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The Impact of Corporate Social Responsibility on Risk Taking and Firm Value

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Abstract We hypothesize that CSR serves as a control mechanism to reduce deviations from optimal risk taking, and therefore, CSR curbs excessive risk taking and reduces excessive risk avoidance. Based on the stakeholder theory, firms with CSR focus must balance the interests of multiple stakeholders, and therefore, managers must allocate resources to satisfy both investing and non-investing stakeholders' interests. Using five measures of corporate risk taking and a sample of 1718 US firms during 1998 to 2011, we find that stronger CSR performance is associated with smaller deviations from optimal risk taking levels. We examine the mechanism through which CSR has an impact on firm value and find a positive indirect impact of CSR on firm value through the impact of CSR on risk taking. CSR performance is positively associated with firm value because CSR reduces excessive risk taking and risk avoidance.

Keywords Corporate social responsibility · Risk taking · Stakeholders · Firm value

JEL Classification G30 · G32 · G34 · G38 · G39

Introduction

The last 20 years have witnessed a significant change in the nature and scope of corporate social responsibility (CSR) activities.[1] There have been an increasing number of corporations making CSR as a priority and many have periodically issued a CSR or sustainability report. Despite considerable public attention on CSR, the debates surrounding corporate and management responsibility continue. On the one hand, opponents of CSR view that the primary responsibility of a business is to generate a profit for its shareholders. Using company resources to engage in CSR activities will reduce the distribution of profit to shareholders. On the other hand, proponents of CSR believe that corporations must satisfy the need of both investing stakeholders (i.e., shareholders) and non-investing stakeholders (e.g., customers, employees, community) who can affect the existence of corporations in today's business environment. Therefore, stakeholder management becomes a critical task for corporate managers to balance the various interests from their stakeholders (Freeman 1984) and CSR activities are the results of stakeholder management.[2]

In the present study, we examine whether CSR performance is associated with management decisions on

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[1] Carroll's commonly used definition of CSR (Carroll 1979) suggests that corporations have four responsibilities: (1) the economic responsibility to be profitable; (2) the legal responsibility to abide by the laws of society; (3) the ethical responsibility to do what is right, just, and fair; and (4) the philanthropic responsibility to be a good corporate citizen by contributing resources for various kinds of social, educational, recreational, or cultural purposes.

[2] See the following link (http://business.time.com/2012/05/28/why-companies-can-no-longer-afford-to-ignore-their-social-responsibilities/) for more discussion about the arguments for and against CSR.

corporate risk taking. The CSR debate raises an important question whether the use of company resources to address social issues will decrease risk taking activities and firm value. CSR engagement is costly and would require managers to use resources that could otherwise be used for investment in value-enhancing, but risky projects. While managers need to take risk to run business, both excessive risk taking and excessive risk avoidance could threaten firms' survival. Examining the link between CSR and corporate risk taking will give us a better understanding of how managers distribute scarce resources between investing and non-investing stakeholders.

We hypothesize that CSR is negatively related to the deviation from optimal risk taking. In other words, CSR reduces risk taking when the level of corporate risk taking is too high and encourages risk taking when the level of risk taking is too low, and therefore, guides managerial decisions toward the optimal level of risk taking. We first estimate firms' optimal risk taking using the Bargeron et al. (2010) model. Consistent with the Glejser method (Glejser 1969), we calculate the deviation from the optimal risk taking level (i.e., measures of excessive and insufficient risk taking) by taking the absolute value of the estimated error terms from the optimal risk taking regression. We argue that CSR serves as a control mechanism balancing the interests of investing stakeholders (i.e., shareholders) and non-investing stakeholders (i.e., community, employee, environment) and providing guidance for allocating firms' resources to meet their stakeholders' needs.

A recent study by Ayadi et al. (2014) finds that firms with higher CSR performance exhibit higher level of risk taking than those with lower CSR performance. They find that employee relations, product characteristics, and diversity dimensions of CSR are positively related with risk taking measures. Erhemjamts et al. (2013) documents a positive association between CSR and capital expenditure as a proxy for investment policy. Our study differs from Ayadi et al. (2014) and Erhemjamts et al. (2013) by examining the impact of CSR on both excessive risk taking and excessive risk avoidance (i.e., deviations from the optimal risk taking), and therefore, provides a better approach to analyze the complex non-linear relationship between CSR and risk taking.

Our study also attempts to explain the mechanisms through which CSR has an impact on firm value. We examine the indirect impact of CSR on firm value through the impact of CSR on risk taking. If CSR serves as a control mechanism to prevent managers from pursuing excessive risk taking or risk avoidance, then we expect CSR to have a positive indirect impact on firm value. To the best of our knowledge, our study is the first study examining the indirect link between CSR and firm value through the impact of CSR on corporate risk taking.

We measure CSR performance based on Kinder, Lyndenberg, and Domini (KLD) scores on firms' CSR strengths and concerns. We define CSR performance as the total CSR strengths scores minus the total CSR concerns scores in five areas: community, diversity, employee relations, environment, and product characteristics. We utilize five different measures of corporate risk taking, including capital expenditures, R&D spending, acquisition spending, the volatility of accounting return, and the volatility of stock return. We measure firm value using the Tobin's Q ratio, a widely accepted proxy for firm value.

Using a sample of 1718 US firms across 10,153 firms-years observations during 1998 to 2011, we find empirical evidence to support our hypotheses. We find that CSR performance is negatively related to deviations from optimal risk taking levels. We also find that our results are driven by both CSR strengths and CSR concerns and they seem to be driven by the environmental and diversity components of CSR.

Our empirical results from the path regression of firm value on CSR and risk taking show a positive indirect link between CSR and firm value through the impact of CSR on risk taking. We find that CSR reduces deviations from optimal corporate risk taking and smaller deviations from optimal risk taking increases firm value. CSR guides managerial risk taking decisions toward the optimal level, which in turn, is associated with higher firm value.

Our study provides some insights into the CSR debate. The notion that CSR activities come at the expense of shareholder wealth takes the center stage at the CSR debate. Our results suggest that CSR engagement does not necessarily result in a wealth transfer from shareholders to other stakeholders. Instead, our results suggest that CSR reduces both excessive and insufficient risk taking that have a detrimental effect on firm value, as well as shareholder value. Our study also provides some implications for regulators considering CSR-related policies and for corporate boards designing an incentive system that incorporates CSR performance. Our results show that managerial decisions on CSR activities could alter managers' strategic decisions, such as corporate risk taking toward the optimal level to maximize firm value. Thus, our finding suggests that emphasizing CSR performance when contracting with corporate managers could reduce excessive risk taking and excessive risk avoidance.

Our study also contributes to the line of research examining the mechanisms through which CSR affects firm value. Prior studies have examined factors, such as corporate governance (Jo and Harjoto 2011) and firms' customer awareness (Servaes and Tamayo 2013), that serve as the channels through which CSR contributes to firm value. Another line of literature also indicates that both excessive risk taking and excessive risk avoidance adversely affect

firm value (Amihud and Lev 1981; Smith and Stulz 1985; Hirshleifer and Suh 1992; Bebchuk et al. 2010; Chesney et al. 2011; Bhagat and Bolton 2014). Our study combines these two streams of literature and suggests that CSR serves as a control mechanism to curb excessive risk taking and reduce excessive risk avoidance and the impact of CSR on managerial corporate risk taking decision leads to greater firm value.

The rest of the paper is organized in the following structure. In the next section, we discuss the hypothesis development. In the following section, we discuss our methodology and empirical models. We then discuss our sample construction and descriptive statistics, multivariate regression results, and robustness checks. Finally, we conclude with summarizing the main findings and discussing the implications.

Hypothesis Development

Prior research has documented several control mechanisms associated with corporate risk taking, including management compensation, investor protection, shareholder diversification, and regulations. Equity-based compensation encourages managers to take risky projects since this incentive pay increases the sensitivity of pay to performance (Smith and Stulz 1985; Jensen and Murphy 1990; Hall and Liebman 1998; Guay 1999). Building on the seminal work of La Porta et al. (1997, 1998) that examine the legal environment affecting a country's capital market, John et al. (2008) show that corporate control mechanisms that increase investor protection are positively associated with corporate risk taking and firm growth. Faccio et al. (2011) examine the effect of large shareholder ownership on corporate risk taking and find that firms with more diversified institutional investors tend to have higher level of risk taking than those with non-diversified large shareholders. Finally, Bargeron et al. (2010) find that corporate risk taking declined significantly after the passage of the Sarbanes–Oxley Act (SOX) of 2002. Several provisions of SOX, such as an expanded role of independent directors, an increase in director and management liability, and additional rules on internal controls, are likely to limit corporate risk taking.

