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Regional Outlook

MANAGERIAL COGNITION ON CORPORATE SOCIAL
RESPONSIBILITY AND CORPORATE PERFORMANCE:
EVIDENCE FROM CHINA

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Responsibility and Corporate Performance: Evidence
from China

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Abstract

This paper explores the role of managerial cognition on corporate social responsibility (CSR) in determining corporate performance. By employing a simple model called the cognitive–affective model, we link managerial CSR cognition with CSR practices and corporate performance. Using a proprietary dataset collected from 223 listed firms in China in 2009, we examine whether managerial CSR cognition can explain CSR practices and corporate performance. We find that managerial CSR cognition is positively related to CSR practices and corporate performance. However, inconsistent with the cognitive–affective model, we cannot find evidence that CSR practices have a significant mediating effect on the relationship between managerial cognition and corporate performance. Both managerial cognition and CSR practices can explain corporate performance when jointly estimated. In particular, managerial cognition (CSR practices) is positively (negatively) associated with corporate performance, regardless of whether or not we control for firm characteristics. This result is consistent with the view that stock investors in China hold a self-conflicting view on managerial cognition on CSR and its impacts. On the one hand, they appreciate managerial cognition on CSR, while on the other hand they worry about the potential adverse implications of adopting CSR practices on corporate performance.

Keywords: corporate social responsibility; managerial cognition; corporate performance

1. Introduction

In the past few decades, there has been great research interest and effort to understand the relationship between Corporate Social Responsibility (CSR) and corporate performance.[1] However, there is enormous variation in the findings. For example, Anderson and Frankle (1980), Freedman and Jaggi (1986) and Aupperle, Caroll and Hatfield (1985) and McWilliams and Siegel (2001) find no relationship. But Pava and Krausz (1996), Ruf et al. (2001) and Simpson and Kohers (2002) find a positive relationship, while Ingram and Frazier (1983), Waddock and Graves (1997), and Preston and O'Bannon (1997) find a negative relationship.

Many of these studies implicitly assume that the response of firms to calls from their external and/or internal environments for corporate social responsibility is automatic and/or homogenous. In other words, firms are assumed to be 'passive' in the sense that they will react 'mechanically' to changes in internal/external environments and their reactions (or performance) are expected to be similar. This kind of reasoning is problematic because in reality firms 'act' through the choices and decisions of their managers, which in turn depend on their managers' cognitive limits, i.e., how their managers collect and gather in, and interpret and understand, the environment. This is particularly true because of the uncertainties and complexities of the environment that managers face. If managers of two identical firms have different patterns in collecting and processing information about the internal/external environment, it is likely that the responses of these firms are very different from each other. Thus, managerial cognition on CSR is potentially important but often a neglected determinant of CSR that shapes corporate performance.

The purpose of this paper is to examine the role of managerial CSR cognition on corporate performance. To link cognition with performance, we use a simple model called the cognitive–affective model from the managerial cognition literature.[2] According to this model, firm behaviour is a function of the interaction between firm characteristics and the environment. More precisely, firm characteristics are activated by environmental factors and have an effect upon behaviour through a core set of cognitive and affective mediating processes. In other words, firm behaviour arises from its own understanding/perception of itself in a particular situation shaped by internal and external environments.

The data for this study are based on a proprietary dataset collected from 223 listed firms in China. This dataset contains data for, *inter alia*, managerial cognition on CSR and CSR practices. Tobin's q is used as corporate performance measure because it is a market-based measure that is forward-looking.[3]

To verify the cognitive–affective model, we first provide empirical evidence that managerial cognition affects CSR practices, which in turn affect corporate performance. Notice that according to the cognitive–affective model it is managerial cognition which directly affects corporate performance through CSR practices while CSR practices just serves as a mediating variable. To this end, we also test for the role of CSR practices as mediating variable using the Goodman (1960)'s mediation test. The test shows a statistically insignificant mediation effect with CSR practices. Taken together, the results do not support the cognitive–affect model in the sense that managerial cognition affects corporate performance through CSR practices. However, the results are consistent with the view that stock investors in China hold a self-conflicting view on managerial cognition on CSR and its impacts. On the one hand, they appreciate managerial cognition on CSR, while on the other they worry about the potential adverse implications of adopting CSR practices on corporate performance.

The rest of the paper is organised into four sections. The following section provides a selective review of the literature on CSR cognition and on related studies in China, respectively. The third section describes the data that we use and the main cognition variables. Section four reports the empirical results. The final section summarises our main conclusions.

2. Literature Review

CSR Cognition

The literature has begun to understand CSR from a cognitive perspective as evident in a small but growing number of studies on cognitive aspects of CSR. For example, Boal and Peery (1985) and Secchi (2009) explore the cognitive dimension of (C)SR at individual level. Boal and Peery (1985) use a multi-dimensional scaling method to identify the cognitive dimension of CSR from 549 undergraduate management students and reported evidence that there is a cognitive dimension consistent with the utilitarianism model of 'utility, justice and rights'. Secchi (2009) offers an interesting explanation of social responsibility behaviour from a cognition perspective at individual level. In particular, by using the notion of docility, i.e., 'the tendency of individuals to rely on suggestions, recommendations, persuasion, and information obtained through social channels as a major basis for choice' (p. 571), he attempts to link together cognition and social behaviour and argues that social responsibility is a way one may use to maintain cognitive advantages especially when the same social channel is used repeatedly over time.

