2006) studied the relationship between CSR and financial performance in the utility industry and found that CSR and financial performance were indirectly linked throughout company risk, while good CSR performance reduces a company's financial risk, although a clear relationship between CSR and financial performance was not found. Bassen *et al.* (2008) suggested that a complete lack of CSR engagement exposes a company to unnecessarily high risk, while companies with good CSR performance enjoyed reduced risk exposure.

Based on the above, we hypothesize that a firm's CSR performance is positively correlated to the firm's DD risk:

H3. Ceteris paribus, CSR performance is positively associated with a firm's DD.

3. Methodology

3.1 Data

To work around the limitation of identifying the CSR representatives of individual companies, previous studies used a firm's social performance data as provided by KLD Research and Analytics to determine the relative strength of a given firm's social performance. KLD rates firm CSR performance based on seven main categories (i.e. community, corporate governance, diversity, employee relations, environmental stewardship, human rights policies, and product quality) and 80 sub-categories. We used the KLD social performance rating scores as our measure of CSR performance. For each firm, KLD separately rates positive indicators (strengths) and negative indicators (concerns) in each non-exclusionary dimension. Second, our credit ratings data are primarily sourced from S&P, which formulates ratings including a broad set of CSR activities. S&P rating decisions consider two broad categories of risk, namely, business risk and financial risk. Third, we obtained various corporate bond yields from the DataStream database and accounting characteristics from Compustat.

3.2 Sample selection

KLD began compiling information on CSR for certain firms in 1991, extending this coverage to the largest 3,000 largest US-based firms by capitalization in 2003. We obtained an initial sample of 38,158 firm-year observations from 1991 to 2012. Firms not appearing

in the Compustat database were eliminated, leaving 33,364 firm-year observations remain. To further investigate the bond spread, we further filtered the data set against the DataStream database, resulting in 18,754 firm-year observations. We obtained the monthly consensus earnings forecast for fiscal year one and the monthly dispersions for these earnings forecasts from I/B/E/S.

3.3 Research design

The S&P issuer rating is used here as a fundamental component of our analysis. To test *H1*, we use credit rating data from S&P as a proxy for firm credit ratings because S&P's ratings criteria include a broad set of CSR activities and considers two broad categories of risk, namely, business risk and financial risk. Following Avramov *et al.* (2009), we transform the S&P ratings into widely used numerical scores, where 1 represents an AAA rating (i.e. the best possible rating) and 22 reflects a D rating (the worst)[1]. Thus, a higher numerical score represents a higher credit risk or a lower credit rating. Numerical ratings of ten or below (BBB– ratings or better) are considered investment grade (IG) while ratings higher than 10 (BB+ ratings or worse) are non-investment grade (NIG) or high-yield.

In this study, bond spread is defined as the spread between corporate bond yield and the three-month Treasury bill rate. Convertible bonds are different from other type of bonds, and are thus excluded from our analysis:

$$\text{Spread}_{i,t} = \text{Yield}_{i,t} - \text{Yield}_{\text{curve},t} \quad (1)$$

where $\text{Spread}_{i,t}$ is the spread for firm i at time t , $\text{Yield}_{i,t}$ is the bond yield for firm i at time t , and $\text{Yield}_{\text{curve},t}$ is the three-month Treasury bill rate at time t .

The KMV-Merton model estimates the market value of debt by applying the Merton (1974) bond pricing model and supposes firm value accords with geometric Brownian motion (i.e. the Wiener process). The value of equity as a function of total firm value can be described by the Black-Scholes-Merton formula. By put-call parity, the value of a firm's debt is equal to the value of a risk-free discount bond minus the value of a put option written on the firm with a strike price equal to the face value of the debt and a time-to-maturity of T . The equity value of a firm satisfies the Merton model as follows:

$$V_E = V_A N(d_1) - F e^{-rT} N(d_2) \quad (2)$$

where V_E is the market value of the firm's equity, V_A is the firm's asset value, F is the face value of the firm's debt, r is the instantaneous risk-free rate (i.e. three month treasury bill rate), $N(\cdot)$ is the cumulative standard normal distribution function, d_1 and d_2 are the standard normal distribution function given by:

$$d_1 = \frac{\ln \frac{V_A}{F} + \left(r + \frac{\sigma_A^2}{2} \right) T}{\sigma_A \sqrt{T}} \quad (3)$$

and d_2 is just following as:

$$d_2 = d_1 - \sigma_A \sqrt{T} \quad (4)$$

Under Merton's assumptions the value of equity is a function of the value of the firm and time, so it follows directly from Ito's lemma that volatility between equity value

and asset value follows Equation (5):

$$\sigma_E V_E = N(d_1) \sigma_A V_A \quad (5)$$

Following the Merton (1974) model, it can be shown that the probability of the firm's default at time T evaluated at time t is $N(-DD_t)$ where the DD at time t is defined as the DD which can be calculated as:

$$DD_t = \frac{\ln \frac{V_A}{F} + \left(\mu - \frac{\sigma_A^2}{2} \right) T}{\sigma_A \sqrt{t}} \quad (6)$$

where μ is an estimate of the expected annual return of the firm's assets.

