Corporate Social Responsibility and Performance Outcomes of high Technology Firms: Impacts on Open Innovation

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Abstract. Although previous studies have proposed studying the missing link between CSR and performance by incorporating innovation (Bocquet et al., 2017; Hull & Rothenberg, 2008), our study goes one step further to assert that OI is the best possible solution and mediator in this relationship. We collected data on 587 publicly listed electronics firms in Taiwan for the 2012-2017 period. Our results showed that different modes of OI corresponding to CSR can lead to positive performance outcomes. Specifically, responsive CSR goes through the markets mode, while strategic CSR goes through the partnerships mode to achieve positive performance. The results can deepen our understanding of CSR, OI and performance.

Keywords: CSR, performance, R&D

1. Introduction

Corporate social responsibility (CSR) has become an imperative for firms operating in an environment where stakeholders matter. Davis (1960) coined the term 'iron law of responsibility' and indicated that firms will lose their societal legitimacy if they do not act with the responsibility that society demands from businesses. This assertion has stimulated much attention from scholars in various fields, including management, finance, economics, innovation, public policy, and environmental studies. Nonetheless, not all firms voluntarily follow this trend in practice; studies even show that the relationship between CSR and financial performance is inconsistent, displaying a positive, negative, or even neutral relationship (e.g., Aupperle, Carroll, & Hatfield, 1985; Hull & Rothenberg, 2008; McGuire, Alison, & Schneeweis, 1988). Observing these divergent approaches and findings, Porter and Kramer (2006) proposed to study or analyze CSR by integrating business and society; strategic CSR and responsive CSR should be distinguished so that firms

know how to incorporate CSR into their value chain activities.

When firms adopt CSR activities, they open up their boundaries to society, and the problems that they uncover usually involve complex problem-solving processes. The question of how to solve these new-found problems using an organization's existing resources or knowledge can be difficult, and external search becomes viable for firms to employ (Nickerson & Zenger, 2004). The result is a natural choice to utilize open innovation (OI), which allows the innovative ideas and knowledge embodied in people and intellectual property to flow freely either inwardly or outwardly (e.g., Chen, Chen, & Vanhaverbeke, 2011; Chesbrough, 2003; Chesbrough, 2012; Enkel, Gassmann, & Chesbrough, 2009). Recently, based mainly on problem complexity, scholars have categorized OI into different modes (Felin & Zenger, 2014). We aim to determine whether and how through these different modes of OI CSR can derive better and more consistent positive performance outcomes. Specifically, this study aims to answer the question of whether adopting CSR can derive positive performance outcomes, especially through the channel of OI with its various modes. Do different CSR types, i.e., strategic CSR versus responsive CSR, lead to different outcomes?

The remainder of this paper is organized as follows. The following section reviews the literature related to how different types of CSR lead to performance outcome and what roles the different modes of OI play. These arguments form the basis of the hypotheses investigated in this study. The subsequent section describes the research methods, conceptual framework, variable definitions and measures, and data collection used in this study, followed by a presentation and discussion of the results. The final section discusses the implications of the findings, limitations, and directions for future research.

2. Literature Review and Hypothesis Development

Firms have been encouraged to adopt CSR practices in recent years; however, the direct outcomes derived from CSR are still contentious, and scholars are still debating whether the adoption of CSR can lead to positive performance. For example, the study of McGuire et al. (1988) indicated that a lack of CSR may expose a firm to additional risk from lawsuits and fines and may limit its strategic options. They further noted that accounting-based (especially return on assets (ROA)) indicators proved to be a better predictor of CSR than market measures. On the other hand, studies suggesting a negative relationship between CSR and financial performance tend to argue that firms trying to enhance social performance allocate resources and management effort away from core areas of the business, resulting in lower profits (Hull & Rothenberg, 2008). Moreover, using economic, legal, ethical, and discretionary (philanthropic) measures as CSR definitions, Aupperle et al. (1985) studied 241 CEOs listed in the Forbes 1981 Annual Directory to examine the relationship between CSR and return on investment (ROI) in both

short-term and long-term effects. Their results showed that employing CSR is not significantly related to financial performance.