Recent studies also suggest that managerial cognition matters for CSR. Using the RESPONSE model, Pedersen (2010) explores the perception of managers on their responsibilities towards society.[4] Using survey data from 1113 managers in eight large international firms, he shows that inconsistent with the prediction of the mainstream models, real life managers have a different (relatively narrow) perception of social responsibilities. In particular, their perception of social responsibilities is confined to taking care of their employees and making products and services in an environment-friendly way. In their perception, other dimensions of CSR like social exclusions, Third World development and poverty reduction are totally out of their mind. This cognitive gap helps explain why some firms respond differently to the external environment's call for CSR. Using the same RESPONSE model, Zollo, Minoja, Casanova, Hockerts, Neergaard, Schneider and Tencati (2009) examine the determinants of the cognition gap between managers and stakeholders based on survey data from 209 (219) interviews with managers (stakeholders) of 19 multinational firms and find evidence that the stakeholder engagement process cannot explain the gap, but the resources commitment firms make in integrating the principles of CSR into their operations and strategies can. This also suggests that managerial cognition has a role to play in narrowing the gap too, because it is not unreasonable to expect that the higher the managerial cognition, the more resources the firm will spend in integrating the principles of CSR into their operations and strategies.

CSR Cognition Research in China

Despite comment by Moon and Shen (2010) that CSR research in China is relatively young and lagging behind that in Western countries, a small but growing literature on CSR cognition research is appearing in China. They include Chen (2009), Jiang (2007), Chen and Wang (2009), and Zu and Song (2008). By comparing data of questionnaires from 502 firms and 1,001 people in Zhejiang Province in China with similar data from several countries including the US, France, Germany, Malaysia and Singapore, Chen (2009) finds that the level of managerial CSR cognition in China is not relatively low. Based on a survey conducted on 131 textile and apparel firms in China's Zhejiang Province during the period November to December 2005, Jiang (2007) finds that cognition of CSR is an important factor that affects CSR strategy choice. However, these two papers have not examined the link between managerial cognition and corporate performance.

Chen and Wang (2009) examine the role of CSR cognition in determining the relationship of CSR strategy and firm life cycle. Their analysis of 319 questionnaire responses reveals that firms of different size and/or at different stage of life cycle have different CSR cognition and CSR strategies. Chen and Wang interpret this evidence as not supporting the view that each firm should assume all kinds of social responsibilities, suggesting that this view is harmful to the firm growth and may hinder firms from engaging in CSR activities.

Zu and Song's study (2008) is closely related to our paper. They examined managerial values/perception on CSR and its impact on firm performance by conducting a survey on 100 firms in China. They find that managerial values/perception can positively affect the firm's sales performance. Our paper is similar to their paper in the sense that both examine the relationship between managerial perception and corporate performance. However, our paper is different from their paper in the following ways: First, they focus on managerial perception while our paper deals with managerial cognition. Obviously, managerial perception and managerial cognition are related concepts. The former refers to the process that organises sensations (i.e., a process that detects stimuli from the firm or its surroundings) into meaningful patterns while the latter is the process of thought that generalises perception by recognising the limitations of memory and the role of judgment in the process of knowing.

Second, Zu and Song (2006) measure corporate performance in terms of business performance (i.e., sales). However, our paper examines stock market based performance. Third, their survey was conducted in 2003 and 2004 during which the call for CSR was not that strong in China. Our survey was conducted in 2009. As pointed out in Chen (2009) and in Moon and Shen (2010), respectively, there were some dramatic changes in the call for CSR in China after 2004. In particular, both government and stock exchanges published a series of documents requiring or encouraging businesses to release sustainability reports. For instance, in January 2007, the State Council's Assets Supervision and Administration Commission issued the 'Guidelines for State-Owned Enterprises Performing their Social Responsibilities' while the Shenzhen Stock Exchange in 2006 and the Shanghai Stock Exchange in 2008 issued guidelines on the performance of listed firms in terms of corporate social responsibility. These all served as a strong driving force to enhance corporate social responsibility in China. Fourth, our sample is also very different from their sample. Over 84 per cent (64 per cent) of the latter sample is state-owned enterprises (from the industrial sector). In our sample, only 17.94 per cent is state-owned enterprises and 49.78 per cent is industrial firms. Their sample size is 83 while our sample size is 223.

3. Data and Methodology

We use a subset of a proprietary dataset collected by the China Federation of Corporate Social Responsibility (CFCSR) during the period 10 February 2009 to 15 June 2009. 300 firms that were index constituent stocks of China Securities Index 300 (CSI 300) were initially selected, and preliminary data were collected from all of them.[5] The CFCSR further filtered firms based on the following sampling criteria:

(1)   Investment criteria. This includes three sub-criteria on price manipulation (i.e., no track records on price manipulations), profitability (i.e., top 90 per cent based on profitability of the past three year average) and liquidity (i.e., top 80 per cent over the past one year); and

(2)   Sustainability criterion: Those stocks without any significant poor records in the past three years on the auditor's reports, malpractices and in the past one year on environmental pollutions and ecological disruptions, large layoffs, strikes or related incidents and briberies.

The list of deleted stocks was verified and subsequently approved by an audit panel consisting of 50 people who were academics or top executives from reputable organisations or big firms in China. These sampling criteria resulted in 223 firms. Of these firms, 23 were in the finance sector, 42 in the public utilities sector, 20 in the properties sector, 21 in the conglomerates sector, 111 in the industrial sector, and six in the commercial sector (see Panel B, Table 1).

The data were collected in accordance with the CFCSR's conceptualisation of CSR. Similar to other standard conceptualisations, the CFCSR considered three dimensions of CSR: economic, social and environmental. However, the CFCSR's conceptualisation is unique in the sense that it recognises the importance of not only corporate performance but also CSR practices and managerial CSR cognition. In the CFCSR's view, this conceptualisation is suitable for developing countries like China.

To gather information on managerial CSR cognition and CSR practices, primary data were collected from the 223 firms by on-site interviews and/or questionnaire survey to executives and staff of those firms. The number of firms interviewed or surveyed was 51 and the response rate was 23 per cent. The geographical locations of these firms were quite diverse; 49 per cent were in the northern part of China, 15.75 per cent in the southern part, 11.8 per cent in the eastern part, 7.8 per cent in the east western part, another 7.8 per cent in the west southern part, and the remaining 3.9 per cent were from the north eastern part. They also came from diverse sectors: 17 in the finance sector, 13 in the materials sector, 11 in the industrial sector, 6 in the energy sector, 4 in the durable goods sector, 2 in the public utilities sector, another 2 in the consumable goods sector, 1 in the health care sector and another one in the telecommunication sector.