To capture the relation between rating score and a firm's financial reporting and CSR disclosure, we estimate the following models:

$$\begin{aligned} Rating_score = & \alpha + \beta_1 CSR + \beta_2 Dummy_rig + \beta_3 Dummy_sic + \beta_4 size + \beta_5 D_E \\ & + \beta_6 EBT_TA + \beta_7 NWC_TA + \beta_8 OI_TA + \beta_9 RE_TA \\ & + \beta_{10} analyst_revision + \beta_{11} \ln_NUMEST \end{aligned} \quad (7)$$

$$\begin{aligned} Rating_score = & \alpha + \beta_1 Strengths + \beta_2 Concerns + \beta_3 Dummy_rig + \beta_4 Dummy_sic \\ & + \beta_5 size + \beta_6 D_E + \beta_7 EBT_TA + \beta_8 NWC_TA + \beta_9 OI_TA \\ & + \beta_{10} RE_TA + \beta_{11} analyst_revision + \beta_{12} \ln_NUMEST \end{aligned} \quad (8)$$

where *Rating_score* is the numerical rating score from 1 (AAA) to 22 (D); *CSR* the net score of CSR ratings, measured as total strengths minus total concerns in seven social rating categories; *Dummy_rig* the dummy variable for IG firms and NIG firms; *Dummy_sic* the Standard Industrial Classification (SIC) for classifying industries by a four-digit code. We separate all firms into ten industry dummies based on their 2-digit SIC codes; *Size* the natural logarithm of the market value of firm equity at the end of the previous year. *D_E* the total Debt scaled by total Equity; *EBT_TA* the Earnings Before Tax scaled by Total Assets; *NWC_TA* the Net Working Capital scaled by Total Assets; *OI_TA* the Operating Income scaled by Total Assets; *RE_TA* the Retained Earnings scaled by Total Assets; *analyst_revision* the change in mean EPS forecast since the previous month divided by the absolute value of mean EPS forecast for the previous month; *ln_NUMEST* the natural logarithm of the number of analysts following the firm through the year; *Strengths* the net score of CSR ratings, measured as total strengths in seven social rating categories; and *Concerns* the net score of CSR ratings, measured as total concerns in seven social rating categories.

4. Results

4.1 Descriptive statistics and univariate analysis

In Table I, we present the sample distribution by the two-digit SIC code industry. The most heavily represented industry is Manufacturing (40.21 percent, $20 \leq$ SIC code < 40), followed by Financial Services (20.67 percent, $60 \leq$ SIC code < 70), and Services (14.11 percent, $70 \leq$ SIC code < 90).

Panel A of Table II reports the credit ratings of the three dispersion groups with C1 (C3) denoting the group with the best (worst) CSR performance based on KLD annual

Table I.
Sample description:
distribution of
firm-year
observations by
industry

Industry	Two-digit SIC	No. of observations	% of sample	Cumulative %
Agriculture	< 10	79	0.24	0.24
Mining	10 ≤ SIC < 15	1,426	4.27	4.51
Construction	15 ≤ SIC < 18	345	1.03	5.54
Manufacturing	20 ≤ SIC < 40	13,417	40.21	45.76
Transportation	40 ≤ SIC < 50	3,315	9.94	55.69
Commercial wholesale	50 ≤ SIC < 52	828	2.48	58.18
Retail	52 ≤ SIC < 60	2,280	6.83	65.01
Financial services	60 ≤ SIC < 68	6,897	20.67	85.68
Services	70 ≤ SIC < 90	4,709	14.11	99.80
Public administration	SIC > 90	68	0.20	100.00
Total		33,364	100.00	

Note: % of sample denotes percentage of certain industry sample in all samples

Panel A: difference in credit rating by year

Year	C1	C2	C3	C1-C3	t-Value
1991	5.92	6.64	7.20	-1.27	-8.95***
1992	5.74	6.58	7.32	-1.59	-11.57***
1993	5.85	6.62	7.20	-1.35	-10.60***
1994	5.66	6.86	7.42	-1.77	-14.66***
1995	6.01	6.81	7.22	-1.21	-10.05***
1996	6.03	7.10	7.12	-1.09	-9.72***
1997	6.08	6.84	7.11	-1.02	-9.41***
1998	6.13	7.21	7.23	-1.11	-10.91***
1999	6.55	7.00	7.49	-0.93	-8.93***
2000	6.47	7.49	7.61	-1.14	-11.42***
2001	7.41	9.10	8.37	-0.96	-10.54***
2002	7.66	8.99	8.72	-1.06	-12.67***
2003	8.89	10.53	10.25	-1.36	-19.08***
2004	8.96	10.82	10.45	-1.49	-21.11***
2005	8.71	10.73	10.51	-1.80	-26.51***
2006	8.70	10.70	10.85	-2.14	-31.34***
2007	8.84	10.89	10.70	-1.86	-26.79***
2008	9.04	10.86	10.67	-1.63	-23.37***
2009	9.52	11.17	10.92	-1.40	-19.03***
2010	9.56	11.76	11.67	-2.11	-29.79***
2011	9.27	11.53	12.15	-2.88	-43.11***
2012	9.54	12.13	11.77	-2.23	-39.97***

Panel B: difference in credit rating by overall sample

Time period	C1	C2	C3	C1-C3	t-Value
1991-2012	8.46	9.84	9.97	-1.51	-78.22***

Panel C: difference in credit rating by time period

Time period	C1	C2	C3	C1-C3	t-Value
Before 2003	6.46	7.58	7.67	-1.21	-37.70***
After 2003	9.17	11.03	10.90	-1.73	-81.71***

Notes: C1-C3 denotes the difference between the first and third divisions in Student's *t*-test. S&P ratings are assigned numeric values as follows: AAA = 1, AA+ = 2, AA = 3, AA- = 4, A+ = 5, [...], D = 22. ***Significant at 1 percent level across high and low-CSR division

Table II.
CSR and credit
ratings

reporting. The dispersion rating score is measured by the numeric rating difference between group C1 and C3. The dispersion group rating increases monotonically as we move from group C1 to C3. This pattern is consistent with previous findings (Avramov *et al.*, 2009) and holds for the entire universe of firms.

Panel B of Table II presents the mean dispersion measure of the three dispersion groups for all firms. The evidence suggests that mean dispersion measures for the best and the worst CSR (i.e. C1 vs C3) are still significant. To illustrate, for the best CSR performance group (C1) the mean dispersion measures based on numeric rating is 8.46; while for the worst CSR performance group (C3) the mean dispersion measures based on numeric rating is 9.97.