Answering the question of 'CSR and Firm Performance: Is Innovation the Missing Link?' (Bocquet, Le Bas, Mothe, & Poussing, 2017), we posit that this inconsistency comes from the different innovation modes employed by organizations. Firms that aim to solve problems using distant search will apply OI for solution governance. We specifically focus on two governance modes, markets and partnerships, for two reasons. First, these two modes reflect different levels of problem-solving involvement, which corresponds to the problems brought by CSR. Second, these two modes of OI have been adopted the most in the high-tech industry, which is the focus of this study. Below, we delineate our rationale.

2.1. Responsive CSR-Market-Performance Link

Porter and Kramer (2006) define responsive CSR as consisting of two elements: (1) acting as a good corporate citizen, attuned to the evolving social concerns of corporate stakeholders, and (2) mitigating existing or anticipated adverse effects from business activities. Regarding the first element, typical activities include donations to nonprofit organizations and support for education or the environment; regarding the second element, businesses need to consider whether there is any procedure in their product or service that may bring harm to the environment. For example, Nike responded to anti- sweatshop accusations by improving the labor working environment. From the perspective of firms, these activities do not change their value chain, and these problems have a clear goal and task.

To solve the problems derived from responsive CSR, we contend that the mode of 'markets and contracts' ('markets' hereafter) is appropriate. 'Markets' refer to the mode in which firms purchase or sell their technological knowledge or intellectual property rights (Chesbrough, 2003). Adopting this mode, firms seek solutions to problems by matching the problems with external parties who already possess solutions or solution elements and who require only minimal communication and a low cost (Felin & Zenger, 2014). Therefore, our first hypothesis is as follows:

H1: Responsive CSR is positively associated with the engagement of the markets mode of OI.

Prior studies have used cases to show how a company using markets to acquire knowledge generates enhanced results when its efforts span both organizational and technological boundaries (e.g., Chesbrough and Crowther, 2006; Dodgson et al., 2006). According to the recombinant innovation literature, a broader knowledge base provides firms with more unique technological fields, which facilitates combined market opportunities for products or services (Arora, Fosfuri, & Gambardella, 2001; Katila & Ahuja, 2002; Wu & Shanley, 2009). With an increased knowledge pool, distinctive new variations can provide the firm with

numerous choices for renewing its problem-solving capacities and possibilities for finding new and useful combinations of knowledge to create value with unique benefits (Atuahene-Gima et al., 2005; March, 1991). We thus propose the following hypothesis:

H2: The markets mode of OI is positively associated with firm performance.

Combining the above arguments, we find that responsive CSR cannot directly lead to performance outcomes because the realization of such outcomes requires a problem-solving mechanism in the organization to materialize them. We therefore propose the following hypothesis:

H3: The markets mode of OI mediates the relationship between responsive CSR and firm performance.

2.2. Strategic CSR-partnership-performance link

According to Porter and Kramer (2006), '[S]trategic CSR…mounts a small number of initiatives whose social and business benefits are large and distinctive. Strategic CSR involves both inside-out and outside-in dimensions working in tandem. It is here that opportunities for shared value truly lie' (page 88). Bocquet et al. (2017) specifically study strategic CSR and argue that strategic CSR has a positive effect on firms' growth through the mediating effect of technological innovation. We follow this logic but delve into a deeper level of analysis by incorporating the mode of OI into this analysis.

Strategic CSR moves beyond showing good corporate citizenship and mitigating harmful value chain impacts; it involves both inside-out and outside-in dimensions. From this definition and practice, we posit that firms adopting strategic CSR tend to engage in the 'partnerships' mode of OI, which includes both equity and nonequity alliances and corporate venture capital and addresses problems of intermediate complexity. Compared to the markets solution, this governance form generates richer, more multifaceted relationships that support active problem solving and provide access to external knowledge (Enkel et al., 2009; Felin & Zenger, 2014). We thus propose the following hypothesis:

H4: Strategic CSR is positively associated with engaging in the partnerships mode of OI.

Firms adopting the partnerships mode are looking for new opportunities to obtain ideas or knowledge that is not used by the focal firm but that still has economic value in technology markets. This approach allows a firm to cocreate or codevelop this knowledge with another independent organization, for example, through research and development (R&D) alliances (Chesbrough & Garman, 2009; Nieto & Santamaría, 2007) . In addition, the partnerships mode may provide firms with access to external technology (Grindley & Teece, 1997) and may also generate new business possibilities and growth options by putting technologies to work

(Chesbrough & Garman, 2009). Based on these arguments, we propose the following hypothesis:

H5: The partnerships mode of OI is positively associated with firm performance.