Our study examines the role of CSR in directing managerial decisions on corporate risk taking. We rely on the stakeholder theory to build our hypothesis about the association between CSR and corporate risk taking. Freeman (1984) introduces the stakeholder theory into the literature. He emphasizes that corporate managers must understand the need of all groups who have a stake in the business (i.e., stakeholders) and strategically balance the interests of these stakeholders. Cornell and Shapiro (1987) suggests that firms have contracts with their stakeholders and that firm value depends on the firms' ability to fulfill these contracts. Firms could suffer both monetary and reputational losses from failing to align management's interests with those of their stakeholders.[3]

Frooman (1999) merged the stakeholder theory and the resource dependence theory to propose several ways in which stakeholders could exercise their influence over firms' management decisions. Resource dependence theory suggests that access and control over resources are essential elements to organizational success, and therefore, firms must carefully implement strategies to maintain access to these resources. Key stakeholders, such as shareholders, employees, customers, suppliers, and the community, have control over these resources, and could influence management decisions and gain control over the firm. CSR activities can be viewed as a means by which a firm can reduce the risks associated with resource acquisition (Haley 1991; Berman et al. 1999). CSR engagement enhances a firm's public image and strengthens its relationship with key stakeholders. These key stakeholders, in turn, have more positive views toward the firm and are more willing to provide the firm with the critical resources they control (Frooman 1999; Backhaus et al. 2002).

The preceding discussion suggests that firms' commitment to CSR could serve as a control mechanism to balance the interest of multiple groups of stakeholders (Mason and Simmons 2014). CSR engagement, as an outcome of stakeholder management, will lead to a more equal resource allocation toward meeting the needs of both investing and non-investing stakeholders. Firms with CSR focus will have to distribute firm resources to balance the interests of their key stakeholders because these stakeholders have control of various resources that firms need (e.g., access to labor, product, and capital markets). Stakeholder management includes identifying areas or projects in which investing stakeholders (i.e., shareholders) and non-investing stakeholders (i.e., community) share common interests. Better allocation of resources to such areas or projects will reduce excessive risk taking (i.e., too much allocation of resources to shareholders) and excessive risk avoidance (i.e., too much allocation of resources to non-investing stakeholders).

We build our first hypothesis by examining firms with risk taking level above the optimal level (i.e., more likely

[3] Firms have both explicit and implicit contracts with their stakeholder. Explicit contracts refer to formal contractual agreements between firms and their stakeholders, such as investment contracts with shareholders, loan contracts with creditors, and wage contracts with employees. Implicit contracts refer to promises to stakeholders that are either too vague or too costly to specify in writing. Firms may have implicit contracts to provide customers with quality products and services, to maintain safe workplace for employees, and to protect the environment for local communities and government.

to have excessive risk taking) and below the optimal level separately. We estimate the optimal levels of risk taking activities using Bargeron et al.'s (2010) model. When the corporate risk taking level deviates far from the optimal level (either far above or far below the optimal level), CSR serves as a countervailing factor to rebalance the allocation of resources between investing and non-investing stakeholders. Given firms' limited resources, excessive investments in risky projects could neglect the needs of non-investing stakeholders, and these stakeholders, in turn, could use their power to limit access to resources they control (e.g., employees will avoid firms with poor working conditions, customers will not purchase products with poor safety records). Thus, we expect a negative association between CSR and risk taking when the corporate risk taking level is above the optimal point.

When the risk taking level falls below the optimal level, managers with CSR focus must increase risk taking activities without reducing their commitment to non-investing stakeholders. Excessive risk avoidance makes firms less attractive to shareholders and potential investors and limits the availability of funds for future growth. Given the limited resources, stakeholder management requires that managers focus on projects that would serve the needs of both investing and non-investing stakeholders (Erhemjamts et al. 2013). For example, CSR activities could increase capital expenditure on properties, plants, and equipment to reduce pollution and waste, increase energy efficiency, and meet regulatory requirements. CSR engagement increases R&D expenditure as customers demand for products that have better safety features and are friendlier to the environment. Firms with CSR engagement could use acquisitions to meet the needs of multiple stakeholders for new technologies, more streamlined business processes, and greater market share. Thus, we expect CSR acts as a guide for managerial risk taking decision toward the optimal risk taking level. We expect a positive association between CSR and risk taking when the corporate risk taking level is below the optimal point.

We use the absolute value of deviations from the optimal risk taking level as both excessive and insufficient level of risk taking could be measured as deviations from the optimal point. Based on the preceding discussions, we expect that CSR activities will guide managerial decision toward the optimal risk taking level for balancing the interests of various stakeholder groups. Thus, we expect a smaller deviation from the optimal risk taking point when CSR performance is stronger. Our first hypothesis is stated as follows:

H1 Ceteris paribus, CSR performance is negatively related to the deviations from the optimal risk taking level.

Prior research on CSR has extensively examined the association between CSR and firm performance, but their results are inconclusive (Margolis and Walsh 2003). The relation between CSR and firm value is less examined and there is limited evidence on the link between CSR and firm value, and on the mechanisms through which CSR affects firm value. Jo and Harjoto (2011) and Servaes and Tamayo (2013) are among a few studies examining the conditions or mechanisms through which CSR affects firm value. Jo and Harjoto (2011) find a significantly positive relation between CSR and firm value as the number of analysts following increases. Servaes and Tamayo (2013) find that CSR is positively associated with firm value when firms have high customer awareness.

We argue that CSR has an indirect impact on firm value and the link between CSR and firm value could be explained through the impact of CSR on corporate risk taking. Prior studies have shown that both excessive risk taking and excessive risk avoidance adversely affect firm value (Amihud and Lev 1981; Smith and Stulz 1985; Hirshleifer and Suh 1992; Bebchuk et al. 2010; Chesney et al. 2011; Bhagat and Bolton 2014). As discussed earlier, we expect CSR is negatively related to deviations from the optimal risk taking level. Therefore, through its impact on guiding managers toward optimal risk taking level, CSR should have a positive impact on firm value.

Based on the preceding discussion, our second hypothesis is stated as follows:

H2 Ceteris paribus, the positive association between CSR and firm value is mediated through the impact of CSR on managerial corporate risk taking.

Methodology

Constructing CSR Measures

We construct our CSR performance measures using the data from MSCI ESG (KLD) Stats, a common database used in recent CSR studies (e.g., Kim et al. 2012; El Ghoul et al. 2011; Goss and Roberts 2011; Baron et al. 2011; Harjoto et al. 2015). MSCI ESG (formerly known as Kinder, Lyndenberg, and Domini & Co. or KLD) initially collected environmental, social, and governance (ESG) scores (i.e., CSR scores) for US publicly traded firms in the Standard and Poor's (S&P) 500 index and the MSCI KLD (formerly known as Domini) 400 social index from 1991 to 2000. KLD has begun to include firms listed in the Russell 1000 index since 2001, and include firms listed in the Russell 2000 index since 2003. In 2011, KLD has provided CSR scores for over 3000 US publicly traded firms. KLD data were obtained from surveys, financial statements,

media reports, regulatory filings, and other sources and were used to assess a firm's CSR performance in seven different categories (i.e., community, diversity, employee relations, environment, product characteristics, corporate governance, and human rights). In each category, KLD sets several measures for determining firms' CSR strength (CSR concern) scores and uses a binary rating (i.e., one (zero) for meeting (not meeting) the criteria). For example, if a firm meets the criteria in one CSR strength (concern) item in the "diversity" category, it will receive one point and zero otherwise.[4]

We exclude the human rights category since human rights criteria were not available prior to 2002. We exclude the corporate governance category in our CSR measure since our study focuses on the impact of CSR on risk taking beyond the impact of corporate governance and managerial compensation measures on corporate risk taking. We control for corporate governance and executive compensation variables in our regression models. We do not include the KLD exclusionary criteria (gambling, tobacco, alcohol, military contracting, and nuclear power) in our CSR measures since these criteria do not represent management discretionary activities (Kim et al. 2012).

We measure CSR performance (CSR) as the total CSR strengths scores minus the total CSR concerns scores across these five different categories (community, diversity, employee, environment, and product) from the KLD Stats. For additional analysis, we include CSR strengths (CSRSTR) and CSR concerns (CSRCON) separately in the regression models, consistent with the existing CSR studies suggesting that CSR strengths and CSR concerns have different constructs (e.g., Chava 2014; Chatterji et al. 2009; Mattingly and Berman 2006; Oikonomou et al. 2012; Kim et al. 2012; Goss and Roberts 2011). Finally, we measure CSR performance (strengths minus concerns) in each category: community, diversity, employee, environment, and product.[5] Table 11 in Appendix provides the variable definitions of the CSR measures.

[4] For further description of MSCI ESG rating methodology, see https://www.msci.com/eqb/methodology/meth_docs/Executive_Summary_MSCI_ESG_Ratings_Methodology.pdf MSCI no longer publishes a detail description of MSCI ESG Stats database publicly. The description of MSCI ESG Stats can be found in the WRDS database. We fill the missing values of KLD scores with zero. This approach is consistent with that of Chava (2014), Erhemjamts et al. (2013), and Kim et al. (2012).

[5] See Goss and Roberts (2011) and Harjoto and Jo (2011) for a detailed list and description of CSR strengths and concerns criteria for KLD Stats database.

Constructing Corporate Risk Taking Measures

We use five variables to proxy for corporate risk taking. The first three measures: CAPEX, RDEX, and ACQEX, are defined as a firm's capital expenditures, R&D expenses, and acquisition spending, respectively; each scaled by the average assets for the year. These variables measure firms' investment spending and provide direct measures of management decisions on corporate risk taking.[6] Our fourth measure, STDROA, captures the volatility of a firm's accounting return. Following Acharya et al. (2011), we measure STDROA as the standard deviation of industry-adjusted return on assets (ROA), where ROA is calculated as earnings before interest and taxes divided by assets. At least 5 years of data (i.e., $t-4$ to t) are required to compute the standard deviation. ROA is industry-adjusted by subtracting the industry median ROA from a firm's ROA in each year. The fifth measure of risk taking, STDRET, represents the equity risk measure as reflected in the volatility of stock returns. We measure STDRET as the standard deviation of daily stock returns for the fiscal year. Our risk taking measures are similar to existing studies used in Bargeron et al. (2010), Bova et al. (2012), Acharya et al. (2011), Faccio et al. (2011), and John et al. (2008). Table 1 provides the variable definitions for the five measures of corporate risk taking.

