

# Corporate Social Responsibility and Shareholder Wealth: A Longitudinal Mixed-Model Analysis

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## 1 Introduction

The empirical findings on the relationship between corporate social performance (CSP) and corporate financial performance (CFP) are widely varied and often inconsistent. Although most studies find a positive CSP-CFP relationship, many find no statistically significant relationship and some find it to be negative.

Firms engage in socially responsible (SR) activities based on the condition that the anticipated benefits from these activities are greater than the costs associated with the additional resources that must be allocated for the firms to achieve SR status (profit maximizing SR theory, e.g., McWilliams and Siegel (2001) and Bognoli and Watts (2003), Paul and Siegel, 2006). Motives inconsistent with profit maximization might also drive SR investment (i.e., public pressure from customers, employees, suppliers, governments, shareholders, and community groups might induce firms to undertake the costs of SR initiatives with little or no expectation of increased profit). Managers and large stockholders may pursue private benefits from SR initiatives that do not flow to stockholders generally (Barnea and Rubin (2006). Whether managers are responding to public pressure or seeking private benefits, the resources allocated for these types of investment creates a tradeoff between SR investment and profitability.

We examine the effect of CSP on stock price, which is the sole direct measure of firm value and the only measure that can capture the inherently long-term and intangible implications of CSP on stakeholder relationships by using 1,115 unique companies from 1999-2008 with an improved panel data methodology.

## 2 Contributions

Different than ad-hoc measures of firm performance (accounting profits or Tobin's q), we use an empirical model of stock price that incorporates a measure of expectations about future earnings and stock price.

The intrinsic value of a firm's common stock equals the current book value of its common equity plus the present discounted value of its projected stream of income in excess of the opportunity cost of equity capital (The Residual Income Valuation Model (RIM) e.g., Penman and Sougiannis (1998)). We examine the extent to which variation in stock price not accounted for by intrinsic value can be attributed to CSP.

We estimate CSP-CFP relationship using a mixed effect model (letting the coefficient on the Domini 400 Social Index (DS400) membership vary randomly by industry) for stock price after controlling for firm's intrinsic value and the traditional explanatory factors such as profitability, size, financial leverage, business cycle effects and industry characteristics.

We take a closer look at those industries where stock price is statistically significantly impacted by DS400 membership, both positively and negatively, and examine the differences between these industries in terms of the KLD dimensions of social performance.

## 3 Data Sources

Compute intrinsic value using Value Line, Inc. data; Use KLD ratings for CSP variables; Use Compustat data for control variables.

	Distribution by Year			Distribution by Sector			
	Total	DS400	Non-DS400	Total	DS400	Non-DS400	
1999	218	138	80	Energy	330	91	239
2000	65	40	25	Materials	429	127	302
2001	353	159	194	Industrials	986	316	670
2002	435	189	246	Consumer Discretionary	1,243	414	829
2003	648	185	463	Consumer Staples	296	147	149
2004	718	206	512	Health Care	657	214	443
2005	716	213	503	Financials	710	296	414
2006	713	210	503	Info Tech	741	145	596
2007	769	212	557	Telecom	33	9	24
2008	826	215	611	Utilities	29	8	21
Total	5,461	1,767	3,694		5,454	1,767	3,687

Table Notes: The sample consists of 5,461 firm-years from 1999-2008. There are 1,115 unique firms. Industry classification is based on Compustat Global Industrial Classification (GIC) at the two-digit level. Seven firms had no industry classification.

## 4 Empirical Method

We estimate a linear mixed model (LMM) using firm-level panel data from 1999-2008. In a LMM framework both fixed and random effects are accommodated. The "fixed" effects of the LMM are analogous to linear predictors from standard OLS. The "random" effects are assumed to be distributed as an empirically derived probability function (Kreft and De Leeuw 1998). Specifically, we estimate a linear mixed model of the form;

$$y = X\beta + Z\phi + \varepsilon$$

In this setup,  $y$  is an  $N \times 1$  vector of responses,  $X$  is an  $N \times q$  design matrix for fixed effects  $\beta$ , and  $Z$  is an  $N \times r$  design matrix for random effects  $\Phi$ . The random effects  $\Phi$  and  $\varepsilon$  are normally distributed with

$$E \begin{bmatrix} \phi \\ \varepsilon \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \text{ and } Var \begin{bmatrix} \phi \\ \varepsilon \end{bmatrix} = \begin{bmatrix} G & 0 \\ 0 & R \end{bmatrix}$$

Thus, we model the variance of  $\Phi$  (the  $r$  random coefficients) by setting up  $Z$  (the random effects design matrix) to allow for panel-level variation in intercept and slope for CSP and by specifying covariance structures for  $G$ . We model  $G$  at the level of 8-digit GICS (sub-industry) thereby allowing the intercept and returns to CSP (i.e., the slope) to vary between well established industry strata (the 8-digit GIC).

Thus, linear mixed models, as random coefficient models, allow each of the  $M = 143$  strata formed from 8-digit GICS designation to deviate from the fixed solution in both their intercept and slope for our CSP indicator (Laird & Ware 1982). As in OLS,  $R$  is an  $N \times N$  block diagonal matrix with each block,  $R_i$ , containing the variances and covariance of within-subject errors. As is customary,  $R$  is assumed to exhibit equal variance for all residuals in  $\varepsilon$ .

