

Anatomy of a Socially Responsible Firm

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Abstract

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This paper investigates the relation between firm characteristics and corporate social responsibility (CSR) with the purpose to understand the reason for investment activities in CSR. We develop a principal component based approach to categorize the KLD fourteen-dimensions of CSR activities into two groups, namely, reactive CSR, which firms would apply to counter any potential fallout from CSR concerns, and proactive CSR, which stands for not reactive CSR activities. We find evidence supporting that (1) financially strong firms, older firms, and firms with more R&D expenditures are more likely to invest in CSR; (2) firms operating in multiple markets tend to invest more in reactive CSR while do the same as single market firms in proactive CSR; (3) firms tend to increase their investment in both CSR as the level of competition decreases but reduce proactive CSR more in extreme high level of concentration; and (4) better corporate governance leads to lower reactive CSR but higher proactive CSR.

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Introduction

Corporate social responsibility (CSR) includes all activities of a firm in its attempt to meet its legal, ethical and other discretionary responsibilities while continuing to meet its economic responsibilities (Carroll, 1979). Extant research has mostly focused on the implications of CSR. For example, the link between CSR and financial performance (Cochran and Wood, 1984; Waddock and Graves, 1997; Wu and Shen, 2013); CSR and stock market returns (Galema, Plantinga and Scholtens, 2008); CSR and firm's cost of capital (Ghoul, Guedhami, Kwok, and Mishra, 2011); and CSR's impact on cost of bank loans (Goss and Roberts, 2011). Little empirical work has been done to explore the other side of this relationship, whereby we have a very limited understanding of what types of firms behave in socially responsible ways.

This paper attempts to explore the above question. It does so by empirically testing the various propositions laid out in McWilliams and Siegel (2001) and Campbell (2007). According to McWilliams and Siegel (2001) CSR represents an action that appears to further some social good, extend beyond the explicit interests of the firm, and is not required by law. According to Campbell (2007), a firm is seen to be acting in a socially responsible manner if it does not, knowingly do anything that could harm any of its stakeholders, and if it does cause some harm, it must rectify whenever the harm is discovered. The rectification could be a result of either voluntary or some sort of encouraged action. Encouragement could be moral suasion, normative pressure, legal threats, regulatory rulings, or other means.

Extant empirical research provides little clarity in terms of the implications of CSR for the economic underpinning of the firm. Margolis and Walsh (2001) catalog more

than 90 empirical studies attempting to establish the relationship between CSR and the resulting financial performance. The evidence continues to be inconclusive.¹ Despite this lack of clarity, CSR has continued to gain importance in managerial practice (Knox and Maklan, 2004). Increasing number of Fortune 1000 companies have taken to issuing corporate social responsibility (CSR) reports. Anecdotal evidences suggest that an ever-increasing number of businesses are engaged in serious effort to integrate CSR into their strategic planning. This study aims at treating CSR as the observed variable and relating it to firm and industry characteristics with the goal of understanding the anatomy of a high CSR firm/sector. Through the findings of this study we hope to provide a better understanding as to what motivates managers to invest in CSR despite the paucity of sound economic rationale.

We frame CSR into two distinct categories based on the firm's motive for their undertaking. First: a set of positive CSR activities (as defined by CSR strength in the Kinder, Lydenberg, and Domini database) taken up by the firm as a means for correcting the effects of negative CSR activities (which is also described as CSR concerns) that the firm might be generating in due course of its operations. In the spirit of Campbell (2007), we propose that rectification of harm suggests a greater likelihood of a positive correlation between CSR concerns and CSR strengths for socially responsible firms, because such firms are more sensitized to the negative effects of their operations. In short, such firms can simultaneously engage in positive and negative behaviors (Strike, Gao and Bansal, 2006). We refer to these as reactive corporate social responsible behavior

¹ Cochran and Wood (1984) and Waddock and Graves (1997) identified positive relationship between CSR and financial performance, while Aupperle, Carroll and Hatfield (1985), and McWilliams and Siegel (2000) found no significant relationship between them. Wright and Ferris (1997) found CSR and financial performance to be negatively related.

(RCSR). Second: all other CSR activities that the firm might be involved with; we refer to these as proactive corporate social responsible behavior (PCSR).

Our study builds upon the findings of Chih, Chih, and Chen (2010). They test the theory postulated by Campbell (2007) for a set of financial firms by contrasting the set of firms in the Dow Jones Sustainability Index (DJSI) World, with those in the Dow Jones World Index (but not a part of DJSI World). Their Study finds evidence suggesting that: (i) larger firms are more CSR minded, however, (ii) financial performance and CSR are not related. They also find that (iii) firms would act in more socially responsible ways to enhance their competitive advantages when the market competitiveness is more intense. We contribute to this work in at least two different ways. First: Financial firms are highly regulated firms. Government regulations could potentially lead to different, more limited scope for CSR, particularly PCSR. The results from this sector cannot be generalized to other industries without further research. We omit utilities and financials from our sample.

Second: Chih, Chih, and Chen (2010) use a dichotomous variable to identify CSR. This variable takes the value one if the firm belongs to the CSR group (DJSI World) and zero otherwise. Corporate social responsibility (CSR) of a firm is a complex construct that includes a range of firm behaviors in domains such as the environment, community, human rights, employee relations, ethnic and gender diversity, product policy, and corporate governance. Actions in each of these spheres may impact firm performance in different ways (Brammer and Millington, 2008). It is also possible that combinations of certain policies may have their own distinctive effect on the CSR and firm performance relationship, which further complicates the development of an aggregate CSR measure and thereby the study of its relationship with firm performance (Cavaco and Crifo, 2010).

Use of a dichotomous variable to study entire CSR could be potentially misleading. We propose the use of principal component analysis to extract CSR factors from CSR data obtained from Kinder, Lydenberg, and Domini (KLD) database. Corporate social responsibility (CSR) of a firm is the assessment of its CSR (Margolis et. al. 2009). These factors allow us to separate RCSR and PCSR.

The paper uses the CSR data collected by Kinder, Lydenberg, and Domini (KLD) database as the starting point of our analysis. This data has been extensively used in prior research (Jayachandran *et al.*, 2013; Waddock and Graves, 1997). The KLD ratings information is well suited to CSR research as it is calculated by disinterested researchers using all available data on multiple aspects of CSR (Waddock, and Graves, 1997). KLD monitors and rates 650 to 3000 firms that constitute 500 of the largest US companies (increased to 1,000 largest companies in 2001, and 3,000 largest companies in 2003) and all firms in the MSCI KLD 400 social index. Firms are rated in seven major areas – environment, community, human rights, employee relations, diversity, customers, and governance – using a set of approximately eighty indicators for strengths and concerns. Thus, the KLD dataset collects CSR data for a total of fourteen dimensions.

The paper is structured in the following manner: first we define reactive and proactive corporate social responsible behavior (RCSR/PCSR) and then we develop our hypothesis relating firm characteristics and CSR in the spirit of McWilliams and Siegel (2001), and, Capmbell (2007). We continue our analysis with a description of our data and methodology and finally, we present our empirical analysis testing all the laid out hypotheses.

Reactive vs. Proactive CSR

Extant research suggests that CSR is closely related to reputation. Branco and Rodrigues (2006) propose that positive CSR enables firms to improve reputation with a broad range of stakeholders including customers, suppliers, competitors, bankers, and investors. Findings of studies such as Fombrun and Shanley (1990) and Pfau, Haigh, Sims and Wigley (2008) suggest that when positive CSR programs are communicated to the public they build corporate reputation and credibility. Studies have also shown that reputation is related to a broad range of benefits for the firm. For example, it enhances the firm's ability to attract superior job applicants (Gatewood et al. 1993), increases employee retention and their job satisfaction (Riordan, 1997), and it enhances firm's brand equity (Dowling, 2006). Therefore, it is not entirely surprising that, in recent years CSR has continued to gain importance in managerial practice (Knox and Maklan, 2004).

Drawing upon the above arguments, while positive CSR is an asset for the firm, negative CSR is a potential liability. To the extent that this liability can be offset by positive CSR firms, which are sensitized to the negative effects of their operations, are likely to simultaneously engage in positive and negative behaviors (Strike, Gao and Bansal, 2006). We refer to this set of CSR activities as reactive corporate social responsibility (RCSR). However, CSR needs not necessarily be reactive. Corporate desire to build reputational capital (Fombrun et al., 2000), employee commitment (Turban and Greening, 1996), trust (Frank, 1996) or moral capital (Godfrey, 2005) among its stakeholders, could also engage in positive CSR behaviors. We group these CSR activities into the set of proactive CSR (PCSR).