Combining the above arguments, we find that strategic CSR does not directly lead to performance outcomes because the realization of such outcomes requires a problem-solving mechanism in the organization to materialize them. We therefore propose the following hypothesis:

H6: The partnerships mode of OI mediates the relationship between strategic CSR and firm performance.

3. Methodologies

3.1. Sample and Data Collection

The sample that we collected consist of firms in the electronics industry listed on the Taiwanese stock exchange because these high-technology companies are the most representative with regard to their OI activities and CSR. There were 587 publicly listed electronics firms for the 2012-2017 period. The sample excludes foreign companies and other listed firms with incomplete data. For the empirical analysis of this study, we collected data from various sources. We collected CSR and OI data from the annual reports of the companies for years in the study period as the basis for checking the companies' activities. This study also uses financial data drawn from the Taiwan Economic Journal (TEJ), which provides the most comprehensive information on listed companies in Taiwan. Data were collected from multiple sources not only to mitigate problems of common method variance (CMV) but also to increase the validity of the empirical evidence.

3.2. Measures

The independent variables were responsive and strategic CSR, as defined by Porter and Kramer (2006): Strategic CSR leads to the creation of economic benefits and firm strategic alignment, and it includes six dimensions (products, raw materials, the production process, energy, building, and employees and the community). Responsive CSR represents acting as a good corporate citizen and it mitigates the negative effects from business activities. This study collected the annual reports and CSR reports from all sample firms to determine whether a focal company has ever conducted these activities. We employed content analysis by using two independent coders to code these activities; the inter-rater reliability coefficient is greater than 0.90. The mediating variables include the markets and partnerships mode of OI. Again, we employed a similar procedure involving two independent coders to code these activities; the inter-rater reliability coefficient is also greater than 0.90. We adopted the same composite measure as that employed by Chesbrough (2006), Gassmann and Enkel (2004) and Mazzola, Bruccoleri, and Perrone (2012).

The dependent variable is financial performance, with Tobin's Q as firm value and the ROA growth rate as firm growth. Tobin's Q is defined as the market value of a company divided by its replacement costs of assets. We adopted the same measure as that employed by the TEJ database. Tobin's Q was calculated as the market value of a firm divided by its total costs of assets for each year. Regarding the ROA growth rate, to assess the mediation role of OI in the relationship between CSR and financial performance, we considered a second set of dependent variables related to firm growth. We computed the two-period growth rate for the observation period and the prior period using the variation in a firm's ROA.

Finally, we included the industry effect, firm size, firm age, R&D intensity and organizational slack as control variables to account for their possible interference. The high-tech industry was classified into three subcategories: semiconductors, opto-electronics, and other. Setting the other sector as the reference, two industry dummy variables were included in our model. This study included total assets, total capital and the logarithm of the number of employees as a size measure to control for the size effect on firm performance. We used the principal component analysis to form a composite factor score for firm size. We also measured firm age by counting the number of years from a firm's year of inception to the observation year. To control for the size effects of R&D investment, this study controlled for the R&D intensity of the firm year by year for the observation period. Organization slack resources have an impact on firm performance; we also measured organization slack by counting the current ratio as a control variable in this study.

3.3. Statistical Methods

Our sample data are composed of high-tech firms for the 2012-2017 period. Thus, this study applied a least squares dummy variable (LSDV) to estimate the hypothesized relationships. The LSDV regression involves ordinary least squares (OLS) with dummy variables, and the parameter estimates of the regressors in the fixed effects model are identical to those of the LSDV estimation (Park, 2009).

4. Results

The means, standard deviations and correlations of the relevant variables for this study were checked but omitted here in the interest of space. The matrix of correlation coefficients showed a healthy correlation structure of the variables. The highest correlation (0.698) existed between the two dimensions of CSR, which is reasonable and anticipated.

This study used the LSDV hierarchical regression model design in Table 1. The results in Model 1 clearly show a positively significant relationship between responsive CSR and the engagement of the markets mode of OI ($\beta = 0.011$, $p < 0.01$); thus, the results support H1. The results of Models 5 and 8 show that the markets mode of OI is positively and significantly associated with firm performance

(β=0.077, p<0.05 for Tobin's Q; β=6.076, p<0.01 for the ROA growth rate); therefore, H2 is supported.