Data for managerial CSR cognition were constructed from six survey questions while data on CSR practices were based on 24 survey questions that examined the practices of firms on economic dimensions (nine questions), environmental protection (four questions) and social dimensions (11 questions) (see Appendix A for the survey questions). The primary data were then supplemented by secondary data collected from 65 published reports that covered 140 firms, and 65 unpublished reports that examined 32 firms, the websites of relevant firms, and a financial database called China Centre for Economic Research (CCER) database.

We compute the overall score of a key variable as the (simple) average of the scores of relevant survey questions for that key variable. For examples, we took the average of all of the six survey question scores for cognition and labelled this average the CSR cognition score. The CSR practices score is computed in a similar manner. All survey questions are tested with respect to their reliability. To this end, the Cronbach's alpha tests are conducted. The Cronbach's alpha coefficient can take values ranging from 0 to 1 while values that are higher than 0.70 are considered satisfactory (Cronbach, 1951). Questions on managerial cognition on CSR score 0.8273, and questions on CSR practices score 0.8708. This means that these questions on managerial CSR cognition and CSR practices are reasonably reliable.

Tobin's q is used as corporate performance measure. We have reasons to believe that this measure is a relevant and sound measure. First, unlike accounting-based performance measures, which are largely based on historical information, Tobin's q is a market-based measure which as argued in Demsetz and Villalonga (2001) is forward-looking as it incorporates investors' expectation on the firm. As long as stock market prices convey useful information about investors' expectation on the firm, then Tobin's q is a useful measure of how investors perceive the future performance of the firm. Whether investors recognise or disapprove the firm's effort on CSR, their actions result in changes in share price and hence changes in Tobin's q.[6] Second, with the availability of time-series data on Tobin's q, we can now use lagged Tobin's q as a control variable that captures omitted variables' biases that are commonly observed in cross-sectional regression.

Following Bai, Liu, Lu, Song and Zhan (2004), we compute Tobin's q as follows:

$$q_t = (MVCS_t + BVLTD_t + BVINV_t + BVCL_t - BVCA_t)/BVTA_{t-1}$$

where
$MVCS$ = the market value of the firm's common stock shares;
$BVLTD$ = the book value of the firm's long-term debt;
$BVINV$ = the book value of the firm's inventories;
$BVCL$ = the book value of the firm's current liabilities;
$BVCA$ = the book value of the firm's current assets; and
$BVTA$ = the book value of the firm's total assets.

To control for firm characteristics that may affect performance, we use a set of control variables similar to those used in Bai, Liu, Lu, Song and Zhan (2004). They are firm size (fsize), managerial ownership (mown), financial leverage (leverage), operational efficiency (opsales), asset turnover (atover), state ownership (sown), foreign ownership (fshare), and industry effect (indcd). See Appendix B for their definitions.

Low Response Rate as Missing Data Problem

Recall that out of the 223 firms included in the sample, only 51 firms responded to the questionnaire/interview of CFCSR. This implies that the data on managerial cognition (c) and CSR practices (p) are only available for these 51 firms, raising concern over any standard analyses that are restricted to these 51 firms with complete data. In particular, concern is raised about whether these firms may be an unrepresentative sample from which biased conclusions may be obtained.

Inverse Probability Weighing (IPW) Approach

To correct for this potential selection bias, we use the inverse probability weighting (IPW) approach (See Vansteelandt, Carpenter and Kenward (2010) and references therein for details).[7] The underlying principle of the IPW approach is that to correct for the selection bias, IPW aims to 'reconstruct' a random sample from the data so that the subsample with complete data is matched with, or similar to, that with incomplete data in terms of their characteristics. This can be done by giving more weight to firms when

they are less likely to be observed. More specifically, the bias can be corrected by weighting each of these firms' observations by the inverse of the probability of observing complete data.

Similar to other approaches of handling missing data, the IPW approach employs the standard assumption that the missing data are missing at random (MAR). Intuitively, this assumption implies that a firm's probability of having an observed CSR cognition and practices does not depend on whether or not the firm has a high level of CSR cognition and/or practices.

Formally, the idea of the inverse probability weighting method may be shown as follows. Without loss of generality, we consider a linear regression model of the following:

$$Y_i = \beta X_i + \varepsilon_i \tag{1}$$

where Y_i, X_i, and ε_i are dependent variable, explanatory variable(s), and error term for firm i = 1, 2, 3, …, N, respectively. Our objective is to estimate β, the beta coefficient(s) of the above model. Assume that Y_i has no missing observations while some of X_i has some missing values. Let D_i be an indicator of whether or not X_i is missing for firm i. If missing, D_i = 0 or else, D_i =1. The probability of D_i = 1 is π_i.[8] Standard estimation theory typically requires an estimator to satisfy the following unbiasedness condition:

$$\frac{1}{N}\sum_{i=1}^{N}U_i = 0 \tag{2}$$

where U_i is a function that is dependent on the observed data. For example, $U_i = Y_i - \beta X_i$ in the OLS regression. Implicit in this condition is that all U_i have equal weight (i.e., 1/N). Note that in our case where some of U_i are not observable due to missing data, suggesting that if we derive the estimator from the observed data only, those U_i computed from observable data are overweighted, while other U_i that are not observable are underweighted. To correct for this selection bias, we used the IPW estimator of β that can be shown to be a solution to a generalised form of the above unbiasedness condition:

$$\frac{\sum_{i=1}^{N}\dfrac{D_i}{\pi_i}U_i}{\sum_{i=1}^{N}\dfrac{D_i}{\pi_i}} = 0 \tag{3}$$

As clearly shown in the above equation, 'the inverse probability' ($1/\pi_i$) serves as a weighting function to underweight the subsample with complete observations and overweight the subsample with missing observations.