Empirical Models

First, we estimate optimal managerial risk taking using Bargeron et al. (2010) regression model that can be stated as[7]

$$\begin{aligned}\text{Risk taking}_{i,t} = {} & \alpha_0 + \alpha_1 \text{POSTSOX}_{i,t} + \alpha_2 \text{SPINDEXRET}_{i,t} \\ & + \alpha_3 \text{GDPGROWTH}_{i,t} + \alpha_4 \text{EBIT}_{i,t-1} \\ & + \alpha_5 \text{MTB}_{i,t-1} + \alpha_6 \text{DEBT}_{i,t-1} + u_{i,t}\end{aligned} \tag{1}$$

The results of the optimal risk taking regression are reported in Table 1. Consistent with Bargeron et al. (2010), we find that managerial risk taking activities are significantly lower after the Sarbanes–Oxley Act (POSTSOX). Then, we calculate the absolute value of the estimated residuals (error terms) from Eq. (1) (Absolute value ($\hat{u}_{i,t}$)). The absolute value of the residuals is our measure of deviation from the optimal risk taking level.

[6] We recognize that acquisition expense can be a noisy risk taking measure since acquisition expense can come from both related (synergy) acquisitions and unrelated acquisitions.

[7] Since all of sample firms in this study are US firms, we use S&P500 Index returns (SPINDEXRET) and US GDP growth (GDPGROWTH).

Table 1 Regressions for estimating optimal risk taking and residual from optimal risk taking

	CAPEX	RDEX	ACQEX	STDROA	STDRET
POSTSOX	−0.01069	−0.00231	−0.00728	−0.00125	−0.00716
	(3.30)***	(2.29)**	(2.26)**	(0.59)	(2.35)**
SPINDEXRET	−0.00007	0.00000	−0.00011	−0.00005	−0.00019
	(1.70)*	(0.09)	(4.47)***	(1.76)*	(4.35)***
GDPGROWTH	0.00056	−0.00043	0.00054	0.00010	−0.00226
	(2.49)**	(2.99)***	(1.38)	(0.66)	(12.29)***
EBIT	0.06071	−0.09143	0.10663	−0.05563	−0.03557
	(3.93)***	(9.83)***	(5.51)***	(4.06)***	(8.87)***
MTB	0.00249	0.00717	0.00513	0.00559	0.00151
	(2.41)**	(8.34)***	(4.83)***	(5.24)***	(6.82)***
DEBT	−0.02306	−0.00646	−0.01149	−0.00966	0.00326
	(4.58)***	(2.34)**	(1.72)*	(1.68)*	(2.18)**
Constant	0.02501	0.06264	0.05178	0.03766	0.04118
	(3.93)***	(7.59)***	(9.02)***	(5.90)***	(11.76)***
Year dummies	Yes	Yes	Yes	Yes	Yes
FF48 industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	10,153	10,153	10,153	10,153	10,153
Number of firms	1718	1718	1718	1718	1718
R squared	0.4323	0.5345	0.0831	0.3331	0.4519

To test our first hypothesis, we estimate the impact of CSR on the deviation from the optimal risk taking point. Equation (2) presents the structural model for testing the first hypothesis:

$$\text{Absolute value}\ (\hat{u}_{i,t}) = \beta_0 + \beta_1 \text{CSR}_{\text{i,t}} + \sum_{j=2}^{n} \beta_j \text{CONTROL VARIABLES}_{\text{i,t}} + \varepsilon_{\text{i,t}} \quad (2)$$

We utilize the standard ordinary least square (OLS) method with two-dimension (firm level and year) standard errors clustering (Petersen 2009).

We test our second hypothesis using the path regression analysis for examining the indirect effect of CSR on firm value through corporate risk taking. Path analysis was originated from the series of work by Sewall Wright (e.g., Wright 1921, 1923) and has been applied to estimate complex empirical equations in accounting, econometrics, management, marketing, and sociology (Stage et al. 2004). Lleras (2005) indicates that path analysis could be used to disentangle the causal relationship and the strength of direct and indirect impact of a certain factor on an outcome. Path coefficients are standardized regression coefficients. Path analysis allows us to examine the direct and indirect effects of CSR on firm value simultaneously with multiple independent and dependent variables (Bushee and Noe 2000). Figure 1 shows the direct and indirect effect of CSR on firm value via its impact on corporate risk taking. Arrow A indicates the direct effect of CSR on firm value. Arrow B indicates the effect of CSR on corporate risk taking, while arrow C indicates the effect of risk taking on firm value. The indirect effect of CSR on firm value via risk taking is measured by multiplying B and C (B × C).

Equation (3) presents the path regression model to test our second hypothesis.

$$\text{Firm value}_{\text{i,t}} = \beta_0 + \gamma_1 \text{CSR}_{\text{i,t}} + \beta_2 \text{Absolute value}\ (\hat{u}_{i,t}) + \sum_{j=4}^{n} \beta_j \text{CONTROL VARIABLES}_{\text{i,t}} + {}_{\text{i,t}}\varepsilon \quad (3)$$

The direct impact of CSR on firm value is measured by γ_1 and the indirect impact of CSR on firm value via its impact on risk taking is measured by multiplying β_1 from Eq. (2) and β_2 from Eq. (3).

Control Variables for Risk Taking Regressions

We include a set of board characteristic control variables, such as the percentage of independent directors (PCTIND), the percentage of directors appointed after the current CEO took office (PAFTERCEO), average director age (AVGAGE), average director experience (AVGOUTDIR), and average director tenure (AVGTENURE) because board and director characteristics may be associated with corporate risk taking. We also control for firm characteristic variables that prior studies have shown to be associated with corporate risk taking (e.g., Bargeron et al. 2010; Harford et al. 2008; Cohen et al. 2007). These variables include the number of shareholder

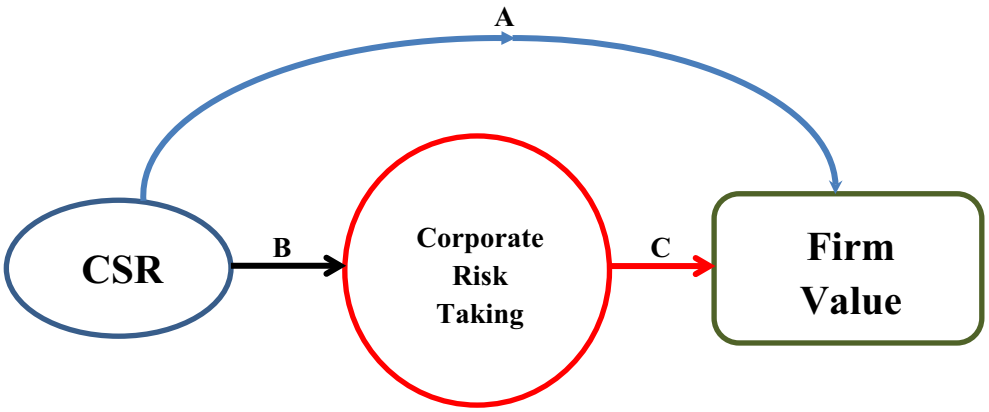

Fig. 1 Path analysis diagram. A: The direct effect of CSR on firm value. B: The direct effect of CSR on corporate risk taking. B × C: The indirect effect of CSR on firm value via corporate risk taking

rights-decreasing provisions a firm has (GINDEX), cash holdings (CASH), and sales growth (SALEGRW). We control for CEO characteristic variables, such as CEO's age (CEOAGE), gender (CEOFEMALE), tenure (CEOTENURE), and compensation (i.e., PCTBONUS, EXOPT, UNEXOPT, and PCTOWN).[8] We also include the Fama-French's 48 industry dummy variables to control for industry effect (Fama and French 1997). Table 11 in Appendix provides the variable definitions for our control variables.

Firm Value and Control Variables for Firm Value Regressions

We measure firm value with the Tobin's *Q* ratio, a widely used measure of firm value in accounting, economics, and finance literature (Brainard and Tobin 1968; Tobin 1969; Gompers et al. 2003). Table 11 provides the variable definition of the Tobin's *Q* ratio. In particular, we use industry-adjusted Tobin's *Q* (TOBINQ) to neutralize the effect of specific industries (Campbell 1996). In the path regression analysis, we use the same control variables as described above.

Sample Construction and Descriptive Statistics

Sample Construction

We obtain 30,754 firms-year observations with social rating data from the MSCI ESG (KLD) Stats for the sample period 1998 to 2011. We merge the KLD Stats dataset with risk taking measures constructed from Compustat data and with stock return volatility data from CSRP, resulting in 25,338 firms-year observations. To control for corporate governance and board composition and CEO characteristics variables, we merge the dataset with RiskMetrics Governance and Directors and Execucomp databases and delete observations with missing values.[9] Our final sample has 10,153 firm-year observations across 1718 US firms from 1998 to 2011.