Determinants of CSR

This section draws upon existing literature to develop a set of four hypothesis relating CSR to economic conditions, market conditions, brand/product differentiation, and corporate governance.

Economic conditions: Economic conditions affect the degree to which corporations act in socially responsible ways (Campbell, 2007). Margolis and Walsh (2001) reviewed ninety empirical studies on CSR, from 1972 to 2002. According to their survey, firms whose financial performance is weak are less likely to engage in positive CSR activities. Extending this line of reasoning, we suggest that, firms are likely to give up proactive CSR than reactive CSR during difficult financial times. Thus, our first hypothesis presented below is a variant of Campbell (2007) proposition 1:

H1: Financially weak firms are less likely to invest in CSR activities.

Level of competition: Campbell (2007) suggests that the level of competition in the market will affect the firm's attitude towards CSR. In situations where the competition level is very high, corporations are likely to have narrow profit margins and hence it is a natural tendency for them to cut expense wherever possible. In such a situation, CSR might fail to figure prominently in the decision making of the firm. On the other hand, if the level of competition is too low or non-existent, concerns about corporate reputations or customer loyalty is less likely to affect managerial decision-making. Arguably, when firms have less distress of getting squeezed out of the market and are assured a relatively wider profit margin under normal competition, consumers will have enough choices so as

to make managers sensitive to the issues of customer loyalty and corporate reputation. Thus our second hypothesis is in line with Campbell (2007) proposition 2.

H2: Firms situated in industries where the level of competition is either too high or too low, are less likely to invest in CSR activities.

CSR as an instrument of differentiation: McWilliams and Siegel (2000) hypothesize that corporations could embody their products with socially responsible attributes as a means to satisfy consumer demand for CSR and thereby differentiate their product in market place. This approach to differentiation could require firms to invest more in research and development. Therefore, our third hypothesis follows McWilliams and Siegel (2000) hypothesis 1.

H3: There is positive correlation between the level of product differentiation (a proxy for which is the firm's R&D to sales ratio) and the level of positive CSR.

Corporate governance and CSR: Existing literature provides at least two competing hypothesis relating corporate governance and the CSR activities of the firm. First, the strategic choice hypothesis supported by Surroca and Tribo (2008) suggests that non-performing managers tend to use CSR as a strategic tool for satisfying other stakeholders. If so we should then see a negative relationship between corporate governance and CSR. A competing hypothesis originating from conflict resolution literature supported by Calton and Payne (2003), Jensen (2001) and Scherer et al.(2006) suggest that corporations are subject to close scrutiny by non-investing stakeholders, such as environmental and other activists. Effective corporate governance managers utilize CSR engagement to resolve conflicts with these stakeholders and hence to maximize the

shareholders' wealth (Chung, Elder, and Kim, 2010). The conflict-resolution hypothesis suggests a positive relationship between corporate governance and CSR. Jo, and Harjoto (2011) find evidence in support of the conflict resolution hypothesis. If effective managers are using CSR as a means for satisfying non-investing stakeholders, we believe their activities are more likely to be in the realm of reactive CSR than proactive CSR.

H4: There is positive relationship between effective governance and CSR.

Data and methodology

We use the period from 2001 through 2010 for this analysis. We get Corporate Social Responsibility (CSR) data from the Kinder, Lydenberg, and Domini (KLD) database. Extant studies have typically aggregated the various KLD dimensional scores into an index to proxy for the overall CSR of the firm (Ullmann, 1985; Waddock and Graves, 1997; Hull and Rothenberg, 2008). In doing so these studies have implicitly assumed cardinality across the various dimensions. This can be potentially problematic, as KLD scores are ordinal in nature. Therefore, a score of +2 on Environment strengths is better than a score of +1 on Environment strengths. However, it might be difficult to argue that a score of +1 on Environment is precisely the same as +1 on Community, or +1 on Corporate Governance, etc. Therefore aggregating the dimensions by simply summing them up into an index could result in potentially erroneous representation of the firm CSR.

Another potential problem of aggregating the various dimensions of CSR into an index is the loss of information regarding the nature of complementarity between these dimensions. Cavaco and Crifo (2010) define *complementarity* as a specific combination

of firm policies that would likely lead to superior corporate performance. Two or more practices are complements when using one more intensely increases the marginal benefit of using others more intensively. By this logic, a simple aggregation of strengths and concerns leads to a loss of opportunity to understand the synergies that come from complementary practices.

In order to demonstrate the notion of complementarity we did a correlation for all the dimensions of strengths and concerns of CSR within the KLD database. Table 2 reports a positive correlation across all except the “gender diversity concerns” dimension. A possible source of the positive correlation between concerns and strengths could be the complementarity between them, whereby strengths compliment concerns, as suggested in the idea of reactive CSR (RCSR) outlined in the previous section. The use of an aggregate index hides the effects of these complementarities. For example, a firm receiving +1 on Environment concern and +1 on Environment Strength receives net zero score on environment. This firm gets treated at par with another firm with no role in environment (zero on strength and zero on concern). The central limitation of the aggregation method emphasizes the needs of using a more apt methodological tool to extract the common components across dimensions; one such approach is principal component analysis.

Principal component analysis

The principal component analysis (PCA) was developed in the early 20th century (Pearson, 1901; Hotelling, 1933) for the purpose of aggregating information scattered across multiple correlated numeric variables. We recommend the use of PCA technique

for aggregating the KLD category scores. PCA constructs factors to maximize explanatory power within a set of related variables.² For example, let x_{ij} represents the CSR score (as assigned by KLD) for dimension i (fourteen dimensions of CSR as tracked by KLD) and sample firm j . Given 14 dimensions and N sample firms, let $X_1, X_2, X_3, \dots, X_{14}$ be vectors of length N such that $X_i' = [x_{i1}, x_{i2}, \dots, x_{iN}]$. Let X be the matrix $[X_1, X_2, \dots, X_{14}]$, and let Σ be the covariance matrix of X . Consider a linear combination of these variables defined as:

$$Y_k = \lambda_k' X = \lambda_{1k} X_1 + \lambda_{2k} X_2 + \lambda_{3k} X_3 + \dots + \lambda_{14k} X_{14} \text{ ----- (1)}$$

The variance of Y_k is then defined as $\lambda_k' \Sigma X$.

If the vector λ_j is chosen to maximize the variance of Y_k , then Y_k is referred to as the first principal component. The second principal component is the linear combination that maximizes the variance of Y_k subject to the condition that it be uncorrelated with the first principal component. A maximum of 14 principal components can be constructed successively in our case, each subject to the condition that the i th component must be orthogonal with the already generated $(i-1)$ components. Together these 14 principal components provide the same information as the original fourteen dimensions. In other words, $\sum_{k=1}^{14} \sigma_k^2 = \sum_{k=1}^{14} Var(Y_k)$. The principal components can be interpreted as functions of the eigenvalues and eigenvectors of Σ . The variance of the first principal component, $\gamma_1 = Var(Y_1)$, equals the first eigenvalue of Σ and the coefficient vector, λ_1 equals the first eigenvector. Similar interpretation can be assigned to the remaining thirteen principal components.

² For a more complete discussion of principal components analysis, see Johnson and Wichern (2007).

Principal component analysis is potentially sensitive to the units in which the underlying variables are measured. Fortunately, measurement units are not a concern here because the CSR ratings are simply the total number of concerns and the total number of strengths in the various categories. However, the number of areas of strengths and concerns varies from one dimension of CSR to another and occasionally from one year to another. Therefore, to facilitate aggregation of information from across the dimensions and more importantly to facilitate comparison across various years, we standardize the ratings.³

KLD data covers approximately 80 indicators in seven major categories. Each category has a number of strengths and concern items, where a binary measure indicates either its presence or absence. The number of items in each category often varies from year to year, thus making it difficult to compare the raw measures across time. To get around this problem, we standardize the categories within each year by taking the company's summed score for a given category, subtracting from it the mean score in the same category across all companies for the same year, and dividing the resulting difference by the standard deviation in that category for that year. We extract two principal components from the fourteen transformed variables.