Similarly, Panel C of Table II presents the mean dispersion measure of the three dispersion groups for all firms into two sub-periods (i.e. before 2003 vs after 2003). The resulting pattern is consistent with Panels A and B. Overall, the evidence in the three panels of Table II suggests that CSR performance can be treated as a proxy of firm credit risk. Accordingly, the sample of the best CSR performance firm is sufficiently representative to capture the dispersion effect for credit risk (consistent with Lee and Faff, 2009; Luo and Bhattacharya, 2009; Starks, 2009; El Ghoul *et al.*, 2011), a finding consistent which supports *H1*, i.e., that CSR disclosure is positively associated with a firm's credit rating.

To better understand the relationship between CSR and credit ratings, we divide all firms rated by KLD into decile groups based on their CSR performance (see Table III). The resulting pattern is consistent with that in Table II, and the empirical results suggest that CSR performance is a good indicator to explore firm credit risk. Interestingly, Panel C of Table III shows the credit rating difference between IG and NIG is significant (i.e. C1 vs C6, C7, C8, C9, C10), clearly indicating that CSR has an impact on long-term credit risk. In particular, when the sample increases rapidly, the difference between IG and NIG is more significant (see Panel B of Table III following the 2003 sub-period).

4.2 CSR information and corporate bond spread

In this study, for all selected bonds, we obtained all end-of-month credit spreads available in DataStream for the period 1991-2012. DataStream calculates credit spreads as the yield differential between the bond and Treasury bill curve.

Table IV provides the results for the entire sample of corporate bonds spreads and for high-, medium- and low-CSR-performance groups. Panel A of Table IV reports the average spreads across the CSR-performance increased from high-CSR-performance (C1) for low-CSR-performance (C3). This pattern occurs 20 times in 22 years and exhibits a significant difference 14 times. However, different patterns occur in 1995 and 2009. Consistent with Avramov *et al.* (2007) in the 1990-2003 period, in 1995 a prominent peak appears in the spread levels and may explain the unusual spread trend. Regardless, the spreads pattern holds for major credit events including the 1997 East Asian financial crisis, the 1998 Russian crisis (i.e. collapse of Long-term capital management), the 1999 bursting of the dot-com bubble, the 2003 bursting of the telecom bubble, and the 2007 subprime mortgage crisis. Another anomalous trend occurred in 2009 coinciding with the global financial crisis resulting in distortions to credit spreads.

To understand the overall time period spread patterns, Panel B of Table IV presents the average dispersion measure of the three dispersion groups for all firms. The evidence suggests that mean dispersion measures for the best and the worst CSR performers (i.e. C1 vs C3) are still significant. For example, for the best CSR performance group (C1)

CSR decile (C1 = best, C10 = worst CSR performance)

Panel A: difference in credit rating by year

Year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1991	4.38	6.26	6.41	7.15	6.01	7.87*** (-11.09)	7.18*** (-9.43)	5.65*** (-5.91)	7.14*** (-12.31)	7.96*** (-15.48)
1992	4.56	6.57	6.01	7.49	5.78	7.22*** (-12.06)	5.95*** (-6.80)	7.55*** (-12.76)	7.46*** (-10.98)	7.48*** (-12.02)
1993	5.21	5.92	6.26	6.39	6.42	7.54*** (-9.61)	6.78*** (-8.81)	5.91*** (-2.86)	8.23*** (-13.43)	6.81*** (-7.81)
1994	5.19	5.51	5.96	7.19	6.34	7.50*** (-12.59)	6.22*** (-5.77)	6.34*** (-6.34)	9.74*** (-20.21)	7.28*** (-9.97)
1995	5.43	6.07	6.62	6.77	6.08	7.42*** (-10.75)	6.68*** (-6.65)	6.66*** (-5.98)	7.45*** (-9.04)	7.70*** (-12.47)
1996	6.05	6.06	6.42	5.72	7.27	7.17*** (-5.35)	7.60*** (-5.88)	7.18*** (-6.23)	6.48*** (-2.22)	7.68*** (-7.42)
1997	5.45	6.71	6.26	6.33	6.23	7.16*** (-10.20)	7.58*** (-10.89)	6.95*** (-9.01)	6.81*** (-6.49)	7.20*** (-10.01)
1998	5.60	6.04	7.07	6.32	7.66	7.06*** (-7.95)	7.25*** (-9.85)	7.07*** (-9.84)	7.53*** (-10.60)	7.12*** (-7.63)
1999	5.80	6.68	7.42	6.08	7.08	7.36*** (-9.35)	7.36*** (-11.30)	7.49*** (-10.08)	7.18*** (-9.22)	7.78*** (-10.46)
2000	6.45	6.15	6.31	7.62	7.62	7.22*** (-4.90)	7.82*** (-8.90)	7.77*** (-7.43)	7.71*** (-7.81)	7.20*** (-4.34)
2001	6.67	6.96	8.17	8.52	8.69	9.79*** (-22.07)	9.78*** (-18.29)	9.08*** (-17.42)	8.12*** (-9.92)	7.88*** (-8.67)
2002	6.88	7.39	7.92	8.95	8.60	10.32*** (-26.92)	9.05*** (-14.72)	9.38*** (-17.63)	8.47*** (-11.66)	8.26*** (-10.05)
2003	7.85	9.32	9.56	9.81	11.04	11.66*** (-31.36)	9.69*** (-14.37)	10.89*** (-24.40)	10.12*** (-18.62)	9.99*** (-18.64)
2004	7.65	9.10	9.93	10.64	10.98	9.78*** (-14.03)	10.89*** (-22.13)	9.97*** (-16.57)	10.46*** (-18.68)	10.18*** (-18.12)
2005	7.43	8.61	9.45	10.72	9.66	11.32*** (-29.45)	11.12*** (-24.58)	9.81*** (-19.07)	10.68*** (-22.14)	10.36*** (-24.92)

(continued)

Firm's financial risk associated with CSR

Table III. CSR and Credit ratings in decile groups

Table III.