In practice, we use a two-stage approach.

(i) To estimate the probability (π_i), we fit a logistic regression with a set of fully observable characteristics Z_i which may include Yi. This logistic regression is also known as the probability estimation (or propensity score) model and specified as follows:

$$\pi_i \equiv \text{Prob}(D_i = 1|Z_i) = 1/(1 + \exp(-(\alpha_0 + \alpha_1 Z_i))) \tag{4}$$

It is well known that the efficiency of logistic regression is sample-size dependent. Given the fact that our sample size is small (less than 500), we use a bootstrapping method. 400 repetitions were used to estimate the clustered standard error of regression coefficients. To select appropriate variables for Z_i, we employ a backward search

algorithm that uses the likelihood ratio test to screen off those variables with statistical significance of greater than 10 per cent.

(ii) To estimate β in equation (1), we use weighted OLS regression method with weights being the inverse probability. As discussed later in the empirical results section, our statistical inference is clustered-based, which may get biased results if we have too few clusters. To control for this potential bias, we use a wild-bootstrapping method to control the size of t-test of the OLS regression coefficient in the second step as recommended in Cameron, Gelbach and Miller (2008).[9]

A potential limitation of the IPW estimator is that the probability so estimated may not be consistent or efficient because the probability estimation model (i.e., equation (4)) is assumed to be correctly specified and the probability is derived from fully observable variables only. To get around these problems, augmented IPW (AIPW) estimators were proposed in the literature and shown to be more efficient than IPW estimators in general because they also use information from those variables with missing data. In addition, they have a desirable property called 'doubly-robustness'. That is, if either the regression model or the probability estimation model is not correctly specified, the AIPW estimator is still valid.

Recently, Graham, Pinto and Egel (2011) developed a modified IPW estimator called Inverse Probability Tilting (IPT) estimator that is proved to be (locally) more efficient than AIPW and IPW and also doubly-robust. In addition, the estimator has been successfully applied in a setting similar to ours where a substantial portion of data is missing. The IPT and IPW estimators are very similar when it comes to implementation; the only difference is that instead of using the Conditional Maximum Likelihood (CML) estimation method, as standard IPW estimation method does, the IPT estimation method uses the Methods of Moment estimator to estimate the probability π_i.

The Goodman (1960) Test

The model we want to estimate may be expressed as follows:

$$Y_i = \beta_1 X_i + \beta_2 M_i + \beta_3 Z_i + \varepsilon_i \tag{5}$$

where Y is the dependent variable, X the independent variable, M the mediating variable, and Z the control variables. In terms of the cognition–affective model, Y is corporate performance, X managerial cognition, M CSR practices, Z observable firm characteristics and/or industry dummies. In addition, the cognition–affective model also assumes that the mediating variable M is a function of X. Mathematically,

$$M_i = \gamma X_i + \upsilon_i \tag{6}$$

Statistical significance of γ implies that X can affect M. Substituting equation (5) into equation (6), we get

$$Y_i = \beta_1 X_i + \beta_2(\gamma X_i + \upsilon_i) + \beta_3 Z_i + \varepsilon_i = \beta_1(1 + \beta_2\gamma)X_i + + \beta_3 Z_i + (\upsilon_i + \varepsilon_i) \tag{7}$$

Equation (7) suggests that X_i can affect Y_i in two ways. One is direct (i.e., β_1) and another one is indirect (i.e., $\beta_2\gamma$). By estimating the parameters of equation (5), one can gauge the extent of these two effects. In addition, one may test for the hypothesis whether there is statistically significant indirect effect. Goodman (1960) shows that with normality assumption, the standard error of $\beta_2\gamma$ can be computed exactly as follows:

$$s(\hat{\beta}_2\hat{\gamma}) = \sqrt{\hat{\gamma}^2 s_{\beta_2}^2 + \hat{\beta}_2 s_{\gamma}^2 + s_{\gamma}^2 s_{\beta_2}^2} \tag{8}$$

However, the above formula may not work in our case where the normality assumption is questionable here because of our small sample size. To get around this problem, we use bootstrapping to estimate the standard error of the indirect effect.[10] In particular, we resample the N units with replacement from the original sample of N units. For each resample, we estimate $\beta_2\gamma$ in the re-sampled data. Repeat the process for k times, and sort the values of $\beta_2\gamma$ estimates from low to high, then we can find the upper and lower bounds of a $100(1-\alpha)$ per cent confidence interval as the $(\alpha/2)k$th and $(1 + (1 - \alpha/2)k)$th values in this sorted distribution. In practice, the distribution of the indirect effect is typically skewed, this confidence interval can be further improved through bias correction as shown in MacKinnon et al. (2004). One can reject the null hypothesis if zero does not lie within the confidence interval.

4. Empirical Results

Summary Statistics and Correlations

Panel A of Table 1 shows the summary statistics of the key variables used in this study. The average Tobin's q of the sample firms is 0.20 with standard deviation of 0.29. Managerial cognition (c) is 2.20 on average while CSR practices (p) score is typically higher with its mean being 3.29. The managerial ownership is close to zero on average while the state ownership is 20 per cent on average. The average firm is characterised by large firm size (fsize) with low debt financing (leverage), good asset turnover (atover) and good profit-generating ability (opsales).

We find in Panel B of Table 1 that less than 50 per cent of the sampled firms are industrial firms. 18.33 per cent of the firms are from the utilities sector. The third largest sector is finance, which accounts for 10.31 per cent.