Other variables

Following existing research in strategic management and CSR (See Jayachandran et. al., 2013), we use Tobin's Q and ROA as two measures of firm's financial

³ Alternatively, we could extract the eigenvalues and the corresponding eigenvectors from the correlation matrix instead of the covariance matrix. To the extent that KLD scores are ordinal in nature, Polychoric correlation matrix should be used instead of the Pearson correlations. However, Kolenikov and Angeles (2009) show that PCA of ordinal data using both Pearson and Polychoric correlations produce similar results.

performance. Following Jayachandran et.al. 2013, we use the formulae proposed by Chung and Pruitt (1994) for computing Tobin's Q. Tobin's Q is defined here as:

$$Q = (MVE + PS + DEBT) / TA \quad \text{---- (3)}$$

where MVE is the product of a firm's share price and the number of common stock shares outstanding, PS is the liquidation value of the firm's outstanding preferred stock, DEBT is the value of the firm's short-term liabilities net of its short term assets, plus the book value of the firm's long term debt, and TA is the book value of the total assets of the firm. ROA is estimated as the ratio of net income to total assets. While Tobin's Q is arguably a forward-looking measure of the firm's financial performance, ROA reflects the current period performance.

Following Hull and Rothenberg (2008), we proxy innovation using three years average R&D spending (research and development spending) to sales ratio. We use sales-based Herfindahl-Hirschman Index (HHI) to estimate market concentration. This index is the sum of the squared values of sales of each firm as a fraction of the total sales for all firms in the given industry group. If an industry group has only one firm, its HHI is one; if an industry group has ten firms and that each contributes 10% of the sales, its Herfindahl index is 0.1. Hence, the Herfindahl index falls as the degree of industry concentration increases. We use the Chung, Elder, and Kim (2010) corporate governance index to measure the quality of governance in the firm. The more popular GIM (2003) index is designed primarily to capture managerial entrenchment through antitakeover provisions in the firm's charter, its bylaws and state laws (Cremers, and Nair, 2005).

Extant research suggests that size, leverage, industry, and the age of the firm are some of the other characteristics, which affect a firm's CSR activities (Cochran and Wood, 1984; Waddock and Graves, 1997; Hull and Rothenberg, 2008). These are included in the model as control variables. Size is a relevant variable because larger firms are likely to have higher level of CSR, vis-à-vis smaller firms (Burk et al., 1986). We measure firm size using three distinct proxies: total assets, total sales and by the number of employees in the firm. Following Jayachandaran, Kalaignanam, and Eilert (2013), financial leverage is defined as the ratio of long-term debt to total assets. We infer firm age from each firm's first CRSP listing date. To the extent that a firm can exist as a private entity before it goes public, our age variable is truncated. However, the resulting bias would cause us to underestimate, rather than overestimate firm age and hence this is a conservative proxy. We use year-specific fixed effects to control for time trends and industry specific fixed effects to control for the industry effects. We follow Fama and French 12 industry classification for creating the industry groups. This classification is similar to the industry definition followed by Waddock and Graves (1997). It is determined using the four digit SIC of the firm. Doz, et al. (1981), Yip (2003), Bartlett et al. (2004) among several others imply that multinational corporations use CSR focused at local needs of their multiple markets as a means of generating global brand recognition. To the extent that such firms might be different from single market firms in their approach to CSR, we introduce I_dummy which takes the value 1 if the firm operating in multiple markets and 0 otherwise (single market).

Results and discussion

Table 1, Panel A provides some descriptive statistics describing the sample of firms used in this study. The sample spans across 10 years from 2001 through 2010 and the average number of firms in each year is about 2177. The size of the sample firms ranges from smallest firm employing 15 individuals to the largest firm employing 176,960. The spread is reflected in the total assets as well as the net sales data. The three variables are different measures of firm size. Firm age counts the number of years that the firm has been publicly trading. R&D to sales data is missing for roughly 47% of the data. These firms are treated as zero R&D firms. Table 1, Panel B reports descriptive statistics describing the Fama-French 12-industry classification that we have used in this study for estimating industry concentration. N represents the average annual number of firms in each industry group. HHI column reports the average annual Herfindhal index for each industry group. Majority of the firms in our sample operate only in the US market (I_Dummy=0).

Table 2 presents the pairwise correlations between standardized ratings for various CSR dimensions. Most correlations are positive suggesting the existence of complementarity across various strengths and concerns dimension. Curiously, gender diversity stands out among all the concern dimensions. Figure 1, Panel A provides a snapshot of the correlation between a firm's gender diversity concerns and its various CSR strengths. These concerns are negatively correlated with all strengths except for a small positive correlation with corporate governance strengths. Contrasting Figure 1, Panel A with Figure 1, Panel B through G suggests that while firms potentially try to rectify poor CSR record in other categories by simultaneously investing in one or more

CSR strengths, they don't seem to be doing the same in the case of gender diversity concerns. The results from Table 2 further seem to suggest that firms with significant gender diversity concerns tend to also have relatively high employee relations concerns such as poor union relations, poor employee's health and safety issues, larger layoffs, underfunded pension funds, etc. However, they seem to be on average doing better on issues of environment, human rights and product (safety, contracting controversy, antitrust violations, etc.).

Table 3 presents the factor loadings for the first and the second principal components (PC). The first eigenvalue of the fourteen standardized CSR dimensions is 3.407. This implies that $3.407/14=24.34\%$ of the total variation across these dimensions can be explained by a single common factor (first PC). Similarly, the second eigenvalue is 1.255, suggesting that 8.96% of the remaining variations can be explained by the second factor (second PC). The third through fifth eigenvalues are very close to 1 and the remaining nine are less than 1, indicating that additional common factors are negligible.

Figure 2, Panel A presents the eigenvector loadings from the first principal component for the fourteen CSR dimensions (seven strengths and seven weaknesses). As expected from the significant positive correlations reported in Table 2, the first principal component is loading positively on thirteen out of the total fourteen dimensions of CSR used in this study. To the extent that positive correlation between various CSR concerns and CSR strengths (Table 2 and Figure 1, Panels B through G) could suggest a relationship of complementarity across these dimensions, thereby at least some of the positive CSR investments coming from the various corporations are an attempt on their parts to rectify the negative effects of CSR concerns generated in the daily course of their

existence. The first principal component potentially identifies the magnitude of complementarity across the various dimensions of CSR. We interpret this component as a measure of reactive CSR (RCSR). An increase in this component would suggest an increase in all the strengths and the concerns dimensions of CSR. This could represent the firm taking on increased levels of positive CSR in order to counter the negative effects of increased CSR concerns. While theoretically this could also suggest the firm responding to its increased positive CSR capital by allowing its CSR concerns to increase, this is extremely unlikely. A reduction in this component could signal reduced concerns and as a result reduced reactive positive CSR investments.

Figure 2, Panel B presents the eigenvector loadings from the second principal component for the fourteen CSR dimensions. The second principal component loads negatively on all strengths and positively on all concerns. This component can be interpreted as a contrast measure between various CSR concerns and CSR strengths. An increase in its magnitude would result in increased CSR concerns and reduced CSR strengths. Similarly, a decrease in its magnitude would represent increasing CSR strengths and decreasing CSR concerns. This component may be interpreted as an inverse measure of proactive CSR (PCSR). In this case, we multiply the second principal component by -1 and take the resulting value as a proxy for PCSR.

Table 4 reports the Pearson correlations between the various variables used in this study. PCSR (second principal component times -1) is negatively correlated with firm size (\ln assets), age of the firm (\ln_age), and leverage. This suggests that larger firms, as well as older firms and firms with higher level of debt seem to be investing relatively less in proactive CSR. PCSR is also positively correlated with R&D expenses, ROA, Tobin's

Q, and governance index (g_score). Thereby lending some preliminary support to hypothesis one, three and four. Thus, financially well-performing firms, and, firms which invest relatively more in research and development, as well as firms with better corporate governance seem to invest more in proactive CSR. The first principal component (RCSR) is positively correlated with firm size, firm age, leverage, firm performance (ROA), and corporate governance. Thereby, larger and older firms, firms with higher levels of debt, strong current financial performance and good corporate governance are likely to invest more in reactive CSR. This could represent the set of firms, which are potentially generating high CSR concerns in course of their everyday operations, and they invest in positive CSR to rectify the negatives. RCSR is negatively correlated with R&D expenses and Tobin's Q ratio, suggesting that firms which invest more in research and development as well as those with strong forward looking financial position (TQ) are better at keeping their negative CSR activities lower and as a result need to invest less in reactive CSR.