Year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
2006	7.65	9.28	9.53	10.18	9.84	11.08*** (-27.28)	11.15*** (-27.43)	11.06*** (-30.00)	11.37*** (-33.73)	10.53*** (-27.81)
2007	7.84	9.50	9.29	10.49	9.83	11.56*** (-32.35)	11.14*** (-24.49)	11.03*** (-25.81)	10.90*** (-26.89)	10.52*** (-25.30)
2008	7.96	9.86	9.42	10.90	9.99	11.27*** (-26.87)	11.24*** (-24.55)	10.98*** (-26.05)	11.00*** (-26.18)	10.35*** (-22.62)
2009	8.61	10.30	9.80	11.00	10.30	11.85*** (-24.74)	11.24*** (-19.46)	11.21*** (-20.11)	11.25*** (-22.02)	10.60*** (-17.16)
2010	8.24	10.12	11.68	11.09	11.39	11.83*** (-27.77)	13.04*** (-30.86)	12.80*** (-36.60)	11.03*** (-26.88)	11.46*** (-32.36)
2011	7.98	9.59	10.76	11.18	11.73	11.70*** (-35.88)	12.41*** (-32.52)	12.48*** (-38.32)	12.29*** (-37.10)	11.87*** (-39.16)
2012	7.90	9.24	10.62	11.50	11.37	11.17*** (-30.76)	12.13*** (-42.15)	11.70*** (-43.33)	12.25*** (-43.62)	12.46*** (-38.03)

<i>Panel B: difference in credit rating by overall sample</i>										
Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1991-2012	7.47	8.65	9.09	9.55	9.52	10.28*** (-80.16)	9.92*** (-65.97)	9.93*** (-72.50)	10.02*** (-76.33)	9.86*** (-77.98)

<i>Panel C: difference in credit rating by time period</i>										
Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Before 2003	5.84	6.47	6.88	7.30	7.25	8.08*** (-39.29)	7.73*** (-33.25)	7.62*** (-32.57)	7.78*** (-35.02)	7.62*** (-32.63)
After 2003	7.96	9.55	10.09*** (-73.96)	10.85*** (-69.86)	10.54*** (-88.97)	11.34*** (-88.97)	11.22*** (-78.67)	11.03*** (-82.72)	11.06*** (-85.00)	10.69*** (-81.47)

Notes: The column values () in C6, C7, C8, C9, and C10, respectively, report the *t*-value difference between the C1 group (i.e. best CSR performance) vs the CSR performance for C6, C7, C8, C9, and C10 (i.e. (C1-C6), (C1-C7), (C1-C8), (C1-C9), and (C1-C10)); () denotes the difference between the C1 division and relative division in Student's *t*-test. ***Significant at 1 percent level across high- and low-CSR groups

Panel A: difference in corporate bond spreads by year

Year	C1	C2	C3	C1-C3	t-Value
1991	3.49	3.46	3.56	-0.08	-0.60
1992	4.13	4.82	4.33	-0.20	-1.50
1993	3.70	3.14	4.18	-0.48	-3.38***
1994	2.99	3.60	3.86	-0.87	-4.24***
1995	1.79	1.70	1.73	0.06	0.71
1996	1.84	2.07	2.06	-0.22	-1.69*
1997	1.87	1.86	2.19	-0.33	-2.25**
1998	1.45	1.85	1.70	-0.25	-2.80***
1999	2.25	2.03	2.35	-0.10	-0.52
2000	1.95	1.80	2.24	-0.29	-1.56
2001	3.39	4.05	3.80	-0.41	-1.68*
2002	4.40	5.12	5.01	-0.61	-2.81***
2003	4.46	5.69	5.58	-1.12	-5.13***
2004	4.12	5.20	5.12	-1.00	-4.65***
2005	2.60	3.43	3.26	-0.66	-3.18***
2006	1.44	2.06	2.40	-0.96	-4.59***
2007	2.35	2.84	2.63	-0.28	-1.03
2008	6.01	6.18	6.17	-0.16	-0.25
2009	8.45	8.26	8.04	0.41	0.98
2010	6.26	8.47	7.50	-1.24	-3.21***
2011	6.18	7.51	7.37	-1.19	-2.62**
2012	5.38	7.24	6.81	-1.43	-5.37***

Panel B: difference in corporate bond spread by overall sample

Time period	C1	C2	C3	C1-C3	t-Value
1991-2012	3.62	4.10	4.17	-0.56	-7.65 ***

Panel C: difference in corporate bond spread by time period

Time period	C1	C2	C3	C1-C3	t-Value
Before 2003	2.80	3.10	3.25	-0.46	-6.94***
After 2003	4.51	5.41	5.08	-0.58	-4.85***

Panel D: difference in corporate bond spread by type of bond

Type of bond	C1	C2	C3	C1-C3	t-Value
Straight	3.68	4.12	4.19	-0.52	-6.99***
Floating	2.75	3.66	3.74	-0.99	-2.68**

Notes: Values within parenthesis denotes the difference between the C1 and C3 divisions in Student's *t*-test. Straight and Floating respectively indicate that the bond pays a fixed rate of interest at regular intervals and the interest amount fluctuates in step with the market interest rates. *, **, ***Significant at 1, 5, and 10 percent levels, respectively

Table IV.
CSR information
and corporate
bond spreads

the mean bond spread is 3.62; while the worst CSR performance group (C3) the mean bond spread is 4.17.