Table 2 depicts the pairwise correlation among the variables. Tobin's q is not correlated to managerial cognition (c) and CSR practices (p). As expected, Tobin's q is positively correlated with some firm characteristics. More specifically, q is positively related to fsize, asset turnover ratio, and leverage while it is negatively correlated with operation sales ratio. This result is consistent with the intuition that firms with larger size, better asset turnover, higher debt-financing, and higher sales-generating ability tend to have better corporate performance. Note that managerial cognition is highly related to CSR practices and the correlation is 0.655 and highly significant. The fact that many of the control variables are found to be correlated with Tobin's q, managerial cognition and CSR practices suggests that they are useful control variables.

Results for the Probability Estimation Model

Recall that to select appropriate variables for Zi, we employ a backward search algorithm that uses the likelihood ratio test to screen off those variables with statistical significance of greater than 10 per cent.[11] The search starts off with all the variables without missing data and they include corporate performance and other variables except managerial cognition and CSR practices. It ends up with four variables and the results are reported in Table 3.

The selected variables are Tobin's q, firm size, asset turnover, and an industry effect dummy variable for the property and real estate sector. Except asset turnover, all other variables are statistically significant at 10 per cent.

The Effect of Managerial CSR Cognition on CSR Practices and Corporate Performance

The Effect on CSR Practices

Table 3 provides some support to the cognitive–affective model in the sense that managerial CSR cognition can explain CSR practices. In particular, a unit increase in managerial cognition is associated with approximately 47 per cent increase in CSR practices. This effect holds true regardless of how the standard error of regression coefficient is estimated (Columns (1) to (3)) and whether or not control variables are incorporated in the analysis (Columns (4) to (6)). It is noteworthy that even though the size of the robust standard error is similar to that of the OLS standard error, its size is smaller than that of the bootstrapped standard error clustered by industry. This points to the existence of a positive correlation within industry cluster that cannot be captured by the robust standard error because the latter only allows for heteroscedasticity.

Ignoring this cluster effect may lead to incorrect statistical inference. Thus, from this point onwards, we always specify the regression model that incorporates this cluster effect.

Some firm characteristics are also found to be related to CSR practices. In particular, CSR practices are positively associated with managerial ownership (mown) and firm size (fsize) and negatively associated with leverage. This result is consistent with the intuition that firms with bigger size, higher managerial ownership and less debt-financing tend to have better CSR practices. It is interesting to note that industry dummy dum1 (i.e., whether the firm is a finance firm or not) is positively correlated with CSR practices. As we drop dum4 to avoid the multicollinearity problem, this also means that the conglomerate sector is used as the base for comparison, a positive coefficient of dum1 means that the CSR practices of a financial firm is better than that of a conglomerate firm by 51.4 per cent.

As indicated by the adjusted R-squared, the explanatory power of the regressions is reasonably good, ranging from 32.8 per cent to 67.7 per cent. The VIF inflation statistic does not reveal any significant problem of multicollinearity between managerial cognition and CSR practices as their Variance Inflation Factor (VIF) are all far less than 10.

The effects on Tobin's q

In Table 5, Tobin's q is used as corporate performance metric. As discussed earlier in the methodology section, we include lagged Tobin's q as an additional control variable to proxy for other unknown or omitted variables in the regressions. With this new control variable, the regressions seem to be well-specified, for the following reasons. First, adjusted R-squared indicates that from 78.4 per cent to 94.5 per cent of variation of the current Tobin's q can be explained by the variation of the explanatory variables. Second, the constant term is no longer statistically significant in most cases, suggesting that the chance of omitted variable biases is low. Third, the lagged Tobin's q, as expected, is found to be highly and positively correlated with the current Tobin's q, capturing substantial part of variations that are not explained by other independent variables. A unit increase in lagged Tobin's q can explain at least 87.6 per cent of the corresponding increase in the current Tobin's q. The VIF statistic of managerial cognition and CSR practices are 1.55 and 1.52, respectively, suggesting that there is no severe multicollinearity problem between them.

Columns (1) to (4) of Table 5 show the wild-bootstrapping cluster results. Once the lagged Tobin's q is included, CSR practices are now statistically significantly related to Tobin's q, regardless of what (simple or multiple) regressions we use. But managerial cognition is only statistically significant when jointly estimated with CSR practices. In simple regression, the coefficient of managerial cognition is now −0.002 while that of CSR practices is −0.008. The former is not statistically insignificant while the latter is significant at 5 per cent (see Columns (1) and (2)). The same pattern carries over to the case where both of these two variables are jointly estimated (see Column (3)). After controlling for known firm characteristics and industry effect, we reach a very different conclusion because their coefficients are now statistically significant, meaning that managerial cognition and CSR practices can explain Tobin's q. In particular, a unit increase in managerial cognition level is associated with 1.4 per cent *increase* in Tobin's q whereas on the other hand a unit increase in CSR practices comes with 7.2 per cent *decrease* in Tobin's q. This finding is consistent with the view that there is a dilemma faced by stock investors in China. On the one hand, they do recognise and appreciate managerial cognition on CSR but on the other hand they also are concerned with the potential costs of adopting CSR practices that may impair corporate performance.

Now firm characteristics like managerial ownership (mown), and asset turnover ratio (atover) are all positively related with Tobin's q while state ownership (sown) is negatively related with Tobin's q. This result suggests that firms with larger managerial

ownership, less state ownership and efficient asset management tend to have higher Tobin's q. Two industry dummies, dum2 and dum5 (i.e., whether the firm is a public utilities firm or industrial firm) are also positively correlated with Tobin's q. As we use the conglomerate sector as the base for comparison, a positive coefficient of dum2 (dum5) means that Tobin's q of public utilities (industrial firms) is higher than that of conglomerate firms by 7.2 per cent (14.6 per cent).

The direct effect and indirect effect are estimated 0.014 and −0.034, respectively. However, the Goodman (1960)'s mediation test shows that the mediating effect of CSR practices is not statistically significant because zero falls within both the percentile confidence interval and bias-correction interval at 95 per cent. In other words, this provides empirical evidence that does not lend support to the cognitive–affective model where CSR practices serve as a mediating variable that is affected by managerial cognition and effect to corporate performance.