Multivariate regression analysis

Table 4 results are univariate and hence caution is warranted in their interpretation. Table 5 presents the results of multivariate regression analysis. This table presents the coefficient estimates for the following model:

$$CSR = \beta_0 + \beta_1 \times ROA + \beta_2 \times TQ + \beta_3 \times RD_sales + \beta_4 \times g_score + \beta_5 \times HHI + \beta_6 \times HHI2 + \beta_7 \times Size + \beta_8 \times \ln(age) + \beta_9 \times Lev + \beta_{10} \times I_Dummy + \beta_{11-19} \times Year_Dummy + \varepsilon \quad --(3)$$

where: CSR is measured by RCSR and PCSR, represents the two proxies for CSR. ROA is the return on assets (a measure of the firm's current period financial performance). Tobin's Q (TQ) is a forward-looking measure of the firm's financial performance.

RD_sales is the firm's research and development expenses, per dollar of sales (three year average calculated over current year and two lagging years). We are using it here as a proxy for the level of product differentiation (McWilliams and Siegel, 2000). g_scores is corporate governance index as measured in Chung, Elder, and Kim (2010). For our sample g_score ranges from a minimum of 2 to a maximum of 20 with a median of 9. HHI is the sales based Herfindahl-Hirschman Index. It is a measure of industry concentration. We use the Fama-French twelve-industry classification in this paper. HHI2 is the square of HHI. The second order term is inserted to allow us to test for hypothesis 2. We use three related proxies for size (ln(assets), ln(sales) and ln(number of employees)). The results remain unchanged. Table 5 reports the results using ln(assets) as the proxy for firm size. Firm age proxy estimates the age of the firm from its CRSP listing date. Lev (Financial leverage) is defined as the ratio of long-term debt to total assets. And, I_dummy takes the value 1 if the firm operates in multiple markets and zero otherwise. All single market firms in our sample are firms operating in the US domestic market only. The model also contains nine-year dummies representing 2002 through 2010. All reduced forms of equation (3) which do not include HHI as an explanatory variable, control for industry effect using eleven industry dummies.

Panel A of table 5 estimates equation (3) and eight of its reduced forms relating firm and market characteristics to RCSR (first principal component). Since these regressions use panel data, where a single firm could appear multiple times (potentially once every year), the OLS standard errors might be biased. We address this concern through the use of firm-clustered bootstrap standard errors (Cameron, Gelbach, Miller, 2008) to draw all inferences. RCSR is positively related to ROA, Tobin's Q, R&D to

Sales, suggesting that firms with better performance are on average also firms which potentially generate more CSR concerns in course of their operation. Their good financial position allows them to simultaneously invest in positive CSR activities in attempt to mitigate the adverse effects of the negative CSR. RCSR is negatively related to corporate governance index, which suggests that *ceteris paribus*, firms with better corporate governance are able to potentially reduce CSR concerns and thereby they require less investment in reactive CSR. RCSR is found to be positively related to HHI and negatively related to HHI2. Therefore, firms situated in industries where the level of competition is neither too high nor too low, are more likely to invest in RCSR activities. The results also suggest that larger and older firm's, with lower debt levels, and operating in multiple markets are likely to invest more in RCSR.

Panel B, Table 5 estimates equation (3) and eight of its reduced forms relating firm and market characteristics to PCSR (second principal component multiplied by -1). All standard errors are estimated using bootstrap methodology with firm-clustering (Cameron, Gelbach, Miller, 2008). We find that the PCSR is positively related to ROA, Tobin's Q, R&D to sales, and the governance index. On average, firms with good financial position (ROA and TQ), high R&D firms, as well as firms with good corporate governance tend to invest more in proactive CSR activities. These results support hypothesis one, three, and four. We also find that PCSR is positively related to HHI and negatively related to HHI2. PCSR loads positively on CSR strengths and negatively on CSR concerns after being multiplied by -1, therefore the results suggest that firms in lowest concentration and highest concentration industries are less likely to invest in Proactive CSR. This result supports hypothesis two.

Comparing Table 5, Panel A and B results point to several similarities and differences, which are noteworthy. We find that while bigger firms invest in more reactive CSR (RCSR), smaller firms seem to invest more in PCSR. A possible explanation for the RCSR result could be that larger firms potentially generate greater negative CSR in course of their daily operations and therefore the firm invests more in CSR aimed towards rectifying those concerns. Table 5, both panels suggest that controlling for other characteristics, older firms tend to invest more in CSR. This result is in concurrence with the findings of Jo and Harjoto (2011). They interpret this result to suggest that older firms can afford more CSR. Table 5 also finds that more levered firms (firms with greater level of debt financing) tend to invest less on CSR. This result is consistent with the interpretation of leverage as a measure of financial risk, whereby more risky firms are able to afford relatively less CSR activities (McGuire, Sundgren and Schneeweis, 1988).

A final result that may be inferred from Table 5 is the difference between single market and multiple market firms with respect to their CSR activities. The positive and significant coefficient for I_Dummy in Panel A, and negative non-significant coefficient in Panel B suggests that firms operating in multiple markets tend to invest significantly more than a firm operating in single market, on reactive CSR. However there is no difference between the two groups of firms when it comes to proactive CSR.

Piecewise linear regression analysis

While the quadratic term in equation (3) representing the linear and second order terms for industry concentration could provide evidence in support of or against hypothesis two, the fitted functional form is not necessarily accurate. Piecewise linear

regression is an alternate approach for testing this hypothesis. In this case, apart from testing the second hypothesis, the spline function can provide information about at what levels of industry concentration CSR activity of the firm increases versus declines.

We estimate piecewise linear regressions allowing for four changes in the slope coefficient on industry concentration (HHI). We partition the sample firms into quintiles based on their HHI level. We select four knots for the spline model, defined as:

$$q_k = \text{Min}(\text{Quintile}_{k+1}) \quad k = 1, 2, 3, 4 \quad (4)$$

where $\text{Min}(\text{Quintile}_{k+1})$ is the minimum of the (k+1) quintile for HHI. The spline model is given by:

$$y = \alpha + \beta_1 Q_1 + \beta_2 Q_2 + \beta_3 Q_3 + \beta_4 Q_4 + \beta_5 Q_5 + \text{Control Variables} + \varepsilon \quad (5)$$

where

$$Q_{1,i} = HHI_i$$

$$Q_{k,i} = \begin{cases} HHI_i - q_{k-1} & \text{if } HHI_i \geq q_{k-1} \\ 0 & \text{Otherwise} \end{cases} \quad k=2,3,4,5$$

Table 6 presents the results of piecewise linear regression relating HHI to RCSR and PCSR. While the overall results of this analysis are in concurrence with the results in Table 5, two interesting observations which can be drawn from Table 6 and figure 3 are: as the level of competition decreases (HHI increases), both RCSR and PCSR tend to increase. This trend continues across 80% of our sample firms for RCSR but 40% for PCSR. Both types of CSR see sharp decline for the firms situated in the least competitive

industry. Comparing the coefficients of HHI_5_5 across the two models suggests that the decline is much higher for PCSR than for RCSR. This is confirmed in Figure 3 where the fifth line segment slopes downward in both of the RCSR and the PCSR plot. However the slope is much higher in PCSR than for RCSR. This result suggests that in low competition (limiting case of which is a monopoly) environment where firms have very strong market position with little societal accountability, they tend to reduce investments in all types of CSR. However, we see a much greater reduction in PCSR than RCSR.

Robust Regression analysis

OLS estimates can be biased if the underlying assumption of normality of the residuals is not satisfied. Some of the popular approaches for ensuring normality are winsorizing the data and/or transforming the variables. An alternate approach can be to use median regression instead of OLS (Neter et al., 1996). Median regression (which is a special case among the set of Quantile regressions) is a member of the family of robust regressions and it is designed to reduce the influence of outliers. Median regression minimizes the sum of absolute deviations instead of the sum of squared deviations so that the precise value of the dependent variable in a median regression matters only in determining whether the observation has a positive or negative residual. If the residual is positive or negative, the dependent variable can increase toward infinity (minus infinity) without affecting the estimated parameters.⁴ Table 7 presents the results of median regression with boot strapped standard errors. The table replicates some of the models of Table 5 Panels A and B. The results remain qualitatively unchanged.

⁴ For more detailed discussion of median regression refer to Koenker and Bassett (1982).