## 5 Empirical Model

We estimate the effect of CSP on stock price using the following linear mixed-models equation:

$$P_{it} = \beta_0 + \beta_1 CSP_{it} + \beta_2 IV_{it} + \beta_3 ROIC_{it} + \beta_4 DEBT_{it} + \beta_5 SALES_{it} + \beta_6 Y_{it} + \varepsilon_{it}$$

$i = 1, \dots, 1115$  firms;  $j = 1, \dots, 143$  industries  
 $t = 1999, \dots, 2008$

where:

$P_{it}$  = Stock Price (log form).  
 $CSP = 1$  for firm's inclusion in the DS400 and 0 otherwise.  
 $IV_{it}$  = Intrinsic value of a share of common stock (log form).  
 $ROIC_{it}$  = Return on invested capital (ROIC) to control profitability.  
 $DEBT_{it}$  = Financial Leverage-the amount of debt in the capital structure.  
 $SALES_{it}$  = Size (log form).  
 $Y_{it}$  = Year dummy variables (2008 is the base year).

The coefficient on DS400 membership is of primary interest to us. Its estimated sign and statistical significance shed light on "profit maximizing" and "private benefit seeking" hypotheses.

## For Further Information

Please contact [geylanip@duq.edu](mailto:geylanip@duq.edu) for the full version of the paper.

## 6 Results

Panel A – Covariance Parameter Estimates					Panel B – Fixed Effects Results				
Random Effect	Estimate	Std Err	Z-Val	p-Val	Variable	Estimates	Std Err	t-Value	p-Value
Variance – $\phi_0$	0.0075***	0.0014	5.48	<.001	Intercept	3.3708***	0.020	166.36	<.0001
Covariance( $\phi_1, \phi_0$ )	-0.003+	0.0016	-1.83	0.0673	CSP	-0.0336*	0.014	-2.42	0.0154
Variance – $\phi_1$	0.0103***	0.0028	3.63	<.001	IV	0.8892***	0.016	54.73	<.0001
					ROIC	0.2105***	0.054	3.92	<.0001
					DEPT	-0.0277+	0.017	-1.66	0.0969
					SALES	0.0155**	0.005	3.22	0.0013

Table Notes: + signifies p-value < 0.10, \* signifies p-value < 0.05, \*\* signifies p-value < 0.01, and \*\*\* signifies p-value < 0.001. Number of observations = 5454 from 1,115 unique firms. Continuous predictor variables are grand-mean centered. Robust (Huber-White heteroskedastic corrected) standard errors are reported. -2 Res Log Likelihood = 402.3, AIC = 410.3. Null Model Likelihood Ratio Test –  $\chi^2(3) = 395.66$ , p-value < .001.

Results are consistent with "private benefit seeking" hypothesis that firms exhibiting SR traits have stock prices that are significantly less than firms not exhibiting such traits. On average, SR firms exhibit stock prices that are 3.31% less than non-SR firms. All remaining variables of interest are significant and in the expected direction.

Results also show significant variation between both the random intercept and the random slope for CSP. They confirm that firms differ in average stock price between GICS strata and there is significant variation among the returns to CSP among the GICS strata. Also, there is no evidence that the effects of CSP status on stock price differs depending on the average stock price in the GICS strata.

## 7 Further Investigation

We take a closer look at those industries where stock price is statistically significantly impacted by DS400 membership, both positively and negatively, and we examine the differences between these industries in terms of the KLD dimensions of social performance.

Industries	Community	Diversity	Employee Relations	Environment	Human Rights	Products	Corporate Governance
Energy					0.0923**	0.057**	
Capital Goods			0.0528*	0.0708*	0.0755**		
Commercial Services & Supplies			-0.0967*	-0.1501*		-0.0967*	
Transportation	0.1062**						0.0678*
Consumer Durables & Apparel				-0.1239*			
Consumer Services							0.04336*
Media				-0.1031*			0.0702**
Healthcare Eqp. & Services					0.1185*		
Banks	-0.0801**	-0.1357***	-0.1621***	-0.2062**	-0.1543*		
Insurance		0.0740*				0.0628*	
Real Estate							0.1589**
Software Services							-0.0386*

Coefficient estimates are in parentheses. \*\*\*significant at 1%; \*\*significant at 5%; \* significant at 10%.

## 8 Conclusions

Empirical results from a broad definition of CSP show a negative and significant relationship between CSP and shareholder wealth. This indicates that the stock prices of firms in the DS400 are on average 3.3% lower than the prices of firms not in the DS400.

Our results support of private benefit seeking behavior where managers may undertake SR investment for private benefit at shareholders' expense. If SR investment is a signal that management is prone to acting for their own private benefit, then investors might expect managers of DS400 firms to act in a variety of ways not beneficial to shareholders.

Since stakeholder expectations for CSP vary by industry, the motivation to pursue CSP and thus the effect on CFP can be expected to vary by industry as well. Our industry specific analysis supports this expectation and shows that the effect of CSP on stock price varies between industries in terms of the KLD dimensions of social performance.