Sensitivity Analysis

One may argue that the above main results are sensitive to model misspecification errors in equations (4) and (5). We re-did the analysis using the IPT estimation method because this estimation method is more efficient and doubly robust. That is, it is more efficient than the IPW estimator that we used to generate the main results and still consistent estimator if either equation (1) or equation (2) is mis-specified. The results are reported in Columns (5) to (8) of Table 6. Similar to the main results shown in Columns (1) to (4), both managerial cognition and CSR practices can explain Tobin's q whenever they are estimated jointly with other control variables (see Column (8), Table 6). In the presence of control variables, a unit increase in managerial cognition brings about 1.7 per cent increase in Tobin's q while a similar increase in CSR practices brings Tobin's q down by 5.9 per cent.[12]

5. Conclusion and Discussions

In this paper we study the effect of managerial CSR cognition on corporate performance. We use a proprietary dataset that contains data on managerial cognition on CSR from 223 listed firms in China. Tobin's q is used as a measure of corporate performance. We find strong evidence that managerial CSR cognition positively affects CSR practices. After controlling for firm characteristics and industry effects, we also find evidence that both managerial cognition and CSR practices explain corporate performance, but in different ways. More specifically, the former increases corporate performance while the latter lowers it. However, the Goodman (1960) mediation test reveals that CSR practices have no significant role in mediating the effect of managerial cognition on corporate performance, providing little empirical support to the cognitive—affective model. Overall, the results are consistent with the view that on the one hand stock investors in China appreciate managerial cognition on CSR, while on the other hand they are also concerned with the potential cost implications of CSR practices on corporate performance.

Tables

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Table 1 provides summary statistics of the variables used in this study. For details of these variables and their definition, see Appendix B. Panel A of the table shows the summary statistics of the key variables while Panel B depicts the frequency distribution of the industry dummies we use to control for industry effects.

Table 1:   Summary Statistics

Panel A: Summary statistics

Variable	Mean	Median	Std dev	Skewness	Kurtosis
Tobin's q (q)	0.20	0.20	0.29	0.04	5.78
Managerial cognition (c)	2.20	2.29	0.52	−0.36	2.08
CSR practices (p)	3.29	3.30	0.37	−0.36	2.64
Managerial ownership (mown)	0.00	0.00	0.03	10.28	114.95
Foreign share ownership (fshare)	0.19	0.00	0.40	1.56	3.42
State ownership (sown)	0.20	0.02	0.25	0.82	2.29
Firm size (fsize)	21.91	21.77	1.44	0.65	3.58
Asset Turnover (atover)	1.60	0.87	3.27	9.61	118.30
Operation–sales ratio (opsales)	0.32	0.22	0.35	1.63	7.33
Financial leverage (leverage)	0.15	0.12	0.15	2.26	14.62

Panel B: Distribution of firms across industries

Industry	Code	Freq.	Per cent
Finance	dum1	23	10.31
Utilities	dum2	42	18.33
Properties	dum3	20	8.97
Conglomerates	dum4	21	9.42
Industrials	dum5	111	49.78
Commerce	dum6	6	2.69
	Total	223	100.00

Table 2 reports the Pearson correlation matrix of ten key variables used in the study. They are Tobin's q (q), managerial cognition (c), CSR practices (p), managerial ownership (mown), foreign share ownership (fshare), state ownership (sown), firm size (fsize), asset turnover ratio (atover), operating sales ratio (opsales) and financial leverage (leverage). See Appendix B for a description of these variables.

Table 2:   Correlation Matrix of Key Variables

	q	c	p	mown	fshare	sown	fsize	atover	opsales	leverage
q	1.000									
c	−0.063	1.000								
p	−0.087	0.655[c]	1.000							
mown	−0.020	−0.111	−0.062	1.000						
fshare	−0.011	0.157	0.248[a]	−0.059	1.000					
sown	0.027	0.028	0.125	−0.068	0.083	1.000				
fsize	0.118[a]	0.169	0.423[c]	−0.093	0.474[c]	0.210[c]	1.000			
atover	0.418[c]	0.080	0.035	−0.047	−0.041	0.135[b]	−0.091	1.000		
opsales	−0.175[c]	0.203	0.032	0.027	−0.015	0.012	−0.232[c]	0.201[c]	1.000	
leverage	0.693[c]	−0.008	−0.121	−0.058	−0.036	0.116[a]	−0.075	0.606[c]	−0.037	1.000

Note.   Standard errors in parentheses: [c] $p < 0.01$, [b] $p < 0.05$, [a] $p < 0.1$

Table 3 shows the estimation results of the probability estimation (or propensity score) model we use to generate the inverse probability (π_i). This model is the result of a backward search algorithm that employs likelihood ratio test with 10 per cent significance level. A logit model is used for estimating the probability. In this model, the dependent variable D_i is an indicator of whether or not X_i is missing for firm i. If missing, $D_i = 0$ or else, $D_i = 1$. Conditional Maximum Likelihood method is used for estimation purpose. We begin with all of the variables without missing data and then drop a variable one at a time if it has the highest statistical insignificance. We repeat this process until all of the remaining variables are statistically significant at 10 per cent in terms of the likelihood ratio test.