Conclusion

This paper explores the firm and market characteristics, which potentially define corporate choice to invest in socially responsible activities. Our methodology deviates from the more popular approach of seeing CSR as a unitary construct. Instead, we propose decomposing it into multiple dimensions. More specifically, this paper divides CSR into two broad groups. First: reactive CSR which consists of all socially responsible activities undertaken by the firm with the intention to counter any potential fallout from negative CSR that the firm might be generating as a part of its daily operations. And, second: proactive CSR, which may be understood simply as all not reactive CSR. This decomposition is dictated by our choice of statistical methodology. We extract principal components from the fourteen dimensions of CSR that are reported in KLD. We find that the first two components are able to explain about 33.3% of all the variability across the fourteen dimensions. The first component explains about 24.34% while the second component picks up 8.96%. We find that the first principal component loads positively on all strengths and all CSR concern dimensions. This component quantifies the commonality across the CSR strengths and CSR concerns. We interpret it as a measure of reactive CSR. The second component loads positively on CSR concerns and loads negatively on CSR strengths. An increase in this component would suggest increased concerns and simultaneous decline in strengths, and vice versa. We interpret the second component to be an inverse measure of proactive CSR.

We explore the relationship between our measures of reactive and proactive CSR and various firm and market characteristics. We find that while firms with greater level of debt financing on their books tend to invest relatively less in CSR, older firms invest

more in CSR. Our results also suggest that larger firms tend to invest relatively more on reactive CSR and less on proactive CSR. Existing literature suggests that firms operating in multiple markets tend to invest more in CSR. We find that while this is true for reactive CSR, these firms are no different from single market firms in terms of proactive CSR activities. Our results suggest that financially strong firms, firms with greater investments in R&D, and firms located in industries with neither too low nor too high concentration, tend to make maximum CSR investment. A closer look at this result reveals that as the level of competition decreases (increasing HHI), firms tend to increase their investment in both reactive CSR as well as proactive CSR. However, as the firm's market power increases (tending towards monopolistic positions) they start to cut down these investments. Firms seem to reduce proactive CSR much more than reactive CSR.

Exploring the linkage between corporate governance and CSR activities of the firm, we find that better governed firms are more successful in reducing their firm's negative CSR output, thereby, saving on reactive CSR. Firms with better corporate governance also tend to invest more on proactive CSR. The two results together suggest that potentially, these firms are better positioned for capturing the reputational dividends attached to CSR.

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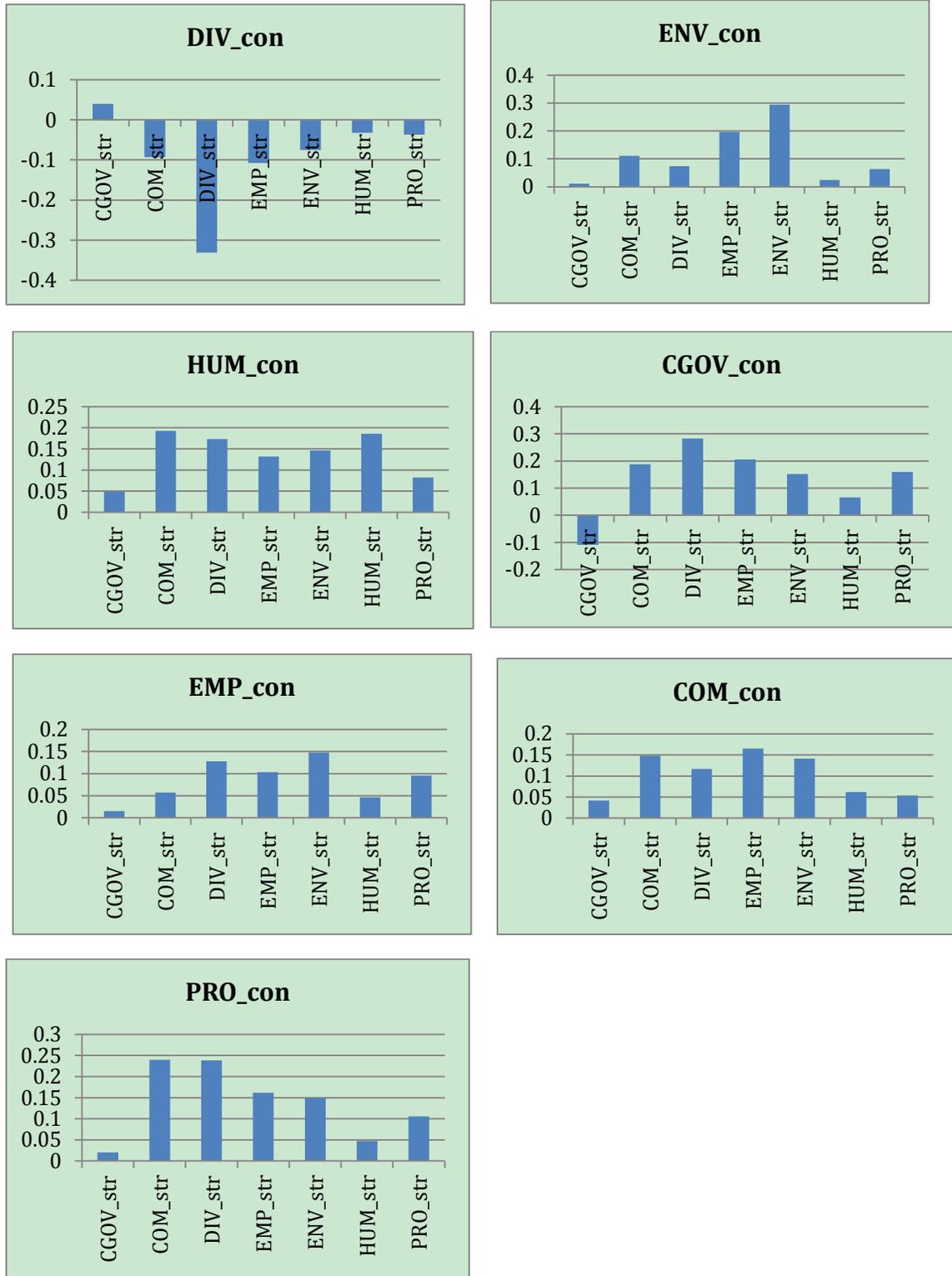
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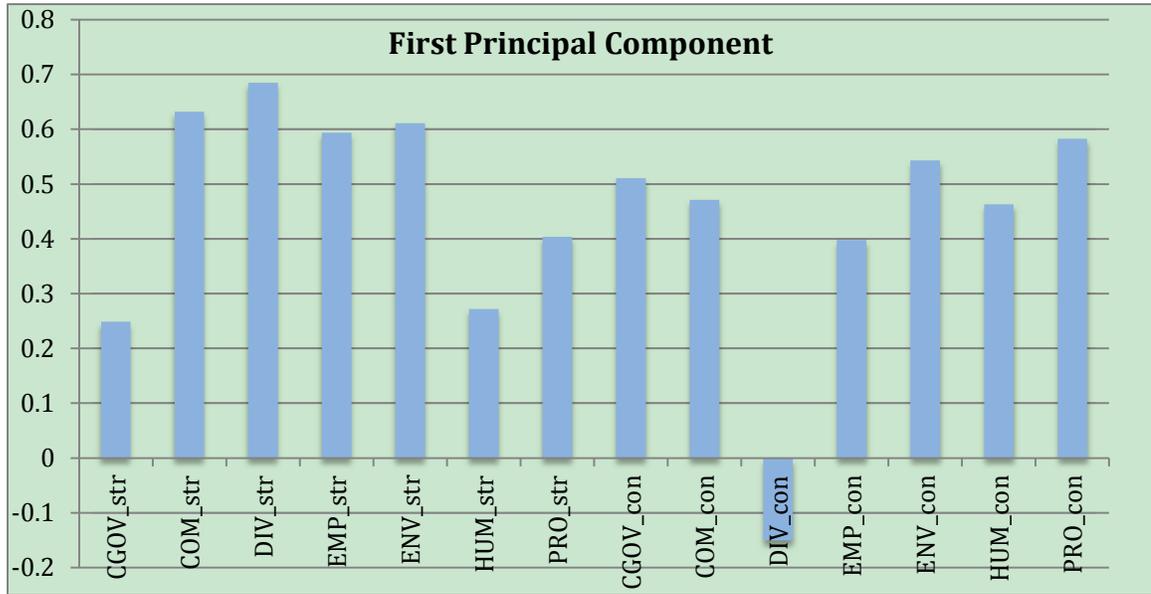
Figure 1. Correlations between CSR concerns and seven strength dimensions.