Table 1: The least squares dummy variable (LSDV) regression results predicting firm performance

$IV \to M$			$IV \to DV$	$IV+Ma \to DV$	$IV+Ma \to DV$	$IV \to DV$	$IV+Ma \to DV$	$IV+Ma \to DV$
	M_b: MOI	M_a: POI		DV: Tobin's Q		DV: ROA growth rate		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Control variables								
Year dummy	included	included	included	included	included	included	included	included
Semicon ductor	0.065** (0.017)	0.061 (0.047)	0.320** (0.042)	0.316** (0.042)	0.315** (0.042)	3.658* (1.852)	3.586 (1.851)	3.264 (1.853)
Opto-electronics	0.014 (0.017)	0.097* (0.046)	-0.033 (0.041)	-0.039 (0.041)	-0.034 (0.041)	-4.668* (1.816)	-4.784** (1.817)	-4.753** (1.813)
Firm size	0.021** (0.008)	0.065** (0.022)	0.175** (0.020)	0.178** (0.020)	-0.176** (0.020)	-1.323 (0.886)	-1.400 (0.887)	-1.452 (0.886)
Firm age	0.000 (0.001)	-0.002 (0.002)	0.010** (0.002)	0.010** (0.002)	-0.010** (0.002)	-0.157* (0.076)	-0.154* (0.076)	-0.157* (0.076)
R&D intensity	0.001* (0.001)	0.012** (0.002)	0.007** (0.002)	0.007** (0.002)	0.007** (0.002)	-0.435** (0.076)	-0.448** (0.077)	-0.443** (0.076)
Organizational slack	-0.302 (0.156)	0.541 (0.428)	0.196 (0.379)	0.166 (0.378)	0.219 (0.379)	70.309** (16.856)	69.661** (16.854)	72.147** (16.841)
Independent variables								
Responsive CSR (RCSR)	0.011** (0.003)	0.009 (0.009)	0.021** (0.008)	0.020* (0.008)	0.020* (0.008)	0.218 (0.360)	0.207 (0.360)	0.150 (0.360)
Strategic CSR (SCSR)	-0.002 (0.002)	0.022** (0.005)	-0.005 (0.005)	-0.006 (0.005)	-0.005 (0.005)	-0.253 (0.204)	-0.279 (0.204)	-0.242 (0.204)
Mediator variables								
Markets mode of OI (MOI)					0.077* (0.032)			6.076** (1.863)
Partnerships mode of OI (POI)				0.055** (0.015)			1.196* (0.480)	
F value	7.721**	15.769**	31.927**	30.698**	29.911**	7.330**	7.032**	7.586**
R	0.170	0.240	0.331	0.337	0.333	0.166	0.169	0.175
R^2	0.029	0.057	0.110	0.113	0.111	0.028	0.028	0.031

Notes: *$p<0.05$; **$p<0.01$ (two-tailed); n=587, observations=3,522; the regression coefficients are standardized, and the numbers in parentheses are standard errors.

To test H3, we use the bootstrapping test to determine the mediation effect. The confidence interval (0.001~0.006 for Tobin's Q; 0.015~0.134 for the ROA growth rate) is not zero (Zhou, Zhang, Su, & Zhou, 2012). Therefore, these results indicate support for the mediation effect on the relationship in H3. The results also show that strategic CSR is positively related to the engagement of the partnerships mode of OI at the α=0.01 level (β=0.022, p<0.01), thus supporting H4. The results in Models 4 and 7 show that the partnerships mode of OI is positively and significantly associated with firm performance (β=0.055, p<0.01 for Tobin's Q; β=1.196, p<0.05 for the ROA growth rate); therefore, H5 is supported. To test H6, we further test for mediation following the bootstrapping approach outlined by Hayes (2018). Typically, a confidence interval is computed, and it is checked to determine whether zero is in the interval. If zero is not in the interval, then the researcher can be confident that the indirect effect is different from zero. The results show that the confidence interval (0.002~0.013 for Tobin' Q; 0.007~0.055 for the ROA growth rate) is not zero (Zhou et al., 2012). Therefore, these results indicate support for the mediation effect on the relationship in H6.