Table 3: Results for the Probability Estimation Model

Logistic regression			Number of obs		=	223	
			Replications		=	400	
			Wald chi2(4)		=	8.16	
			Prob > chi2		=	0.0860	
			Log likelihood		=	−113.25002	

		Coef.	Bootstrap Std. Err.	Z	P>|z|	Normal–based [95% Conf. Interval]	
Q	|	−1.328	0.79	−1.68	0.093	−2.88	0.22
Fsize	|	0.378	0.14	2.77	0.006	0.11	0.65
Atover	|	0.107	0.12	0.92	0.356	−0.12	0.34
dum3	|	1.227	0.72	1.71	0.086	−0.18	2.63
cons	|	−9.597	3.09	−3.11	0.002	−15.64	−3.55

In Table 4, Columns (1) to (3) show the estimation results of a simple OLS regression where managerial cognition (c) is the only explanatory variable. Columns (1), (2), and (3) report the ols standard error, the robust standard error, and wild-bootstrapped clustered standard error, respectively. Columns (4) to (6) show the estimation results of a multiple regression where managerial cognition (c) and other control variables are the explanatory variables. See Appendix B for a description of these control variables. VIF refers to a measure of multicollinearity called Variance Inflation Factor.

Table 4:   The Effect of Managerial CSR Cognition (c) on CSR Practices (p)

VARIABLES	(1) ols	(2) robust	(3) cluster_wb	(4) ols	(5) Robust	(6) cluster_wb
c	0.475[c]	0.475[c]	0.475[b]	0.469[c]	0.469[c]	0.469[b]
	(0.08)	(0.08)	(0.24)	(0.09)	(0.09)	(0.23)
mown				0.192	0.192	0.192[b]
				(0.40)	(0.40)	(0.09)
fshare				−0.060	−0.060	−0.060
				(0.18)	(0.18)	(0.12)
sown				−0.041	−0.041	−0.041
				(0.17)	(0.17)	(0.08)
fsize				0.048	0.048	0.048[b]
				(0.04)	(0.04)	(0.02)
atover				0.039[b]	0.039[b]	0.039
				(0.02)	(0.02)	(0.00)
opsales				−0.439[a]	−0.439[a]	−0.439
				(0.26)	(0.26)	(0.31)
leverage				−0.889[b]	−0.889[b]	−0.889[b]
				(0.38)	(0.38)	(0.34)
dum1				0.514[b]	0.514[b]	0.514[c]
				(0.19)	(0.19)	(0.00)
dum2				0.361[a]	0.361[a]	0.361
				(0.21)	(0.21)	(0.34)
dum3				0.465[b]	0.465[b]	0.465
				(0.21)	(0.21)	(0.34)
dum5				0.340	0.340	0.340
				(0.23)	(0.23)	(0.30)
dum6				0.063	0.063	0.063
				(0.23)	(0.23)	(0.12)
constant	2.204[c]	2.204[c]	2.204[b]	1.027	1.027	1.027
	(0.20)	(0.20)	(0.92)	(0.75)	(0.75)	(0.70)
VIF of c				1.14		
Adjusted R2	0.328	0.328	0.355	0.555	0.555	0.677

Note.   Standard errors in parentheses: [c] p<0.01, [b] p<0.05, [a] p<0.1

Table 5 reports the estimation results of a regression where Tobin's q is specified as the dependent variable and lagged Tobin's q is a control variable for omitted variables bias. For a description of other variables specified in the regression, see Appendix B. Columns (1) to (4) provide inverse-probability weighted (IPW) regression results where we also use wild-bootstrapping method to estimate standard error of regression coefficients. The results of inverse-probability tilting (IPT) estimation method are reported in Columns (5) to (8). VIC refers to a measure of multicollinearity called Variance Inflation Factor. The Goodman (1960) statistic is used to test for the presence of mediating effect of CSR practices. Two bootstrapped confidence intervals (CI) at 95 per cent are also reported; one is percentile confidence interval and another one is bias-corrected confidence interval.

Table 5:   Tobin's q as Performance Metric

VARIABLES	(1) Clustered standard error (wild-bootstrap)	(2)	(3)	(4)	(5)	(6)	(7) IPT estimates	(8)
lagged q	1.072^c	1.072^b	1.073^b	0.876^c	1.099^c	1.095^c	1.098^c	0.867^c
	(0.38)	(0.42)	(0.42)	(0.31)	(0.05)	(0.05)	(0.05)	(0.02)
managerial cognition	−0.002		0.002	0.014^b	0.011		0.020	0.015^a
	(0.00)		(0.01)	(0.01)	(0.03)		(0.03)	(0.01)
CSR practices		-0.008^b	-0.010^b	-0.072^b		−0.002	−0.020	-0.059^b
		(0.00)	(0.00)	(0.03)		(0.02)	(0.02)	(0.03)
mown				0.277^a				0.294^c
				(0.16)				(0.08)
fshare				0.050				0.038^b
				(0.00)				(0.02)
sown				-0.055^b				−0.050
				(0.02)				(0.05)
fsize				0.002				0.007
				(0.00)				(0.01)
atover				0.016^c				0.012^c
				(0.01)				(0.00)
opsales			−0.023				0.007	
			(0.02)					(0.05)
leverage				0.599				0.706^c
				(0.36)				(0.10)
dum1				0.165				0.222^a
				(0.11)				(0.13)
dum2				0.072^a				0.145
				(0.04)				(0.14)
dum3				0.013				0.061
				(0.04)				(0.15)
dum5				0.146^c				0.217
				(0.05)				(0.14)
dum6				0.138				0.223^a
				(0.09)				(0.12)
constant	0.000	0.022	0.022	−0.027	−0.028	0.003	0.018	-0.261^a
	(0.00)	(0.02)	(0.02)	(0.02)	(0.04)	(0.06)	(0.05)	(0.15)
VIF of c			1.55	2.17				
VIF of p			1.52	3.04				
Goodman (1960)'s statistics				−.034				
				(0.03)				
Percentile CI (95%):	[−0.117 0.030]							
Bias-corrected CI (95%)	[−0.151 0.017]							
Adjusted R2	0.784	0.784	0.784	0.945				