Similarly, Panel C of Table IV presents the mean dispersion measure of the three dispersion groups for all firms into two sub-periods (i.e. before 2003 and after 2003), producing a pattern consistent with that found in Panel A and Panel B. We also observe that, over the course of these crises, the credit spread is higher after 2003 than before 2003.

DataStream tracks six types of bonds including with bonds with warrant, convertible bonds, floating bonds, straight bonds, zero coupon bonds, and callable bonds. The yields of bonds with warrant and convertible bonds depend on stock

prices. Callable bonds usually have high spreads because of high levels of corporate uncertainty. Zero coupon bonds usually feature compound interest. However floating bond and straight bond yields are connected to market interest rates (respectively, floating and fixed). Panel D of Table IV shows robustness test results for straight and floating bonds, indicating that firms with poor CSR performance obtain high bond spreads for straight and floating bonds, which is associated with increased risk. Thus, a firm's CSR quality is very important: the higher the CSR quality, the lower the interest rate the bond holder receives.

Overall, the evidence in the four panels of Table IV suggests that better CSR performance leads to lower spreads (consistent with Goss and Roberts, 2011; Menz, 2010) supporting *H2*, namely, that CSR disclosure is negatively associated with a firm's bond spread.

To better understand the relationship between CSR and credit spreads, we divide all firms rated by KLD into decile groups based on their CSR performance (see Table V). The resulting pattern is consistent with that shown in Table IV, and the empirical results suggest that CSR performance is a good indicator of a firm's credit spread.

4.3 Firm default risk and CSR performance

The DD measure is based on Merton's (1974) structural valuation model. Estimating DD requires knowing both the firm's asset value and asset volatility. Empirical studies have shown that DD is a good predictor of corporate defaults, along with bank downgrades in developed and emerging markets.

Table VI provides the results for the entire DD sample and for the three CSR performance groups. Panel A of Table VI shows that high-CSR-performance firms have a lower default risk than low-CSR-performance ones. This pattern persists from 1991 to 2012, though the difference is not significant for several of the sampled years. Furthermore, Panel B of Table VI presents the average DD measure of the three dispersion groups for all firms in 1991-2012. For example, for the best CSR performance group (C1) the mean dispersion measure based on DD is 4.91 while for the worst CSR performance group (C3) the mean dispersion measure based on DD is 4.02 and the difference is significant.

Similarly, Panel C of Table VI presents the mean dispersion measure of the three dispersion groups for all firms in two sub-periods (i.e. before 2003 and after 2003), producing a pattern consistent with that shown in Panel A and Panel B. Interestingly, the improvement in DD from before 2003 to after 2003 suggests that the active pursuit of CSR improves a firm's financial situation.

Overall, the evidence in Table VI suggests that improved CSR performance corresponds with a higher DD value and a lower default risk. This is consistent with previous findings (Verwijmeren and Derwall, 2010; Bassen *et al.*, 2008; Goss, 2009), and supports *H3*, namely, that CSR performance is positively associated with a firm's DD.

To better understand the relationship between CSR and DD, we divided all firms rated by KLD into decile groups based on their CSR performance (see Table VII). The resulting pattern is consistent with that shown in Table VI, and the empirical results suggest that CSR performance is a good indicator of a firm's default risk.

4.4 Distribution of firm observations by industry sector

In Table VIII, we present the different behaviors across sectors identified by the two-digit SIC industry code. In terms of credit ratings, public administration, and construction,

CSR decile (C1 = best, C10 = worst CSR performance)

Panel A: difference in corporate bond spreads by overall sample

Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1991-2012	3.10	3.55	3.75	3.96	4.11	3.94*** (-4.92)	3.55*** (-3.56)	4.10*** (-6.76)	4.05*** (-6.86)	3.97*** (-7.11)

Panel B: difference in corporate bond spreads by time period

Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Before 2003	2.54	2.95	2.91	2.98	3.07	3.24*** (-4.26)	3.18*** (-6.33)	3.24*** (-5.47)	3.32*** (-6.72)	3.21*** (-6.52)
After 2003	3.85	4.77	4.60	5.90	5.47	4.94*** (-4.39)	4.96*** (-4.70)	5.54*** (-7.77)	5.30*** (-6.82)	4.87*** (-5.55)

Panel C: difference in corporate bond spreads by type of bond

Type of bond	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Straight	3.20	3.79	3.84	4.33	4.33	4.12*** (-5.86)	3.80*** (-4.95)	4.45*** (-8.88)	4.30*** (-8.44)	4.16*** (-8.38)
Floating	2.54	2.31	3.48	3.81	2.91	2.60 (-0.06)	3.48 (-1.57)	5.49** (-2.81)	4.14** (-2.40)	3.33* (-1.80)

Notes: Values within parenthesis denotes the difference between the C1 division and the relative division in Student's *t*-test. Straight and Floating, respectively, denote that the bond pays a fixed rate of interest at regular intervals and interest amount fluctuates in step with the market interest rates. *, **, ***Significant at 1, 5, and 10 percent levels, respectively

Table V. CSR information and corporate bond spreads in decile groups

Panel A: difference in DD by year

Year	C1	C2	C3	C1-C3	t-Value
1991	3.60	4.21	2.78	0.81	1.60
1992	4.15	4.80	3.17	0.98	2.05**
1993	4.49	5.15	4.11	0.38	0.83
1994	4.32	4.08	3.36	0.96	2.12**
1995	4.45	4.73	4.29	0.15	0.34
1996	4.75	4.44	4.16	0.59	1.39
1997	4.64	4.26	3.57	1.07	2.62***
1998	3.47	3.34	2.16	1.31	3.98***
1999	3.02	2.70	1.78	1.24	3.54***
2000	2.48	2.07	1.54	0.94	2.94***
2001	3.58	3.41	2.45	1.14	5.30***
2002	3.27	2.93	2.36	0.92	3.91***
2003	5.22	4.91	4.51	0.71	4.37***
2004	5.39	4.70	4.61	0.78	4.23***
2005	5.63	4.68	4.44	1.19	5.94***
2006	5.30	4.58	4.15	1.15	6.11***
2007	4.24	3.93	3.39	0.85	4.80***
2008	2.58	2.24	2.08	0.49	4.68***
2009	4.46	3.96	4.02	0.44	3.57***
2010	6.10	5.04	4.84	1.26	8.73***
2011	5.29	4.34	4.20	1.09	7.95***
2012	6.82	5.79	6.00	0.82	4.98***