Descriptive Statistics

Table 2 presents the descriptive statistics of the sample. On average, the investment-based risk taking measured by capital expenditure (CAPEX), research and development expense (RDEX), and acquisition expense (ACQEX) as a percentage of total assets are 5 %, 2.7 %, and 2.8 %, respectively. More than half of our sample firms do not have RDEX and ACQEX. The average variability of accounting return (STDROA) and the average variability of daily stock returns (STDRET) are 4.5 and 2.6 % respectively. The means of the absolute values of the residuals (ECAPEX, ERDEX, EACQEX, ESTDROA, and ESTDRET) are 0.025, 0.02, 0.037, 0.022 and 0.007, respectively.

On average, the firms in our sample have a net CSR score of 0.272 indicating that firms have slightly higher scores on strengths (2.013) than concerns (1.75). Among the different CSR components, sample firms have higher CSR scores on strengths than those on concerns in the diversity (DIV), community (COM), and environment

[8] We recognize that both board and CEO characteristics variables that we use as control variables may be endogenously determined based on firm characteristics. We re-estimate our analyses by excluding corporate governance variables from all regressions and find that the results without controlling for corporate governance variables are consistent with our main results in Table 6. The CEO compensation data are collected from the Execucomp database.

[9] The RiskMetrics Directors database starts since 1996 and we did not use the RiskMetrics Directors data from 1996 to 1997 due to missing director data on tenure and other directorship positions which restricts the sample size.

Table 2 Sample statistics

Variables	Obs.	Mean	SD	Min	25 Pct	50 Pct	75 Pct	Max
CAPEX	10,153	0.050	0.054	0	0.017	0.034	0.064	0.586
RDEX	10,153	0.027	0.050	0	0	0	0.032	0.777
ACQEX	10,153	0.028	0.075	0	0	0	0.018	0.897
STDROA	10,153	0.045	0.043	0	0.018	0.032	0.057	0.362
STDRET	10,153	0.026	0.013	0.007	0.017	0.023	0.032	0.137
ECAPEX	10,153	0.025	0.032	0.000001	0.007	0.015	0.030	0.490
ERDEX	10,153	0.020	0.028	0.000002	0.004	0.010	0.025	0.626
EACQEX	10,153	0.037	0.062	0.000003	0.011	0.023	0.039	0.841
ESTDROA	10,153	0.022	0.027	0.000003	0.007	0.015	0.028	0.281
ESTDRET	10,153	0.007	0.007	0.000002	0.002	0.005	0.009	0.101
CSR	10,153	0.272	2.703	−9	−1	0	1	17
COM	10,153	0.135	0.647	−2	0	0	0	5
DIV	10,153	0.435	1.546	−3	−1	0	1	7
EMP	10,153	−0.074	0.956	−4	−1	0	0	5
ENV	10,153	0.013	1.005	−5	0	0	0	5
PRO	10,153	−0.237	0.729	−4	0	0	0	2
CSRSTR	10,153	2.023	2.763	0	0	1	3	21
CSRCON	10,153	1.750	1.872	0	0	1	2	13
PCTIND	10,153	74.503	13.909	10	66.667	77.778	85.714	100
PAFTERCEO	10,153	29.555	29.347	0	0	20	50	100
AVGAGE	10,153	61.064	3.716	43.333	58.727	61.222	63.538	77.833
AVGOUTDIR	10,153	0.909	0.550	0	0.5	0.857	1.25	3.6
AVGTENURE	10,153	8.721	3.582	0	6.2	8.222	10.696	28.2
GINDEX	10,153	8.083	4.101	0	6	9	11	18
CASH	10,153	−2.612	1.640	−11.323	−3.717	−2.592	−1.430	2.942
SALEGRW	10,153	10.321	28.185	−99.780	−0.554	7.562	17.152	1106.400
EBIT	10,153	0.105	0.096	−1.201	0.052	0.095	0.150	0.952
MTB	10,153	2.030	1.645	0.404	1.188	1.547	2.260	48.839
DEBT	10,153	0.229	0.182	0	0.071	0.216	0.345	1.684
SPINDEXRET	10,153	3.194	19.929	−38.486	−10.139	8.993	19.526	31.008
GDPGROWTH	10,153	3.954	2.660	−2.5	3.4	4.7	6	6.5
CEOAGE	10,153	58.931	7.824	31	53	59	64	93
CEOFEMALE	10,153	0.020	0.139	0	0	0	0	1
CEOTENURE	10,153	7.007	6.957	0	2	5	9	50
PCTBONUS	10,153	11.985	17.193	0	0	2.629	19.513	97.042
EXOPT	10,153	0.619	0.973	0	0.079	0.297	0.782	32.149
UNEXOPT	10,153	0.426	0.658	0	0.056	0.223	0.549	14.090
PCTOWN	10,153	1.068	2.823	0	0.078	0.244	0.750	29.637

(ENV) components of CSR, while they have higher CSR scores on concerns than those on strengths in the employee (EMP) and product (PRO) components of CSR.

About 74.5 % of directors serving on the average firm are independent directors (PCTIND), and 29.55 % of directors are appointed after the current CEO was appointed (PAFTERCEO). The average age and average tenure of directors are 61 and 8.72 years, respectively. Directors hold, on average, one other directorship position (AVGOUTDIR). The mean and medians of GINDEX for our sample firms are 8.08 and 9, comparable to those reported in Gompers et al. (2003). The average CEO age and tenure for firms in our sample are 59 and 7 years, respectively, while only 2 % of our sample firms have female CEOs.

Table 3 provides the means of the deviations from optimal risk taking and CSR measures across the 48 Fama-French industry classifications indicating that the

Table 3 Estimated residuals (errors) of optimal risk taking and CSR across industries

Industries	Obs.	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET	CSR
Agriculture	17	0.010	0.027	0.057	0.012	0.003	−1.588
Food products	219	0.020	0.010	0.052	0.021	0.006	0.986
Candy and soda	16	0.011	0.003	0.032	0.010	0.003	−0.688
Beer and liquor	45	0.021	0.014	0.034	0.011	0.005	1.8
Tobacco products	19	0.006	0.008	0.055	0.016	0.007	0.105
Toys	64	0.011	0.021	0.037	0.037	0.008	1.375
Entertainment	57	0.077	0.024	0.026	0.042	0.007	−0.053
Printing and publishing	113	0.016	0.008	0.069	0.026	0.007	1.956
Consumer goods	207	0.016	0.017	0.033	0.017	0.008	2.691
Apparel	151	0.015	0.008	0.042	0.031	0.007	0.914
Healthcare	151	0.021	0.010	0.088	0.025	0.007	−0.596
Medical equipment	277	0.017	0.031	0.072	0.037	0.005	0.375
Pharmaceutical products	361	0.022	0.061	0.059	0.041	0.008	1.357
Chemicals	326	0.019	0.016	0.036	0.014	0.005	−0.822
Rubber and plastics products	60	0.021	0.008	0.026	0.014	0.005	−0.25
Textiles	17	0.014	0.009	0.011	0.014	0.006	−0.471
Construction materials	203	0.021	0.012	0.037	0.017	0.005	−0.571
Construction	142	0.023	0.011	0.029	0.016	0.006	−0.711
Steel works	151	0.023	0.010	0.047	0.018	0.008	−0.596
Fabricated products	2	0.006	0.001	0.001	0.000	0.000	0
Machinery	450	0.014	0.026	0.036	0.019	0.007	0.064
Electrical equipment	118	0.009	0.016	0.060	0.015	0.005	−0.068
Miscellaneous	48	0.053	0.034	0.036	0.030	0.007	0.146
Automobiles and trucks	169	0.022	0.019	0.030	0.020	0.006	−0.935
Aircraft	98	0.007	0.017	0.037	0.012	0.004	−0.286
Shipbuilding, railroad equipment	17	0.076	0.009	0.041	0.015	0.004	−1.941
Defense	39	0.016	0.018	0.037	0.021	0.007	−1.231
Precious metals	15	0.021	0.008	0.018	0.011	0.006	−2.2
Non-metallic and metal mining	55	0.045	0.010	0.050	0.035	0.008	−0.473
Coal	29	0.035	0.007	0.058	0.011	0.007	−3.138
Petroleum and natural gas	402	0.082	0.010	0.038	0.030	0.007	−1.478
Utilities	714	0.029	0.006	0.021	0.010	0.005	−0.783
Communication	190	0.043	0.009	0.038	0.016	0.007	0.632
Personal services	87	0.035	0.014	0.046	0.027	0.007	−0.207
Business services	892	0.024	0.043	0.051	0.034	0.007	0.738
Computers	294	0.017	0.039	0.039	0.041	0.008	2.190
Electronic equipment	694	0.030	0.045	0.042	0.034	0.008	0.748
Laboratory equipment	237	0.016	0.027	0.057	0.025	0.007	0.494
Office supplies	190	0.016	0.013	0.031	0.019	0.007	1.242
Shipping containers	59	0.013	0.005	0.066	0.009	0.006	−0.441
Transportation	263	0.058	0.010	0.017	0.015	0.005	−0.122
Wholesale	345	0.013	0.007	0.034	0.013	0.007	−0.032
Retail	668	0.029	0.009	0.025	0.019	0.007	0.25
Restaurants, hotels & motels	187	0.046	0.009	0.025	0.014	0.006	0.727
Banking	376	0.005	0.005	0.011	0.007	0.009	1.428
Insurance	483	0.012	0.005	0.017	0.016	0.008	0.513
Real estate	9	0.006	0.004	0.028	0.006	0.009	2.333
Other financial services	427	0.009	0.011	0.019	0.017	0.008	−0.415