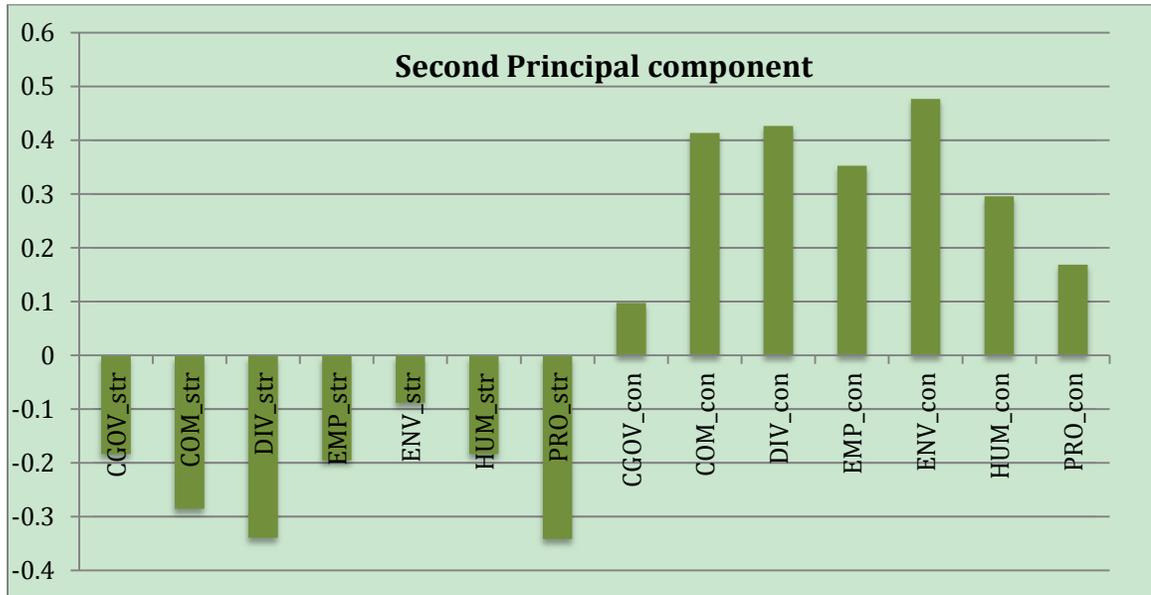
These graphs illustrate the relation between each CSR concerns and all the seven dimensions in strength. DIV, ENV, HUM, CGOV, EMP, COM, and PRO are defined respectively as seven different KLD sectors, namely, diversity, environment, human rights, corporate governance, employee relations, community, and products. Variable names ended with “_con” represent the concern scores recorded, while those ended with “_str” stand for strength scores.

Figure 2. Eigenvectors from principal components analysis on standardized CSR scores.

Panel A



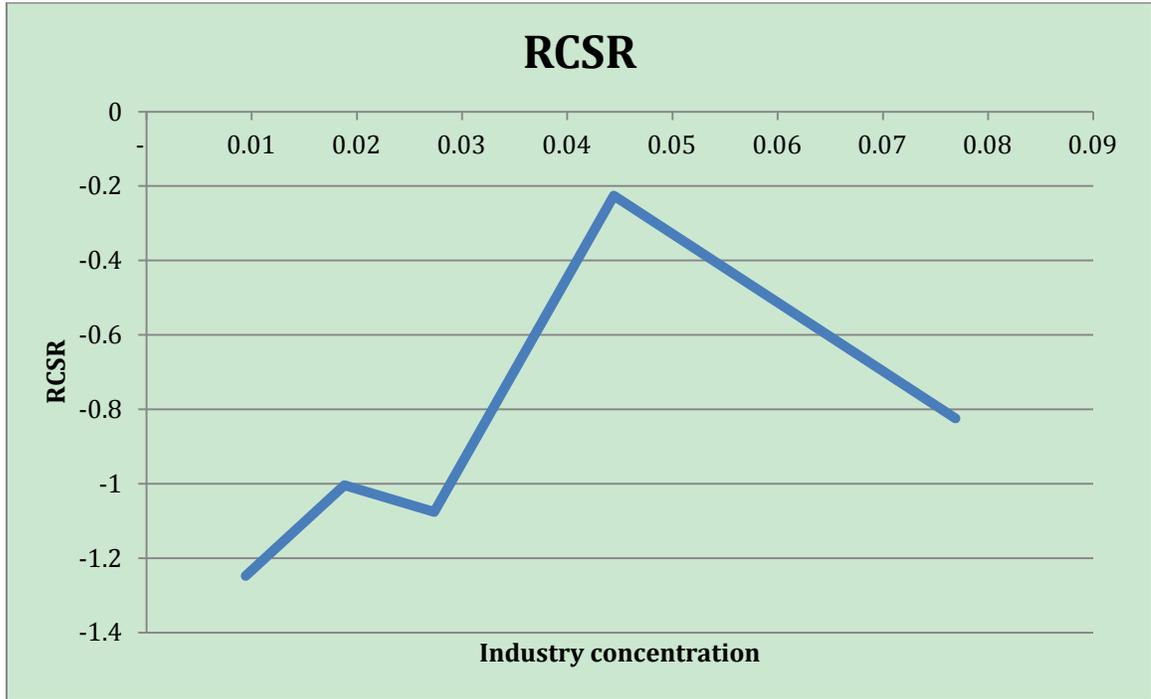
Panel B



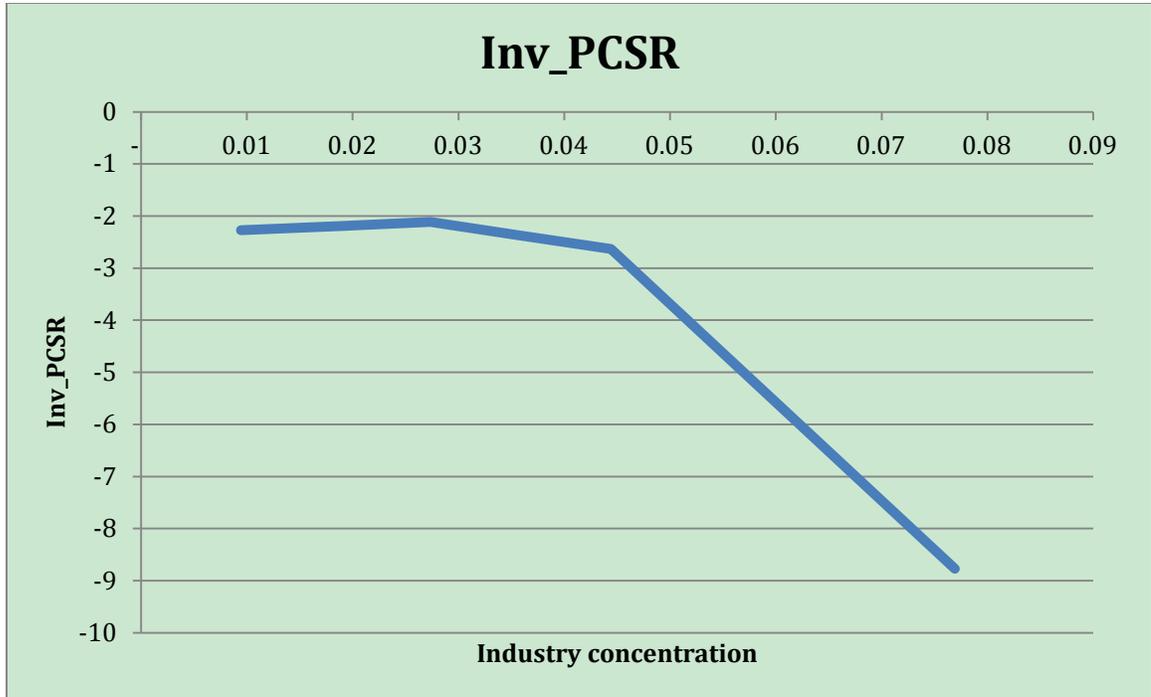
The figure plots the eigenvector loadings from the first two principal components for the seven strengths and seven weakness dimensions of the CSR scores available from the KLD database. The dimensions are: Corporate governance (CGOV), Community (COM), Diversity (DIV), Employees (EMP), Environment (ENV), Human rights (HUM), and Product (Pro).