Panel B: difference in DD by overall sample

Time period	C1	C2	C3	C1-C3	t-Value
1991-2012	4.91	4.18	4.02	0.89	18.01***

Panel C: difference in DD by time period

Time period	C1	C2	C3	C1-C3	t-Value
Before 2003	3.76	3.70	2.87	0.89	8.17***
After 2003	5.18	4.30	4.27	0.91	16.62***

Notes: Values within parenthesis denotes the difference between the C1 and C3 divisions in Student's *t*-test. **, ***Significant at 1 and 5 percent, respectively

Table VI.
Firm default
risk and CSR
performance

respectively, show the best and worst CSR performance. Besides, the *t*-test results for the sectors show a significant difference. In terms of bond spreads, public administration still has the lowest bond spreads while the mining sector has the highest. Statistical results show the public administration sector's investment in CSR seems to draw more positive feedback. Interestingly, in terms of default risk, the construction industry has the greatest risk of bankruptcy while agriculture has the smallest risk. In our empirical results, the construction sector shows poor CSR performance, not only in terms of credit rating but also default risk.

4.5 Additional robustness test

To further assess the robustness of our results, we investigate the impact of KLDs annual CSR performance announcements on credit ratings for three months prior to and following the announcement. The event study shows the rating changing in 6 (+3 ~ -3) month, and exhibits a crucial result: in our decile groups, firms with the best CSR performance (C1) show a pattern which indicates improved credit ratings following the announcement while the opposite is true for firms with the worst CSR

CSR decile (C1 = best, C10 = worst CSR performance)

Panel A: difference in DD by year

Year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
2003	5.80	4.88	5.16	4.69	4.91	4.96***(2.85)	5.06***(2.42)	4.48***(4.50)	4.60***(3.89)	4.39***(4.66)
2004	6.04	4.93	5.15	5.08	4.71	4.87***(3.12)	4.33***(4.64)	4.50***(4.11)	4.76***(3.57)	4.67***(3.60)
2005	6.46	5.49	5.22	4.57	4.37	5.01***(4.04)	5.03***(3.97)	4.61***(5.06)	4.57***(5.07)	3.81***(7.35)
2006	5.89	5.42	4.66	5.13	4.46	4.47***(4.19)	4.37***(4.34)	4.56***(3.93)	4.12***(5.17)	3.69***(6.33)
2007	4.72	4.12	3.87	4.34	3.89	3.99***(2.11)	3.50***(3.43)	3.63***(3.26)	3.77***(2.80)	2.74***(5.94)
2008	2.86	2.50	2.30	2.47	2.33	2.50***(1.81)	1.81***(5.26)	2.14***(3.70)	2.12***(3.72)	1.94***(4.62)
2009	4.76	4.29	4.34	4.09	4.10	4.06*(3.13)	3.91***(3.80)	4.04***(3.26)	3.87***(3.98)	4.06***(3.30)
2010	6.77	5.97	5.38	5.67	4.74	5.38***(5.32)	4.90***(7.39)	5.05***(6.53)	5.11***(6.16)	4.26***(9.69)
2011	6.22	4.97	4.97	4.33	4.35	4.41***(6.93)	4.19***(7.75)	4.14***(7.80)	4.30***(7.46)	4.07***(7.61)
2012	8.17	6.87	6.27	6.07	6.10	5.95***(6.42)	5.79***(6.64)	6.02***(6.33)	6.23***(6.00)	5.52***(6.46)

Panel B: difference in DD by overall sample

Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1991-2012	5.44	4.74	4.56	4.45	4.32	4.40***(11.04)	4.10***(14.00)	4.13***(13.85)	4.08***(14.26)	3.54***(19.96)

Panel C: difference in DD by time period

Time period	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Before 2003	3.77	3.87	3.67	3.62	3.78	3.80(-0.16)	3.43*(1.65)	3.34***(2.10)	2.79***(4.73)	2.42***(6.99)
After 2003	5.44	4.74	4.56	4.45	4.32	4.40***(11.04)	4.10***(14.00)	4.13***(13.85)	4.08***(14.26)	3.54***(19.96)

Notes: Values within parenthesis denotes the difference between the C1 division and the relative division in Student's *t*-test. *, **, ***Significant at 1, 5, and 10 percent levels, respectively

Firm's
financial risk
associated
with CSR

Table VII.
Firm default
risk and
CSR performance in
decile groups

Table VIII.
Distribution of firm
observations by
industry sector

Industry	Two-digit SIC	Credit ratings	Corporate bond spreads	Default risk
Agriculture	< 10	10.47	3.82	4.96
Mining	10 ≤ SIC < 15	10.82	5.38*** (12.77)	3.94
Construction	15 ≤ SIC < 18	11.40*** (43.15)	4.70	2.74*** (-3.85)
Manufacturing	20 ≤ SIC < 40	9.06	3.93	4.55
Transportation	40 ≤ SIC < 50	9.61	4.29	3.87
Commercial wholesale	50 ≤ SIC < 52	9.90	4.29	3.59
Retail	52 ≤ SIC < 60	9.89	3.86	4.12
Financial services	60 ≤ SIC < 68	8.13	3.26	4.90
Services	70 ≤ SIC < 90	11.04	5.10	4.48
Public Administration	SIC > 90	3.52	2.76	4.12
Average		9.38	4.14	4.13

Notes: Values within parenthesis denotes the difference between the highest division and the relative lowest division in Student's *t*-test. ***Significant at 1 percent

performance (C10) (i.e. we also find a similar pattern for the (-1 ~ +1) and (-6 ~ +6) periods, but these results are not included in the table). This result suggests that CSR performance is a reliable indicator for assessing firm risk. Interestingly, credit ratings improve rapidly in the two anomalous years. Following the 2008 financial crisis, firm credit ratings improved significantly in 2009, but fell rapidly following the 2011 European debt crisis (Table IX).