Table 4 Correlation coefficients

Panel A. Correlations between CSR and Risk Taking measures

	CSR	CSRSTR	CSRCON	COM	DIV	EMP	ENV
CAPEX	−0.07*	−0.07*	−0.04*	−0.001	−0.10*	0.05*	−0.02*
RDEX	0.04*	0.06*	0.02*	0.17*	0.11*	0.06*	0.06*
ACQEX	−0.02*	−0.03*	−0.05*	0.01	−0.01	0.02*	−0.06*
STDROA	0.01	−0.02	−0.05*	0.05*	0.01	0.10*	−0.08*
STDRET	−0.07*	−0.06*	−0.13*	0.001	0.01	0.08*	−0.13*
ECAPEX	−0.08*	−0.07*	0.02	−0.08*	−0.08*	0.002	−0.08*
ERDEX	−0.05*	−0.04*	0.13*	−0.01	−0.04*	0.08*	0.08*
EACQEX	−0.03*	−0.07*	0.06*	−0.03*	−0.0480*	0.02	−0.02
ESTDROA	−0.03*	−0.03*	0.003	0.03*	0.01	0.02*	0.05*
ESTDRET	−0.01	−0.04*	0.07*	−0.01	−0.04*	0.04*	0.02*

Panel B. Correlations among independent variables

No	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	CSR	1																			
2	PCTIND	0.07*	1																		
3	PAFTERCEO	−0.03	0.003	1																	
4	AVGAGE	−0.09*	0.12*	−0.03	1																
5	AVGOUTDIR	0.16*	0.25*	−0.12*	0.01	1															
6	AVGTENURE	−0.03	−0.31*	−0.001	0.39*	−0.22*	1														
7	GINDEX	0.07*	0.12*	−0.15*	0.07*	0.17*	0.07*	1													
8	CASH	0.13*	−0.01	0.10*	−0.09*	−0.05*	−0.02	−0.18*	1												
9	SALEGRW	−0.04*	−0.06*	0.07*	−0.06*	−0.03*	−0.06*	−0.10*	0.08*	1											
10	EBIT	0.09*	−0.08*	−0.01	−0.08*	0.01	0.03	−0.03	0.09*	−0.04*	1										
11	MTB	0.12*	−0.12*	0.01	−0.18*	0.02	−0.02	−0.08*	0.33*	0.21*	0.38*	1									
12	DEBT	−0.07*	0.05*	−0.03*	0.05*	0.11*	−0.06*	0.10*	−0.34*	−0.01	−0.11*	−0.20*	1								
13	SPINDEXRET	0.04*	0.01	0.02	0.02	0.01	0.02	0.0001	0.01	0.01	−0.04*	−0.08*	−0.02	1							
14	GDPGROWTH	−0.01	−0.16*	−0.08*	−0.13*	0.03*	−0.02	0.09*	−0.002	0.23*	0.05*	0.13*	−0.01	0.03	1						
15	CEOAGE	−0.03	−0.19*	−0.04*	0.20*	0.06*	0.16*	0.15*	−0.15*	0.002	0.04*	−0.01	0.07*	0.01	0.21*	1					
16	CEOFEMALE	0.11*	0.03	0.01	−0.04*	−0.001	−0.06*	−0.06*	0.03*	−0.01	−0.01	−0.004	−0.01	0.003	−0.03*	−0.09*	1				
17	CEOTENURE	−0.05*	−0.17*	0.47*	0.12*	−0.18*	0.38*	−0.06*	0.05*	0.03	0.03	0.03	−0.04*	0.02	−0.01	0.35*	−0.03*	1			
18	PCTBONUS	−0.03*	−0.16*	−0.05*	−0.10*	0.03	−0.02	0.07*	−0.09*	0.06*	−0.03	−0.06*	0.08*	0.02	0.24*	0.19*	−0.03*	−0.01	1		
19	EXOPT	−0.06*	−0.03	0.17*	−0.04*	−0.10*	0.06*	−0.04*	0.08*	0.001	−0.001	−0.01	−0.04*	0.001	0.01	0.05*	0.004	0.19*	0.06*	1	
20	UNEXOPT	−0.06*	−0.06*	0.04*	−0.12*	−0.04*	−0.04*	−0.01	0.07*	−0.01	0.02	0.03	−0.02	−0.01	0.03	0.02	−0.004	0.02	0.10*	0.35*	1
21	PCTOWN	−0.04*	−0.17*	0.18*	0.04*	−0.15*	0.20*	−0.10*	0.04*	−0.01	0.05*	0.01	−0.06*	0.001	0.003	0.10*	0.01	0.32*	0.02	0.17*	0.09*

* Indicates statistical significance at 5 % level or less

Table 5 Non-linear RELATIONSHIP between CSR, risk taking, and firm value

Panel A. Average deviation from optimal risk taking across CSR quartiles

CSR quartiles	Lowest quartile			Highest quartile
	1	2	3	4
Average ECAPEX	0.0268	0.0266	0.0244	0.0204
Average ERDEX	0.0218	0.0207	0.0202	0.0182
Average EACQEX	0.0385	0.0381	0.0380	0.0330
Average ESTDROA	0.0071	0.0070	0.0069	0.0066
Average ESTDRET	0.0231	0.0227	0.0222	0.0217

Panel B. Average Tobin *Q* across deviation from optimal risk taking quartiles

Estimated error of risk taking	Lowest quartile			Highest quartile
ECAPEX quartiles	1	2	3	4
Average Tobin *Q*	0.4228	0.2305	0.1490	0.1490
ERDEX quartiles	1	2	3	4
Average Tobin *Q*	0.4332	0.2695	0.1509	0.1306
EACQEX quartiles	1	2	3	4
Average Tobin *Q*	0.4117	0.3201	0.1784	0.0741
ESTDROA quartiles	1	2	3	4
Average Tobin *Q*	0.5517	0.1916	0.1320	0.1089
ESTDRET quartiles	1	2	3	4
Average Tobin *Q*	0.2747	0.2485	0.2326	0.2284

deviations from optimal risk taking and CSR vary across different industries. The top five industries in our sample firms are business services, utilities, electronic equipment, retail, and insurance and they represent one-third of our sample. Firms in petroleum and natural gas and entertainment have the highest deviations from the optimal capital expenditure (ECAPEX) while banks have the lowest ECAPEX. As expected, firms in pharmaceutical products and electronic equipment have the highest deviations from optimal research and development expense (ERDEX), while fabricated products and candy and soda have the lowest ERDEX. Healthcare and medical equipment industries have the highest deviations from optimal acquisition expenditure (EACQEX), while fabricated products and banks have the lowest EACQEX. Entertainment and Pharmaceutical industries have the highest deviations from the optimal volatility of profitability (ESTDROA), while fabricated product, real estate, and banks have the lowest ESTDROA. Banks and real estate have the highest deviations from optimal volatility of daily stock returns (ESTDRET) while fabricated products and candy and soda have the lowest ESTDRET. Finally, firms that produce consumer goods and computer manufacturing have the highest CSR score, while coal, precious metals, and shipping industries have the lowest CSR score.

We report the correlations between CSR and the risk taking measures in Panel A of Table 4. We find that CSR is negatively correlated with the deviations from optimal risk taking levels. We find CSR strengths are negatively related to the deviations from optimal risk taking levels, while CSR concerns are positively related to the deviations from optimal risk taking levels. On the one hand, firms with a high score on CSR strengths devote a significant amount of their resources to CSR activities, and therefore, have lower deviations from optimal risk taking as fewer resources are available for risk taking activities. On the other hand, firms with a high score on CSR concerns may have a risk taking level significantly above the optimal point. Alternatively, these firms may have a risk taking level significantly below the optimal point because they have to devote their resources to address CSR issues, and therefore, have fewer resources available for risk taking activities. In both scenarios, firms with a high CSR concern score, exhibit greater deviation from the optimal risk taking level.

In Panel B of Table 4, we present the correlations among the independent variables. The highest correlation (0.47) is between CEO tenure and percent of directors who are appointed after the CEO current appointments (PAFTERCEO), suggesting a potential multicollinearity. The rest of the correlation coefficients are relatively small, and therefore, we do not expect any multicollinearity issue.

Panel A of Table 5 classifies CSR performance into quartiles. We examine the means of the deviations from optimal risk taking across different quartiles of CSR. We

observe a negative relationship between CSR and the deviations from optimal risk taking levels. As CSR performance increases toward the highest quartile, the deviations decrease. These results provide evidence to support our first hypothesis (H1).

Panel B of Table 5 classifies the deviations from optimal risk taking into quartiles and provides the means of Tobin's *Q* for each quartile. We observe that as the deviations from optimal risk taking increase toward the highest quartile, the means of Tobin's *Q* decrease. Thus, we find that firm value is negatively related to the deviations from the optimal point.