Note.   Standard errors in parentheses: ^{c} p<0.01, ^{b} p<0.05, ^{a} p<0.1

Notes

1. For a survey on this literature see Griffin and Mahon (1997), Roman, Hayibor and Agle (1999), and Orlitzky, Schmidt and Rynes (2003).
2. For examples, Thomas, Clark and Gioia (1993) find linkages between cognition and action, and cognition and performance, in their questionnaire-based study of 156 hospital CEOs. Barr, Stimput and Huff (1992) consider the relationship between managerial cognition and organisational change. They conclude that the mental models of managers may be better predictors of organisational change than other managerial characteristics, such as succession, age or education.
3. See the data section for other reasons why Tobin's q is chosen as corporate performance measure.
4. The RESPONSE model is a variant of the cognitive–affective model. Unlike the cognitive–affective model, which stresses the *level* of cognition, the RESPONSE model focuses on cognitive *gaps*. The aim is to determine cognition alignment, i.e., the degree to which managers' and stakeholders' understandings are aligned. See RESPONSE (2007).
5. The CSI 300 index is a value-weighted stock market index designed to replicate the price movement of 300 stocks traded in the Shanghai and Shenzhen stock exchanges. It was established on 8 April 2005 and is compiled by the China Securities Index Firm, Ltd.
6. This line of reasoning does not require that financial markets are efficient.
7. As discussed in Little and Rubin (1987), there are three general methods for handling missing values in statistical analysis. The first approach ignores the observations with missing values and bases the analysis on the complete case data. As discussed in the paper, the disadvantages of this approach are biases in estimates when data are missing in a systematic way and the loss of efficiency due to discarding the incomplete observations. The second approach is the so called 'imputation method', which imputes values for the missing variables and carries out the analysis as if the imputed values were observed data. This approach may reduce the bias of the complete case analysis but may lead to additional bias in multivariate analysis if the imputation fails to control for all multivariate relationships. The third approach is to assume some models for those variables with missing values and then use a maximum likelihood approach to obtain estimates for the models. The inverse probability weighting approach fails into the third approach.
8. If π_i is a constant, then we have a situation called 'missing completely at random' (MCAR) problem. If π_i depends on observed data but not on X_{1i}, then this situation is referred to as 'missing at random' (MAR) problem. In the case where π_i depends on X_{1i}, we have a situation called 'nonignorable or systematic missingness'.
9. Notice that wild-bootstrapping is not applicable in the first stage because it is based on residual bootstrapping from linear regression hence the outcome must be continuous (which rules out logistic regression where the outcome is not continuous but dichotomous).
10. See, for example, Bollen and Stine (1990), and MacKinnon, Lockwood and Williams (2004).
11. Interestingly, we used a forward search algorithm with similar threshold and ended up with the same model in the end.
12. In unreported results, we have also examined the data with an AIPW estimator. The results are essentially unchanged.

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Appendix A

List of questions used to assess managerial cognition

Q.1   What is/are the possible impact(s) of risk management on the firm?
A.   Increasing the operational costs
B.   Enhancing the effectiveness of decision-making
C.   Enhancing the corporate governance
D.   Enhancing the firm's competitiveness
E.   Others. Please specify: _____

Q.2.   Do you think your firm has already started using risk or risk-related management? In what way(s)?
A.   Yes, as the importance of risk management has been clearly spelled out in various operations meetings.
B.   Yes, as the firm has already set up or started to set up a system/procedure of risk management.
C.   Yes, as the firm has already set up or started to set up a risk management department.
D.   Yes, as there is provision of proper training on understanding the importance of risk management to all employees.
E.   Yes, others. Please specify: _____
F.   No or not sure.

Q.3   What is the most difficult problem that your firm has to face when it comes to environmental protection?
A.   Lack of necessary knowledge of environmental protection.
B.   Lack of necessary knowledge of environment protection and lack of money to do environmental protection.
C.   Lack of money to do environmental protection.
D.   Yes, others. Please specify: _____
E.   No, or not sure.

Q.4   What is/are the reason(s) why your firm engages in environmental protection?
A.   Compliance
B.   Pressure from society or public opinion
C.   Enhancing the corporate image
D.   Enhancing the firm's competitiveness
E.   Yes, others. Please specify: _____
F.   No or not sure.

Q.5   What are the possible impact(s) of engaging your firm in corporate social responsibility?
A.   Increasing the operational costs
B.   Enhancing the corporate image and influence
C.   Jeopardising shareholders' interest
D.   Enhancing employee satisfaction
E.   Enhancing the firm's economic efficiency
F.   Avoiding regulatory risk
G.   Others. Please specify: _____

Q.6   What is/are the reason(s) why your firm engages in corporate social responsibility?
A.   Compliance
B.   Pressure from society or public opinion
C.   Resolving disputes on international trades
D.   Enhancing the corporate brand-name
E.   Enhancing the firm's competitiveness
F.   Enhancing the corporate sustainability
G.   Yes, others. Please specify: _____

Appendix B

Definitions of Key Variables

Variable (symbol)	Definition
Tobin's q (q)	$q_t = (MVCS_t + BVLTD_t + BVINV_t + BVCL_t - BVCA_t)/BVTA_{t-1}$ where: $MVCS$ = the market value of the firm's common stock shares; $BVLTD$ = the book value of the firm's long-term debt; $BVINV$ = the book value of the firm's inventories; $BVCL$ = the book value of the firm's current liabilities; $BVCA$ = the book value of the firm's current assets; and $BVTA$ = the book value of the firm's total assets.
Managerial cognition (c)	Simple average of 6 indicators (see Appendix A for details)
CSR practices (p)	Simple average of 24 indicators covering economic dimensions (9 indicators), environmental protection (4 indicators) and social dimensions (11 indicators)
Managerial ownership (mown)	Percentage of managerial ownership
Foreign share ownership (fshare)	A dummy variable where it is 1 if foreign share ownership > 0; otherwise zero.
State ownership (sown)	Percentage of state ownership
Firm size (fsize)	log(net income)
Asset Turnover (atover)	Total assets/sales
Operation-sales ratio (opsales)	Net income/sales
Financial leverage (leverage)	Total debt/total equity