4.5 Regression results

To capture the relationship between a firm's rating score and its financial reporting and CSR disclosure, we report the estimated results from the regression models in Equations (7) and (8). There are 121,938 samples in regression model and Table X reports the variable statistics.

Our test focusses on the coefficient of CSR, and captures the effect of CSR performance on rating score by firms covered by KLD. To avoid collinearity, we review three different measures of CSR performance, including CSR, Strengths, and Concerns (i.e. the net score of total CSR ratings, the net score of strengths CSR ratings, and the net score of concerns CSR ratings). In Table XI, we report the regression analysis results using Equations (7) and (8). Consistent with Cho *et al.* (2013), the results show that the aggregate measure of positive and negative indicators of CSR activities (the net score of total CSR ratings) is negatively associated with the rating score (-0.07 and significant at a 1 percent level). Similarly, we find a negative association between the positive indicator of CSR performance (Strengths) and rating score (-0.06 and significant at a 1 percent level). Interestingly, we also find that the negative indicator of CSR performance (Concerns) is significantly and positively associated with rating score (0.08 and significant at a 1 percent level). These results strongly suggest that both Strength and Concern CSR activities have a significant impact on a firm's financial risk, with Strengths improving credit worthiness and reducing financial risk, while Concerns tend to lead to credit crises and increased financial distress.

5. Conclusion

This study examines the relationship between CSR performance and financial risk. Specifically, we investigate whether CSR performance reduces a firm's credit risk,

Year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1992	-	1.00	-1.80*	0.44	-1.00	-	-	1.00	-	-0.57
1993	-1.66	-0.57	0.90	-0.44	-1.37	1.00	-0.75	-	1.19	0.90
1994	1.00	1.36	0.81	1.72	-1.36	-	0.00	-1.45	1.00	0.00
1995	-1.00	-0.37	0.63	0.00	-1.44	0.00	0.00	-0.37	1.00	0.57
1996	-1.00	-0.53	0.00	-0.57	-	-0.57	-1.82*	-1.41	0.00	0.81
1997	0.57	0.37	-1.69	0.37	1.45	0.00	-0.44	1.44	-	-0.44
1998	-1.00	-1.00	1.79*	1.00	-0.90	1.00	-0.57	1.00	1.00	-0.27
1999	-1.67	0.00	0.81	-1.80*	-0.57	0.44	0.00	-0.44	-1.16	-1.00
2000	-1.36	-	-1.53	-0.53	-0.57	1.00	-1.22	0.00	-2.22**	-1.96*
2001	-1.75*	-1.40	-1.69	-0.30	-1.45	-	-1.07	0.33	-1.82*	-1.66
2002	-2.64**	-2.77***	-1.63	0.57	0.00	0.30	-0.82	1.35	-1.00	-2.77***
2003	-1.62	-1.15	-1.18	-0.37	-1.00	-0.44	-0.57	-1.44	-2.17**	-2.27**
2004	0.38	-0.45	-0.57	1.36	-1.00	0.00	-0.86	2.77	-1.66	-0.58
2005	0.00	0.14	0.13	-0.39	0.04	0.20	-0.08	0.06	-0.10	0.04
2006	0.11	-0.09	-0.09	0.21	-0.06	0.10	0.00	0.00	-0.06	-0.05
2007	-0.21	0.17	0.53	-0.81	-0.47	-0.84	-1.16	0.77	1.39	1.91*
2008	-2.4**	-0.63	0.63	-0.83	-1.07	0.83	-1.07	0.73	-1.41	0.35
2009	-3.72***	-3.72***	-2.67***	-1.85*	-3.46***	-2.36**	-2.99***	-3.16***	-3.34***	-4.42***
2010	-0.35	0.78	0.00	2.09**	1.62	-0.44	1.07	0.57	0.70	2.40**
2011	2.06**	3.93***	1.88*	1.16	1.92**	1.04	2.36**	1.79*	1.27	2.35**
2012	-0.33	1.40	0.22	0.23	0.57	0.57	1.66	-0.23	1.94*	1.09

Notes: - denotes unchanged in credit ratings. Significant changes are in italic. *, **, *** Significant at 1, 5, and 10 percent levels, respectively

Table IX.
Credit rating
changes in decile
groups before
and after CSR
announcements

Variables	<i>n</i>	Mean	Median	SD	25th Percentile	75th Percentile
CSR	121,938	-0.112	0.000	3.040	-2.000	1.000
Rating score	121,938	9.255	9.000	3.438	7.000	12.000
Dummy_rig	121,938	0.656	1.000	0.475	0.000	1.000
Dummy_sic	121,938	4.497	4.000	2.093	3.000	7.000
Size	121,938	8.648	8.460	1.452	7.618	9.568
D_E	121,938	0.701	0.314	2.815	0.137	0.670
EBT_TA	121,938	0.016	0.015	0.035	0.004	0.029
NWC_TA	121,938	0.132	0.109	0.155	0.018	0.227
OI_TA	121,938	-0.121	-0.076	0.162	-0.167	-0.018
RE_TA	121,938	0.162	0.167	0.409	0.040	0.343
analyst_revision	121,938	-0.019	0.007	0.694	-0.011	0.020
ln_NUMEST	121,938	1.802	1.965	1.002	0.956	2.644
Strengths	121,938	2.301	1.000	2.961	0.000	3.000
Concerns	121,938	-2.412	-2.000	2.282	-3.000	-1.000