Multivariate Regression Results

The Impact of CSR on the Deviations from Optimal Corporate Risk Taking

We conduct multivariate regression analyses to examine the impact of CSR on the deviations from the optimal risk taking level. Table 6 presents the OLS regression results with two-dimension (firm level and year) standard error clustering (Petersen 2009). We also include the Fama-French 48 industry dummy variables in all our regression analyses. One standard deviation of CSR performance reduces the deviations from the optimal CAPEX, RDEX, ACQEX, STDROA, and STDRET by 1 %, 2 %, 5.4 %, 2.7 %, and 0.2 % of the relative mean of the deviations, respectively. Although the economic significance of CSR is relatively small, we find that the impact of CSR on risk taking residuals is statistically negative and consistent across five risk taking measures. The results support our first hypothesis that CSR serves as a control mechanism to reduce the deviations from optimal risk taking levels.[10]

CSR is a multi-dimension construct. The overall CSR score measures how well firms meet the need of various groups of stakeholders, while each CSR component score measures performance in only one area of CSR. We conduct the analysis of CSR components and the analysis of strengths and concerns to show the consistency of results across different components and scores (i.e., strengths and concerns). Panel A of Table 7 indicates that the deviations from optimal risk taking decrease with CSR strengths and increase with CSR concerns. Our results suggest that CSR activities resulting in higher CSR strength score guide managerial risk taking decision toward the optimal level. In contrast, firms with high CSR concern score are more likely to have greater deviation from the optimal risk taking because firms either have excessive risk taking, and thus, fewer resources to meet the needs of non-investing stakeholder, or insufficient risk taking because firms must divert their resources to address CSR issues (non-investing stakeholder concerns).

We examine the impact of each CSR component on the deviations from managerial optimal corporate risk taking measures in Panel B of Table 7. Our results suggest that the environmental (ENV) and diversity (DIV) components of CSR be the primary drivers of the main results in Table 6. The environment (ENV) component score of CSR is associated with lower deviations from optimal risk taking levels for all five risk taking measures and the magnitude of the slope coefficients is higher than those of (overall) CSR reported in Table 6. The diversity (DIV) component score of CSR is associated with lower deviations from the optimal corporate risk taking for capital expenditure (ECAPEX), research and development (ERDEX), and acquisition expense (EACQEX). The other CSR component scores, the community (COM), employee (EMP), and products (PRO), are negatively related to the deviations from the optimal risk taking in two out of five regressions in Panel B.[11]

Path Regression for Direct and Indirect Effect of CSR on Firm Value

We test our second hypothesis (H2) by examining both the direct and indirect impact of CSR on firm value (measured by industry-adjusted Tobin's *Q*) using the path regression analysis. Table 8 presents the path regression results and Table 9 reports the direct effect of CSR on firm value (i.e., arrow A in Fig. 1) and the indirect effect of CSR on firm value through corporate risk taking (i.e., arrow B × arrow C in Fig. 1).

We find that the direct effect of CSR on firm value (Tobin's *Q*) is generally positive. The coefficient of CSR in each regression in Table 8 measures the direct effect of CSR on firm value (i.e., arrow A in Fig. 1). This finding is consistent with that of some existing studies (McGuire et al. 1988; Waddock and Graves 1997; McWilliams and Siegel 2001; Jiao 2010; Jo and Harjoto 2011). More importantly, we find that firm value is negatively related to the deviations from optimal risk taking, suggesting that the deviations adversely affect shareholder value.

[10] The estimated slope coefficients of CSR on the deviations from the optimal risk taking in Table 6 are significantly smaller than the correlation coefficients between CSR and the deviations from the optimal risk taking in panel A of Table 4 because slope coefficients in a multivariate regression represent the causal impact while correlation coefficients only represent the co-movement between two variables without controlling for other factors that influence the dependent variable.

[11] We also examine the strengths and concerns for CSR components (i.e., community strengths, community concerns). Our untabulated results indicate that the results of CSR components are driven by both strengths and concerns and they are consistent with our findings in panels A and B of Table 7.

Table 6 The impact of CSR on deviations from optimal risk taking

	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
CSR	−0.00007	−0.00015	−0.00075	−0.00021	−0.00002
	(1.72)*	(1.78)*	(3.69)***	(2.56)**	(2.66)**
CASH	0.00012	0.00242	0.00294	0.00326	0.00007
	(0.45)	(13.31)***	(6.28)***	(15.00)***	(1.37)
SALEGRW	0.00013	0.00006	0.00054	0.00004	0.00001
	(9.50)***	(4.21)***	(15.76)***	(3.35)***	(0.82)
PCTIND	−0.00005	−0.00004	−0.00021	0.00005	−0.00001
	(1.93)*	(1.79)*	(3.44)***	(2.27)**	(1.33)
PAFTERCEO	0.00003	0.00001	0.00008	−0.00002	−0.00000
	(2.39)**	(0.85)	(3.02)***	(2.01)**	(1.18)
AVGAGE	−0.00032	−0.00013	0.00002	−0.00028	−0.00005
	(2.96)***	(1.43)	(0.08)	(2.69)***	(2.04)**
AVGOUTDIR	−0.00142	−0.00224	−0.00383	−0.00273	0.00029
	(2.57)**	(4.92)***	(3.01)***	(5.41)***	(2.24)**
AVGTENURE	−0.00011	0.00008	−0.00090	−0.00057	−0.00002
	(1.04)	(1.01)	(4.15)***	(6.40)***	(0.78)
GINDEX	−0.00035	−0.00012	−0.00055	−0.00087	−0.00011
	(5.09)***	(2.23)**	(3.13)***	(11.05)***	(5.98)***
CEOAGE	0.00006	−0.00017	0.00020	−0.00011	0.00000
	(1.30)	(3.84)***	(2.04)**	(2.71)***	(0.04)
CEOFEMALE	0.00323	0.00177	0.00629	0.00294	0.00064
	(1.60)	(0.86)	(0.97)	(1.61)	(0.97)
CEOTENURE	−0.00001	0.00008	−0.00017	0.00010	0.00001
	(0.20)	(1.69)*	(1.53)	(2.24)**	(0.46)
PCTBONUS	0.00001	0.00002	0.00003	−0.00005	−0.00002
	(0.80)	(1.01)	(0.93)	(3.68)***	(4.48)***
EXOPT	0.00027	0.00028	0.00080	0.00009	−0.00028
	(0.78)	(1.07)	(0.86)	(0.25)	(3.82)***
UNEXOPT	0.00037	0.00207	−0.00047	0.00085	0.00055
	(0.79)	(4.67)***	(0.49)	(1.65)*	(4.24)***
PCTOWN	0.00019	−0.00001	−0.00014	0.00021	0.00000
	(1.41)	(0.14)	(0.52)	(2.15)**	(0.22)
Constant	0.03300	0.04754	0.07154	0.04330	0.00739
	(5.05)***	(6.85)***	(3.63)***	(6.57)***	(4.95)***
R-squared	0.2674	0.3218	0.0782	0.1713	0.0380
Year dummies	Yes	Yes	Yes	Yes	Yes
FF48 industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	10,153	10,153	10,153	10,153	10,153
Number of firms	1718	1718	1718	1718	1718

***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % respectively

The indirect effect of CSR on firm value via corporate risk taking is computed by multiplying the standardized slope coefficients of the risk taking residuals (ECAPEX, ERDEX, EACQEX, ESTDROA, ESTDRET) from each regression in Table 8 (i.e., arrow C in Fig. 1) and the respective standardized slope coefficients of CSR from the path regression results (untabulated) of Eq. (2) (i.e., arrow B in Fig. 1).

Table 9 shows that the direct and indirect effect of CSR on firm value is positive and statistically significant for all risk taking measures. Taken together, the results suggest a positive indirect link between CSR and firm value through the impact of CSR on corporate risk taking. CSR reduces deviations from optimal corporate risk taking and smaller deviations from optimal risk taking increases firm value. The economic significance (magnitude) of the indirect

Table 7 The impact of CSR strengths and concerns on deviations from optimal risk taking

Panel A. The impact of CSR strengths and concerns

	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
CSRSTR	−0.00036	−0.00034	−0.00107	−0.00026	−0.00006
	(3.91)***	(3.58)***	(5.20)***	(3.09)***	(2.45)**
CSRCON	0.00100	0.00050	−0.00040	0.00001	0.00015
	(6.16)***	(3.95)***	(1.15)	(0.04)	(3.51)***
R squared	0.2715	0.3239	0.0795	0.1715	0.0405

Panel B. The impact of CSR components

	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
COM	−0.00062	−0.00113	−0.00147	−0.00047	0.00003
	(1.35)	(3.50)***	(1.86)*	(1.60)	(0.26)
DIV	−0.00083	−0.00055	−0.00123	−0.00021	−0.00003
	(4.16)***	(3.36)***	(2.89)***	(1.18)	(0.63)
EMP	−0.00051	0.00027	−0.00116	0.00025	0.00003
	(1.74)*	(1.19)	(1.87)*	(1.04)	(0.48)
ENV	−0.00085	−0.00040	−0.00139	−0.00067	−0.00021
	(2.84)***	(2.06)**	(2.50)**	(3.51)***	(3.05)***
PRO	0.00053	−0.00089	−0.00021	0.00045	−0.00039
	(1.55)	(2.77)***	(0.27)	(1.57)	(3.70)***
R squared	0.2695	0.3239	0.0793	0.1721	0.0400
Control variables	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
FF48 industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	10,153	10,153	10,153	10,153	10,153
Number of firms	1718	1718	1718	1718	1718

All regressions include control variables presented in Table 6. ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % respectively

impact of CSR on firm value, relative to the direct impact of CSR on firm value, varies from 1.76 % (EXCAPEX) to 33 % (EACQEX).[12] Thus, our path regression results in Tables 8 and 9 provide strong support for our second hypothesis (H2).