Figure 3. Fitted spline functions (equation 5).

Panel A:



Panel B:



These graphs plot the spline regression result for equation 5. Panel A shows how reactive CSR changes across the Herfindahl-Hirschman Index, and panel B describes that of proactive CSR.

Table 1. Summary Statistics

Panel A reports the descriptive statistics of main variables on a firm-year basis. Panel B reports the sample statistics based on the Fama-French 12 industry portfolios. Median value is taken for HHI, which is the Herfindahl-Hirschman Index calculated for every industry group, across 10 sample years (2001-2010). Firm Years stands for the number of firms categorized in a specific group. Domestic is the number of firms operated only domestically in the category while International means the number of multinational firms.

Panel A:

	Firm Years	Mean	Median	Std Dev	Minimum	Maximum
Number of employees (in thousands)	21385	9.418	2.500	19.241	0.015	176.960
Total Assets (in millions)	21753	4945.350	711.674	12116.610	34.491	151100.000
Net Sales (in millions)	21745	2566.740	1245.740	5326.820	1.650	52935.230
Leverage	21690	0.195	0.140	0.216	0	5.945
ROA	21256	0.021	0.033	0.106	-0.710	0.247
Firm Age	21772	18.993	14.000	17.094	0	85.000
3 year average R&D to Sale	11363	0.196	0.028	0.809	0	12.788

Panel B:

Industry Group	Firm Years	HHI	Dummy	
			Domestic	International
Consumer Non-Durables	1171	0.0227	1103	68
Consumer Durables	506	0.0769	484	22
Manufacturing	2293	0.0115	2162	131
Energy	977	0.0539	894	83
Chemicals	587	0.0339	569	18
Business Equipment	3897	0.0186	3565	332
Telecom	653	0.0229	593	60
Utilities	802	0.0132	774	28
Shops	2261	0.0226	2177	84
Healthcare	2349	0.0298	2144	205
Finance	5136	0.0106	4913	223
Others	2612	0.0171	2515	97

Table 2. Correlations between various standardized CSR dimensions

This table lists the Pearson correlations between the fourteen KLD dimensions. CGOV, COM, DIV, and EMP variables represent corporate governance, community, diversity, and the Employee categories of the CSR scores. ENV, HUM, PRO measure Environment, Human rights and Product categories. _con stands for concerns, while _str represents the strength dimensions in the various categories. The correlations numbers represent the average annual correlations between the fourteen CSR dimensions.

	CGOV_co	CGOV_str	COM_con	COM_str	DIV_con	DIV_str	EMP_con
CGOV_c	1						
CGOV_st	-0.1090 ^{***}	1					
COM_co	0.1340 ^{***}	0.0420 ^{***}	1				
COM_str	0.1875 ^{***}	0.1070 ^{***}	0.1485 ^{***}	1			
DIV_con	-0.0435 ^{***}	0.0400 ^{**}	-0.0270 [*]	-0.0935 ^{***}	1		
DIV_str	0.2830 ^{***}	0.0800 ^{***}	0.1170 ^{***}	0.3185 ^{***}	-0.3310 ^{***}	1	
EMP_con	0.1385 ^{***}	0.0155	0.0990 ^{***}	0.0575 ^{***}	0.0430 ^{***}	0.1280 ^{***}	1
EMP_str	0.2050 ^{***}	0.0150 ^{***}	0.1650 ^{***}	0.2505 ^{***}	-0.1080 ^{***}	0.2975 ^{***}	0.1035 ^{***}
ENV_con	0.1295 ^{***}	0.0110 ^{***}	0.2725 ^{***}	0.1110 ^{***}	-0.0315 ^{***}	0.0735 ^{***}	0.1845 ^{***}
ENV_str	0.1520 ^{***}	0.1260 ^{***}	0.1410 ^{***}	0.2180 ^{***}	-0.0755 ^{***}	0.1780 ^{***}	0.1480 ^{***}
HUM_co	0.1800 ^{***}	0.0490 ^{***}	0.1780 ^{***}	0.1930 ^{***}	-0.0190 [*]	0.1730 ^{***}	0.1315 ^{***}
HUM_str	0.0655 ^{***}	0.0815 ^{***}	0.0620 ^{***}	0.1465 ^{***}	-0.0325 [*]	0.0870 ^{***}	0.0465 ^{**}
PRO_con	0.2535 ^{***}	0.0200 ^{***}	0.2000 ^{***}	0.2395 ^{***}	-0.0645 ^{***}	0.2385 ^{***}	0.1385 ^{***}
PRO_str	0.1595 ^{***}	0.0465 ^{***}	0.0535 ^{**}	0.1720 ^{***}	-0.0370 [*]	0.1645 ^{***}	0.0955 ^{***}

	EMP_str	ENV_con	ENV_str	HUM_con	HUM_str	PRO_con	PRO_str
EMP_str	1						
ENV_con	0.1960 ^{***}	1					
ENV_str	0.2775 ^{***}	0.2940 ^{***}	1				
HUM_co	0.1315 ^{***}	0.1880 ^{***}	0.1460 ^{***}	1			
HUM_str	0.0765 ^{***}	0.0245 [*]	0.0865 ^{***}	0.1855 ^{***}	1		
PRO_con	0.1615 ^{***}	0.2140 ^{***}	0.1490 ^{***}	0.1905 ^{***}	0.0470 ^{***}	1	
PRO_str	0.2280 ^{***}	0.0630 ^{***}	0.2170 ^{***}	0.0820 ^{***}	0.0365 [*]	0.1060 ^{***}	1

*** p < 0.01; ** p < 0.05; * p < 0.10.

Table 3. Principal component analysis factor loadings and communality.

PCA 1 is the first principal component representing the reactive CSR. PCA 2 is defined as the second principal component, the proactive CSR.

	Component		Communalities
	PCA 1 (RCSR)	PCA2 (Inv_PCSR)	
PRO_str	0.404	-0.341	0.270
DIV_str	0.685	-0.339	0.095
COM_str	0.632	-0.285	0.393
EMP_str	0.594	-0.195	0.481
HUM_str	0.272	-0.183	0.204
CGOV_str	0.249	-0.183	0.584
ENV_str	0.611	-0.088	0.283
CGOV_con	0.511	0.098	0.391
PRO_con	0.583	0.169	0.522
HUM_con	0.463	0.296	0.381
EMP_con	0.398	0.353	0.302
COM_con	0.471	0.414	0.107
DIV_con	-0.150	0.427	0.368
ENV_con	0.543	0.477	0.280
Eigenvalue	3.407	1.255	
% of variance	24.33%	8.97%	

Table 4. Correlation Matrix.

This table provides the correlation matrix of various variables used in regression analysis. Ln(Assets) is calculated as the logarithm of total asset of the firm. Ln(age) is taking the logarithm value of years since the firm got public. Leverage is defined as the financial leverage ratio. RD_Sales is the ratio of research and development expenditure to net sales. ROA is the return on asset for the firm in the specific sample year. TQ represents the firm's Tobin's Q. g_score is the proxy for governance. RCSR and Inv_PCSR signify respectively reactive CSR and proactive CSR.

	Ln(Assets)	ln(age)	Leverage	RD_Sales	ROA	TQ	g_score	RCSR	Inv_PCSR
Ln(Assets)	1								
ln(age)	.373**	1							
Leverage	.213**	.031**	1						
RD_Sales	-.253**	-.113**	-.143**	1					
ROA	.016*	.084**	.040**	-.313**	1				
TQ	-.365**	-.185**	-.375**	.341**	.165**	1			
g_score	.053**	.190**	-.056**	-.069**	.064**	-.038**	1		
RCSR	.599**	.355**	.056**	-.038**	.091**	-.096**	.088**	1	
Inv_PCSR	-.071**	-.049**	-.126**	.092**	0.031**	.090**	0.016	0	1

*** p < 0.01; ** p < 0.05; * p < 0.10.

Table 5. Regression results.

These tables illustrate the results of regression analysis. In Panel A, coefficients are estimated with the first principal component (RCSR) as the dependent variable, while in Panel B, the second principal component (Inv_PCSR) is considered as the dependent variable for the regressions. Ln(Assets) is calculated as the logarithm of total asset of the firm. Ln(age) is taking the logarithm value of years since the firm got public. Leverage is defined as the financial leverage ratio. I_dummy is a dummy variable takes value of 1, if the company operates on a multinational basis, and 0 if the company operates only in a single market. ROA is the return on asset for the firm in the specific sample year. TQ represents the firm's Tobin's Q. RD_Sales is the ratio of research and development expenditure to net sales. g_score is the proxy for governance. HHI and HH2 represent the Herfindahl-Hirschman Index and the square of HHI respectively. From Model 1 to Model 6, both year-fixed and industry-fixed effects are applied in the regressions, but for Model 7, 8, and 9, only year effect is fixed.