Notes: *n* and SD, respectively, denote the number of samples and standard deviation. All variables are defined in Equation (8). After matching accounting data with Compustat and financial data with I/B/E/S, 121,938 samples were retained for analysis

Table X.
Descriptive statistics

Variable	Dependent variable = rating score					
	Coeff.	Model 1			Model 2	
		SD	<i>t</i> -Stat.	Coeff.	SD	<i>t</i> -Stat.
Intercept	15.92	0.04	384***	16.05	0.05	338.18***
CSR	-0.07	0.00	-39***			
Strengths				-0.06	0.00	-28.18***
Concerns				0.08	0.00	29.23***
Dummy_rig	-4.60	0.01	-354***	-4.60	0.01	-354.50***
Dummy_sic	0.05	0.00	19.77***	0.06	0.00	20.28***
Size	-0.42	0.01	-82.98***	-0.44	0.01	-68.92***
D_E	0.18	0.00	50.48***	0.18	0.00	50.57***
EBT_TA	-6.68	0.14	-46.36***	-6.70	0.14	-46.51***
NWC_TA	0.09	0.04	2.43**	0.07	0.04	2.06**
OI_TA	-0.36	0.03	-11.71***	-0.36	0.03	-11.58***
RE_TA	-1.10	0.01	-85.77***	-1.10	0.01	-85.64***
analyst_revision	-0.03	0.01	-3.29***	-0.03	0.01	-3.22***
ln_NUMEST	-0.08	0.01	-14.52***	-0.08	0.01	-14.38***
Adj. R ²		0.7458			0.7459	
<i>n</i>		121,938			121,938	

Table XI.
Test of the effect of
CSR performance on
rating scores

Notes: Coeff. and SD, respectively, denote the coefficient in our model and standard deviation. All variables are defined in Equation (8). **,***Significant at 1 and 5 percent levels, respectively

corporate bond spread, and bankruptcy risk, which are taken as proxies for financial risk. Consistent with prior results, CSR activities reduce agency costs by eliminating the information asymmetry between internal and external stakeholders (Kim and Kim, 2014) and reduce financial risk. CSR can improve information transparency for publicly traded firms and allow public opinion to improve investment decisions. To obtain lower financing costs, expand investor base, and enhance brand awareness, companies should pay more attention to CSR as a form of social communication.

Therefore, we infer that CSR provides additional non-financial information for investors, lenders, and regulators.

Using CSR performance information assembled by KLD, we find that better CSR performance scores appear to provide crucial information that can reduce financial risk. Furthermore, positive CSR performance scores appear to be associated with reduced financial risk while negative CSR performance scores lead to increased financial distress. In addition, analysis shows that positive CSR performance has a greater impact on rating score forecasts than does negative CSR performance. That is, firms with good CSR performance enjoy reduced credit risk, corporate bond spreads, and bankruptcy risk. This suggests that investors are more likely to respond to positive CSR information than negative CSR information. However, negative CSR performance can be used to predict financial risk. We further find that financial markets are placing increased emphasis on CSR performance, as shown by the increasing the difference of our three proxies for financial risk (i.e. credit ratings, bond spread, and DD) in the extreme group following the 2008 financial crisis.

When firms initiate a qualitative CSR strategy, their priority must focus on establishing future competitiveness even at the cost of present performance. After firms establish CSR strength, they can then focus on the identity of the brand or product to enhance customer loyalty and thus improve operational efficiency and financial performance. Firms which are known for their commitment to the implementation of CSR are more likely to be rewarded with brand loyalty. In the value creation process, this requires sound management tactics along with careful consideration of CSR issues, especially those related to products. Thus, enterprises should continue to invest in CSR activities to reap these benefits.

Our findings can have important implications for investors, corporate managers, and regulators. For investors, our results should facilitate effective portfolio allocation by accounting for the impact of CSR dimensions on portfolio risk. Fixed-income investors in particular should note the relationship that CSP has with corporate spreads and bond ratings, and how bond maturity mediates these relationships, when assessing investment risk (Oikonomou *et al.*, 2014). For firm managers, our results should promote improved CSR-risk management based on the relative impact of CSR dimensions on risk. Increased self-discipline on the part of firms will also reduce the cost of regulatory supervision. In addition, CSR can extend a firm's investor base by attracting more SR investors, because CSR is a key component of the internal self-control system, which is also crucial for providing reliable and proper corporate non-financial information for outside stakeholders to accurately ascertain a firm's bankruptcy risk.

This study makes several contributions to the literature. First, our results indicate that CSR performance is a useful predictor for forecasting financial risk. Second, we show the important role of positive CSR performance for market sentiment. Finally, to the extent that we control the firms' characteristics, our findings suggest that ethical issues are likely to be of concern to investors and lenders as an indicator of financial risk.

Note

1. The numerical rating scores are as follows: AAA = 1, AA+ = 2, AA = 3, AA- = 4, A+ = 5, A = 6, A- = 7, BBB+ = 8, BBB = 9, BBB- = 10, BB+ = 11, BB = 12, BB- = 13, B+ = 14, B = 15, B- = 16, CCC+ = 17, CCC = 18, CCC- = 19, CC = 20, C = 21, D = 22.

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About the authors

Dr Feng Jui Hsu works at the National Taichung University of Science and Technology and his research fields are Corporate Governance and Accounting Management. Dr Feng Jui Hsu is the corresponding author and be contacted at: rickhsutw@nutc.edu.tw

Professor Yu-Cheng Chen works at the National Chung Hsing University, his research fields are Earning Management and Accounting Information Value.

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