Robustness Tests

We performed several robustness tests. First, we use the 1-year lag of CSR measure instead of the current year CSR measure. There is a potential lag effect of CSR on corporate risk taking activities. While current CSR may influence current managerial risk taking decision, the outcomes of managers' risk taking decision are realized and observed in the following year. We find that the results in Panel A of Table 10 are qualitatively similar to those presented in Table 6.

Second, we conduct a robustness check using the Bloomberg Environmental, Social, and Governance (ESG) score, an alternative measure of CSR. We collected the ESG scores manually from the Bloomberg terminal. Our sample size is reduced to 2815 firms-years across 701 firms during 2006–2011. The results using the Bloomberg ESG scores (Panel B of Table 10) are consistent with the results in Table 6.

Third, we re-examine our main analysis by excluding firms in the financial sector (i.e., banks, insurance, real estate, and other financial firms) because the industry has been scrutinized for having excessive risk taking and has been the subject of more regulatory restrictions to curb excessive risk taking. We also exclude utilities and telecommunications firms. Panel C of Table 10 shows that the results from excluding financial, utility, and telecommunication companies from our sample are similar to the results from including these industries. We also control for the outbreak of corporate scandals in the early 2000s and the post financial market meltdown in 2008 by including

[12] For instance, the indirect impact of CSR via ECAPEX is 0.00018 which is 1.76 % of the direct impact (0.01021).

Table 8 Path regression of firm value on CSR and deviation from optimal risk taking

	TOBINQ	TOBINQ	TOBINQ	TOBINQ	TOBINQ
CSR	0.01021	0.01076	0.00915	0.01055	0.01039
	(3.54)***	(3.74)***	(3.19)***	(3.66)***	(3.61)***
ECAPEX	−0.46657				
	(1.79)*				
ERDEX		−1.87428			
		(6.00)***			
EACQEX			−1.36359		
			(11.02)***		
ESTDROA				−0.68730	
				(2.34)**	
ESTDRET					−4.94051
					(4.37)***
PCTIND	0.00192	0.00195	0.00172	0.00187	0.00181
	(3.15)***	(3.20)***	(2.84)***	(3.06)***	(2.97)***
PAFTERCEO	0.00013	0.00011	0.00019	0.00013	0.00009
	(0.45)	(0.37)	(0.66)	(0.46)	(0.32)
AVGAGE	−0.00130	−0.00131	−0.00112	−0.00120	−0.00173
	(0.55)	(0.56)	(0.48)	(0.51)	(0.74)
AVGOUTDIR	−0.02832	−0.02360	−0.03090	−0.02588	−0.02630
	(1.96)*	(1.63)	(2.15)**	(1.79)*	(1.82)*
AVGTENURE	0.00508	0.00495	0.00427	0.00551	0.00503
	(1.94)*	(1.90)*	(1.64)	(2.11)**	(1.93)*
GINDEX	−0.00450	−0.00446	−0.00450	−0.00390	−0.00479
	(2.38)**	(2.36)**	(2.39)**	(2.05)**	(2.53)**
CEOAGE	−0.00421	−0.00398	−0.00394	−0.00416	−0.00398
	(3.76)***	(3.56)***	(3.53)***	(3.71)***	(3.54)***
CEOFEMALE	−0.05271	−0.05829	−0.04452	−0.05715	−0.05264
	(1.02)	(1.13)	(0.87)	(1.11)	(1.02)
CEOTENURE	0.00205	0.00198	0.00173	0.00202	0.00202
	(1.41)	(1.36)	(1.19)	(1.39)	(1.39)
PCTBONUS	−0.00051	−0.00059	−0.00053	−0.00050	−0.00051
	(1.15)	(1.33)	(1.21)	(1.12)	(1.14)
EXOPT	−0.02463	−0.02571	−0.02361	−0.02508	−0.02610
	(3.05)***	(3.19)***	(2.94)***	(3.11)***	(3.23)***
UNEXOPT	0.00302	−0.00101	0.00291	0.00223	0.00499
	(0.26)	(0.09)	(0.25)	(0.19)	(0.43)
PCTOWN	−0.00035	−0.00041	−0.00065	−0.00056	−0.00037
	(0.13)	(0.15)	(0.24)	(0.20)	(0.13)
Constant	−0.71541	−0.78291	−0.64816	−0.73735	−0.66139
	(3.19)***	(3.50)***	(2.91)***	(3.29)***	(2.95)***
R squared	0.5097	0.5113	0.5154	0.5098	0.5105
Year dummies	Yes	Yes	Yes	Yes	Yes
FF48 industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	10,153	10,153	10,153	10,153	10,153
Number of firms	1718	1718	1718	1718	1718

***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % respectively

Table 9 Path direct and indirect impact of csr on firm value

	Estimated error for risk taking	
	Arrow A	Arrow B × arrow C
	Direct	Indirect effect via
	Effect	ECAPEX
CSR	0.01021***	0.00018*
	Direct	Indirect effect via
	Effect	ERDEX
CSR	0.01076***	0.00129*
	Direct	Indirect effect via
	Effect	EACQEX
CSR	0.00915***	0.00303***
	Direct	Indirect effect via
	Effect	ESTDROA
CSR	0.01055***	0.00075**
	Direct	Indirect effect via
	Effect	ESTDRET
CSR	0.01039***	0.00149**

For each regression in Panel A, the direct effect is measured using the coefficient of CSR in Panel A of Table 8 (i.e., arrow A in Fig. 1). For each regression in Panel A, the indirect effect is measured by multiplying the standardized coefficient of each risk taking variable (ECAPEX, ERDEX, EACQEX, ESTDROA, ESTDRET) in Panel A of Table 8 (i.e., arrow C in Fig. 1) and the standardized coefficient of CSR in the respective absolute value of deviation from optimal risk taking regression and subsample reported in Table 6 (i.e., arrow B in Fig. 1)

***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % respectively

dummy variables to capture the period prior to 2002 and the period after 2008. The untabulated results indicate that our results remain unchanged after controlling for these two major events.

Fourth, we examine whether CEO and director gender play a significant role on the relationship between CSR and risk taking. There are 917 firms with at least one female director and 801 firms without any female directors. Our untabulated results indicate that there is no apparent difference between firms with at least one female director and those without any female directors. We also find that there are only 61 firms that have/had at least one female CEO during the examination period, while the rest of 1657 firms never have a female CEO. Our results are not driven by the subsample of firms that have/had at least one female CEO in the entire examination period. Overall, our results are not driven by the gender of CEOs and directors.

Since CSR decision can be considered endogenous, we conduct the two-stage (2SLS) regression analysis by examining the impact of firm characteristics on CSR in the first stage and the impact of CSR on the deviations from optimal risk taking (Eq. 2) in the second stage.[13] We report the second-stage regression results in Panel D of Table 10. The results are consistent with those in Table 6. We also re-estimate our analysis using the industry median CSR based on the Fama-French 48 industries as our instrumental variable (IV) for firms' CSR performance (Cai et al. 2011). The results in panel E of Table 10 are consistent with our main results in Table 6.

Lastly, path analysis cannot distinguish which of the two distinct paths (direct effect versus indirect effect) better represent the relationship between CSR and firm value, nor can it distinguish whether the correlation between CSR and deviations from optimal risk taking represent a reverse causal effect of risk taking on CSR (Lea 1997). Therefore, we conduct a reverse causality test by examining the 1-year lag impact of the deviations from optimal risk taking on CSR performance. Panel F of Table 10 shows that deviations from optimal risk taking measures do not significantly affect CSR.

Conclusion

This study examines whether CSR is associated with management decisions on corporate risk taking. We argue that CSR serves as a control mechanism to curb excessive risk taking and to reduce risk avoidance. Thus, we expect a negative relation between CSR and the deviations from optimal risk taking. Both excessive risk taking and insufficient risk taking are measured as deviations from optimal risk taking. Firms with CSR focus must balance the interests of multiple stakeholders, and therefore, must allocate their resources to both investing and non-investing stakeholders. Excessive risk taking activities will neglect the needs of non-investing stakeholders, and these stakeholders, in turn, could use their power to limit access to resources they control. Excessive risk avoidance makes firms less attractive to shareholders and potential investors and limits the availability of funds for future growth. Focusing on projects that could serve the common interest of various groups of stakeholders and having equal allocation of resources to these stakeholders will reduce excessive risk taking and excessive risk avoidance.

We find that CSR performance, as measured by KLD scores, is negatively associated with deviations from optimal risk taking. This implies that CSR performance is associated with lower (higher) risk taking for firms with excessive (insufficient) risk taking. Two components of CSR performance, diversity, and environmental, seem to drive these results. We also examine the mechanism through which CSR

[13] We utilize Harjoto and Jo (2011) and Harjoto et al. (2015) to estimate the first-stage regression to account for endogeneity of CSR decision.