Panel A: Reactive CSR (RCSR) as dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	-3.2177*** (0.0621)	-3.2366*** (0.0625)	-3.4427*** (0.0651)	-3.2633*** (0.0623)	-4.2815*** (0.0825)	-4.6451*** (0.0871)	-3.9804*** (0.0647)	-4.2712*** (0.0676)	-5.4342*** (0.0903)
Ln(Assets)	0.4121*** (0.0063)	0.4115*** (0.0063)	0.4225*** (0.0063)	0.4168*** (0.0063)	0.5459*** (0.0086)	0.556*** (0.0085)	0.3627*** (0.0057)	0.3882*** (0.006)	0.4889*** (0.0078)
ln(age)	0.1051*** (0.0068)	0.1045*** (0.0068)	0.1139*** (0.0068)	0.107*** (0.0068)	0.1321*** (0.0109)	0.1408*** (0.0108)	0.1816*** (0.0068)	0.1827*** (0.0068)	0.2383*** (0.0109)
Leverage	-0.6043*** (0.0342)	-0.6014*** (0.0341)	-0.4471*** (0.0347)	-0.593*** (0.0339)	-0.8504*** (0.0503)	-0.6969*** (0.0522)	-0.4569*** (0.031)	-0.2756*** (0.0319)	-0.3489*** (0.0497)
I_Dummy	0.5229*** (0.0408)	0.5223*** (0.0408)	0.508*** (0.0406)	0.5069*** (0.0407)	0.5657*** (0.0476)	0.5194*** (0.0472)	0.601*** (0.0426)	0.5265*** (0.0418)	0.5762*** (0.0498)
ROA		0.1403** (0.0573)				1.0829*** (0.1099)		0.7117*** (0.0648)	1.8287*** (0.1122)
TQ			0.0155*** (0.001)			0.0056*** (0.0016)		0.0134*** (0.001)	0.0042*** (0.0016)
RD_Sales				0.7404*** (0.0516)		1.2699*** (0.1136)		0.973*** (0.06)	1.6584*** (0.1116)
g_score					-0.0062* (0.0032)	-0.0069** (0.0032)			-0.0003 (0.0033)
HHI							4.2433*** (0.1701)	3.1113*** (0.1688)	3.2217*** (0.2312)
HHI2							-4.7459*** (0.2047)	-3.4192*** (0.2039)	-3.4747*** (0.2777)
R-sq	0.4818	0.4819	0.4868	0.4851	0.5358	0.5447	0.4401	0.4562	0.5037

*** p < 0.01; ** p < 0.05; * p < 0.10.

Panel B: proactive CSR (PCSR) as dependent variable.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	0.2315*** (0.0739)	0.1386* (0.0742)	0.149* (0.079)	0.2185*** (0.0743)	0.3508*** (0.1002)	0.0387 (0.1165)	-0.2878*** (0.0773)	-0.4281*** (0.1314)	-0.4102*** (0.1275)
Ln(Assets)	-0.0261*** (0.0078)	-0.0302*** (0.0075)	-0.0225*** (0.0078)	-0.0248*** (0.0076)	-0.0459*** (0.0113)	-0.0416*** (0.0114)	-0.0593*** (0.0069)	-0.0386*** (0.0074)	-0.0384*** (0.0068)
ln(age)	0.0476*** (0.0101)	0.0444*** (0.0093)	0.0513*** (0.0094)	0.0481*** (0.0094)	0.0391** (0.0162)	0.0427*** (0.0154)	0.0155* (0.0092)	0.0417*** (0.0157)	0.0417*** (0.0157)
Leverage	-0.3065*** (0.0382)	-0.2891*** (0.0381)	-0.2473*** (0.0401)	-0.3035*** (0.0382)	-0.4343*** (0.0634)	-0.3632*** (0.068)	-0.5286*** (0.0377)	-0.7794*** (0.0695)	-0.7794*** (0.0697)
I_Dummy	0.0781* (0.0455)	0.0755 (0.0454)	0.0732 (0.0479)	0.0737 (0.0475)	0.1381** (0.0617)	0.0955 (0.0674)	0.0663 (0.0482)	0.1 (0.0673)	0.1 (0.0623)
ROA		0.7297*** (0.0664)				1.5572*** (0.1382)		1.2361*** (0.1466)	1.2361*** (0.1466)
TQ			0.0056*** (0.0013)			-0.0044** (0.0021)		0.0039* (0.002)	0.0039* (0.002)
RD_Sales				0.1888*** (0.0673)		1.318*** (0.1378)		1.8733*** (0.1341)	1.8733*** (0.1341)
g_score					0.0155*** (0.0042)	0.0138*** (0.0042)			-0.0078* (0.0046)
HHI							3.5339*** (0.4663)	5.0953*** (0.0621)	5.0953*** (0.0721)
HHI2							-8.343*** (0.919)	-11.524*** (1.3481)	-11.524*** (1.3481)
R-sq	0.0748	0.0794	0.0755	0.0751	0.1021	0.1136	0.0403	0.065	0.065

*** p < 0.01; ** p < 0.05; * p < 0.10.

Table 6. Spline Regression.

This table reports the regression results using the fixed spline function. HHI is divided into 5 groups based on quintiles, with HHI_5_1 being the 1st quintile of the HHI and HHI_5_5 signifying the 5th quintile.

	RCSR	Inv_PCSR
Constant	-5.3447*** (0.1106)	-0.025 (0.1329)
Ln(Asset)	0.5097*** (0.0088)	-0.014*** (0.0111)
Ln(Age)	0.2099*** (0.0113)	-0.0445*** (0.0157)
Leverage	-0.5296*** (0.0517)	-0.7845*** (0.0697)
I_Dummy	0.5694*** (0.053)	0.102 (0.0622)
ROA	1.6405*** (0.119)	1.2312*** (0.1465)
TQ	0.0024* (0.0016)	-0.0038* (0.002)
RD_Sales	1.4502*** (0.1104)	1.8883*** (0.137)
g_score	0.0002 (0.0035)	0.0076* (0.0046)
HHI_5_1	2.5933*** (0.3537)	0.8833** (0.4526)
HHI_5_2	-3.4347*** (0.6617)	0.0085 (0.8335)
HHI_5_3	5.8192*** (1.3705)	-3.9161** (1.8869)
HHI_5_4	-3.6458 (2.2987)	3.2244 (3.241)
HHI_5_5	-6.8183*** (3.4567)	-15.8545*** (4.7807)
R-sq	0.5087	0.0675

*** p < 0.01; ** p < 0.05; * p < 0.10.

Table 7. Median Regression.

This table illustrates the regression results by replicating models 6 and 9 from Table 5 (Panels A and B) using median values.

	RCSR		PCSR	
	Model 1	Model 2	Model 3	Model 4
(Intercept)	-3.006*** (0.045)	-3.277*** (0.046)	0.434*** (0.069)	-0.135 (0.133)
Ln(Assets)	0.355*** (0.004)	0.359*** (0.004)	-0.04*** (0.007)	-0.021*** (0.006)
ln(age)	0.127*** (0.008)	0.135*** (0.008)	-0.083*** (0.012)	-0.070*** (0.011)
Leverage	-0.473*** (0.036)	-0.537*** (0.035)	-0.572*** (0.055)	-0.547*** (0.052)
I_Dummy	0.548*** (0.022)	0.534*** (0.023)	0.084 (0.033)	0.066 (0.053)
ROA	0.754*** (0.068)	0.670*** (0.068)	0.301*** (0.103)	0.246** (0.116)
RD_Sales	1.166*** (0.056)	1.024*** (0.055)	0.833*** (0.069)	0.773*** (0.068)
g_score	-0.004* (0.002)	-0.005*** (0.001)	0.001 (0.004)	0.002 (0.004)
HHI		2.506*** (0.161)		4.799*** (0.730)
HHI2		-2.804*** (0.202)		-9.868*** (1.495)

*** p < 0.01; ** p < 0.05; * p < 0.10.