Table 10 Robustness tests results

Panel A. Using 1-year lag of CSR					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
CSR($t-1$)	−0.00025	−0.00021	−0.00044	−0.00030	−0.00027
	(2.51)**	(2.24)**	(1.91)*	(2.07)**	(1.75)**
Constant	0.02319	0.04371	0.07589	0.00507	0.03234
	(3.31)***	(5.72)***	(3.37)***	(3.15)***	(4.86)***
Observations	8435	8435	8435	8435	8435
# Firms	1465	1465	1465	1465	1465
R−squared	0.2720	0.3187	0.0811	0.0388	0.1681
Panel B. Using Bloomberg ESG scores for CSR measure					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
ESG scores	−0.00005	−0.00003	−0.00008	−0.00001	−0.00002
	(5.63)***	(3.35)***	(3.99)***	(3.85)***	(2.38)**
Constant	0.03362	0.05144	0.05392	0.00600	0.01626
	(2.05)**	(4.99)***	(1.76)*	(2.13)**	(1.39)
Observations	2815	2815	2815	2815	2815
# Firms	701	701	701	701	701
R squared	0.2984	0.3587	0.1325	0.0870	0.2324
Panel C. Excluding financial and utilities firms from the sample					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
CSR	−0.00012	−0.00028	−0.00048	0.00031	−0.00012
	(2.06)**	(2.64)***	(1.90)*	(1.82)*	(2.20)**
Constant	0.02253	0.04398	0.05827	0.00518	0.03250
	(3.11)***	(5.31)***	(2.70)***	(3.05)***	(4.50)***
Observations	8858	8858	8858	8858	8858
# Firms	1429	1429	1429	1429	1429
R squared	0.3013	0.3059	0.0757	0.0378	0.1583
Panel D. Using two-stage least square (2SLS) method (second-stage results)					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
CSR	−0.00094	−0.00207	−0.00187	−0.00072	−0.00020
	(2.46)**	(6.37)***	(2.29)**	(2.13)**	(2.20)**
Constant	0.03294	0.04689	0.07138	0.04324	0.00749
	(3.82)***	(6.37)***	(3.86)***	(5.62)***	(3.64)***
Observations	10,153	10,153	10,153	10,153	10,153
# Firms	1718	1718	1718	1718	1718
R squared	0.2630	0.2935	0.0764	0.1694	0.2380
Panel E. Using instrumental variable (IV) method					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
IV_CSR	−0.00121	−0.00048	−0.00207	−0.00014	−0.00017
	(2.97)***	(1.50)	(2.44)**	(1.86)*	(2.58)**
Constant	0.03376	0.04787	0.07300	0.00748	0.04324
	(5.18)***	(6.89)***	(3.71)***	(5.00)***	(6.56)***
Observations	10,153	10,153	10,153	10,153	10,153
# Firms	1718	1718	1718	1718	1718

Table 10 continued

Panel E. Using instrumental variable (IV) method					
	ECAPEX	ERDEX	EACQEX	ESTDROA	ESTDRET
R squared	0.2680	0.3217	0.0778	0.0381	0.1710
Panel F. Reverse causality test					
	CSR	CSR	CSR	CSR	CSR
ECAPEX($t-1$)	−0.30140				
	(0.22)				
ERDEX($t-1$)		1.22330			
		(0.67)			
EACQEX($t-1$)			−1.28864		
			(1.42)		
ESTDROA($t-1$)				−1.65791	
				(1.12)	
ESTDRET($t-1$)					1.23012
					(1.10)
Constant	−5.82819	−3.68227	−7.15374	−8.2746	−11.99551
	(4.44)***	(2.76)***	(4.33)***	(6.64)***	(7.49)***
Observations	8435	8435	8435	8435	8435
# Firms	1465	1465	1465	1465	1465
R squared	0.2421	0.2422	0.2428	0.2423	0.2427

All regressions include control variables presented in Table 6. ***, **, and * indicate statistical significance at 1 %, 5 %, and 10 % respectively

has an indirect impact on firm value through its impact on corporate risk taking. We find a positive indirect link between CSR and firm value. CSR reduces deviations from optimal corporate risk taking and smaller deviations from optimal risk taking increases firm value.

Our study provides some insights into the CSR debate by showing that CSR activities do not necessarily result in a wealth transfer from shareholders to other stakeholders. Instead, CSR engagement serves as guidance for managerial risk taking decisions by reducing both excessive risk taking and risk avoidance. Our study provides an implication for policy makers considering CSR-related policies and for corporate boards designing an incentive system that incorporates CSR performance. When the incentive system motivates managers to be socially responsible, managers must carefully allocate scare resources into activities that would benefit their multiple stakeholders. Managers are less likely to focus solely on shareholder value, and thus, are less likely to pursue excessive risk. In contrast, when the level of corporate risk taking is low, the emphasis on CSR performance will encourage managers to invest more in projects that would serve the common interest of both investing and non-investing stakeholders. Excessive risk avoidance will make firms less attractive for current and potential shareholders, and thus, is not consistent with the notion of stakeholder management.

Our study also contributes to the growing literature examining the mechanisms through which CSR affects firm value. Our results show that CSR, through its impact on corporate risk taking, has a positive impact on firm value. Our study provides an implication for investors when considering the impact of CSR on risk taking level and firm value. Future case studies could examine the relationship between firm's overall enterprise risk management (ERM), CSR activities, and firm value. Future studies could also examine the mediating effect of ERM and corporate governance on the relationship between CSR and firm value and unveil the role of CSR on firms' strategic choices in managing their enterprise risks.

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Appendix

See Appendix Table 11

Table 11 Variable definitions

Risk taking variables	
CAPEX	The capital expenditures for year t divided by the average assets for year t
RDEX	The R&D expenditures for year t divided by the average assets for year t. RDEX is set to zero if R&D is missing
ACQEX	The acquisition spending for year t divided by the average assets for year t
STDROA	The standard deviation of industry-adjusted ROA (i.e., earnings before interest and taxes divided by assets). At least five years of data (i.e., $t-4$ to t) is required to compute the standard deviation. ROA is industry-adjusted by subtracting in each year the industry median ROA (Fama-French 48 industry classification) from a firm's ROA
STDRET	The standard deviation of the daily stock returns for year t
ECAPEX	Absolute value of estimated error term for CAPEX based on the optimal risk taking regression in Table 1
ERDEX	Absolute value of estimated residual (error term) for RDEX based on the optimal risk taking regression in Table 1
EACQEX	Absolute value of estimated residual (error term) for ACQEX based on the optimal risk taking regression in Table 1
ESTDROA	Absolute value of estimated residual (error term) for STDROA based on the optimal risk taking regression in Table 1
ESTDRET	Absolute value of estimated residual (error term) for STDRET based on the optimal risk taking regression in Table 1
CSR variables	
CSR	The net of CSR strengths minus CSR concerns scores across five different CSR categories: community, diversity, employee, environment, and product
CSRSTR	The net of CSR strengths scores across five different CSR categories: community, diversity, employee, environment, and product
CSRCON	The net of CSR concerns scores across five different CSR categories: community, diversity, employee, environment, and product
COM	The net of CSR strengths minus CSR concerns scores for CSR community category
DIV	The net of CSR strengths minus CSR concerns scores for CSR diversity category
EMP	The net of CSR strengths minus CSR concerns scores for CSR employee category
ENV	The net of CSR strengths minus CSR concerns scores for CSR environment category
PRO	The net of CSR strengths minus CSR concerns scores for CSR product category
Other independent variables	
PCTIND	Percent of independent directors for year t
PAFTERCEO	Percent of directors appointed after the current CEO took office for year t
AVGAGE	Average age of directors for year t
AVGOUTDIR	Average number of outside directorships held by directors for year t
AVGTENURE	Average tenure (in years) of directors for year t
GINDEX	The Gindex for year t is constructed from data compiled by the Investor Responsibility Research Center (IRRC), as described in Gompers et al. (2003). The index provides the number of shareholder rights-decreasing provisions a firm has. The index ranges from a feasible low of 0 to a high of 24; a high score is associated with weak shareholder rights
CASH	The log of cash and cash equivalents to total sales for year $t-1$
SALEGRW	The annual growth rate of sales for year t
EBIT	The log of earnings before interest and taxes divided by assets (ROA) for year $t-1$
MTB	The log of the market to book ratio for year $t-1$, i.e., book value of assets minus book value of equity plus the market value of equity, divided by book value of assets
DEBT	The log of the ratio of total debt to assets for year $t-1$
SPINDEXRET	The annual return on the S&P500 Index for year t
GDPGROWTH	US gross domestic product (GDP) percent change based on current dollars for year t
CEOAGE	CEO's age (in years) in year t
CEOFEMALE	A dummy variable that equals to 1 if the CEO is a female, 0 otherwise
CEOTENURE	The number of years the current CEO has served as the CEO of the firm in year t
PCTBONUS	The annual bonus compensation for year t, measured as a proportion of total compensation received by the CEO
EXOPT	Exercisable options defined as the number of unexercised options held by the CEO that have vested at the end of year t, scaled by total outstanding shares of the firm
UNEXOPT	Non-exercisable options defined as the number of unexercised options (including option grants in the current period) held by the CEO that have not vested at the end of year t, scaled by total outstanding shares of the firm
PCTOWN	The number of restricted stocks that have not vested and the aggregate number of shares held by the CEO at the end of year t (excluding stock options), scaled by total outstanding shares of the firm
Dependent variable for firm value regression model	
TOBINQ	Fama-French 48 industry-adjusted Tobin's Q. Tobin's Q is calculated as: {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of inventories)]/ Book value of total assets}

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