5. Discussions and Conclusion

In this paper, we first point out the gap in research on CSR, OI and performance. Although previous studies have proposed studying the missing link between CSR and performance by incorporating innovation (Bocquet et al., 2017; Hull & Rothenberg, 2008), our study goes one step further to assert that OI is the best possible solution and mediator in this relationship. We collected data on 587 publicly listed electronics firms in Taiwan for the 2012-2017 period. Our results showed that different modes of OI corresponding to CSR can lead to positive performance outcomes. Specifically, responsive CSR goes through the markets mode, while strategic CSR goes through the partnerships mode to achieve positive performance. The results can deepen our understanding of CSR, OI and performance.

Residing in an environment where various stakeholders matter, firms may choose to deal with different dimensions of social or environmental problems. Different dimensions breed various challenges to be tackled, and due to problem complexity, firms need to employ different modes of OI to search for new and possible solutions to deal with these problems. When the problem is simple, firms should use the markets mode of OI to acquire or sell existing resources or knowledge to solve problems. However, as problems become difficult, a new problem-solving scheme should be employed (Felin & Zenger, 2014). We found that the partnerships mode involves more discussion and communication between partners and that this coalition can benefit more when firms adopt strategic CSR.

Although we unpack the role of OI and derive insightful results that are compelling and meaningful, this study has several limitations that warrant

additional research. Future studies may use our framework to investigate related phenomena. One possible agenda is to study other types of OI, such as the user community, which is not found much in the electronics industry but may exist in other industries, such as retail industries. Additionally, using human labor to conduct content analysis is time-consuming. Future studies might consider using computer-aided analysis tools to analyze concepts so that the coding results can be more consistent.

References

Arora, A., Fosfuri, A., & Gambardella, A. (2001). Markets for Technology and their Implications for Corporate Strategy. *Industrial & Corporate Change*, 10(2), 419-451.

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. (1985). An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal*, 28(2), 446-463.

Bocquet, R., Le Bas, C., Mothe, C., & Poussing, N. (2017). CSR, Innovation, and Firm Performance in Sluggish Growth Contexts: A Firm-Level Empirical Analysis. *Journal of Business Ethics*, 146(1), 241-254.

Chen, J., Chen, Y., & Vanhaverbeke, W. (2011). The influence of scope, depth, and orientation of external technology sources on the innovative performance of Chinese. *Technovation*, 31(8), 362–373.

Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Boston: Harvard Business School Press.

Chesbrough, H. (2006). Open Innovation: A New Paradigm for Understanding Industrial Innovation, Open innovation: researching a new paradigm: 1-12. Oxford, U.K.: Oxford University Press, 20.

Chesbrough, H. (2012). Open innovation: Where weve been and where were going. *Research- Technology Management*, 55(4), 20-27.

Chesbrough, H., & Garman, A. (2009). How Open Innovation Can Help You Cope in Lean Times. *Harvard Business Review*, 87(12), 68-76.

Davis, K. (1960). Can business afford to ignore social responsibilities?. *California Management Review, 2(3), 70-76.*

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&D Management*, 39(4), 311-316.

Felin, T., & Zenger, T. R. (2014). Closed or open innovation? Problem solving and the governance choice. *Research Policy*, 43(5), 914-925.

Gassmann, O., & Enkel, E. (2004). Towards a Theory of Open Innovation: Three Core Process Archetypes. 2004 R&D Management Conference (RADMA).

Grindley, P. C., & Teece, D. J. (1997). Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics. *California Management Review*, 39(2), 8-41.

Hull, C. E., & Rothenberg, S. (2008). Firm performance: The interactions of corporate social performance with innovation and industry differentiation. *Strategic Management Journal*, 29(7), 781-789.

Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal*, 45(6), 1183-1194.

Mazzola, E., Bruccoleri, M., & Perrone, G. (2012). The effect of inbound, outbound and coupled innovation on performance. *International Journal of Innovation Management*, 16(6), 1-27.

McGuire, J. B., Alison, S., & Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *The Academy of Management Journal*, 31(4), 854-872.

Nickerson, J. A., & Zenger, T. R. (2004). A knowledge-based theory of the firm: The problem- solving perspective. *Organization Science*, 15(6), 617-632.

Nieto, M. J., & Santamaría, L. (2007). The importance of diverse collaborative networks for the novelty of product innovation. *Technovation*, 27(6–7), 367-377.

Park, H. M. (2009). Linear Regression Models for Panel Data Using SAS, Stata, LIMDEP, and SPSS. Indiana, U.S.A: Indiana University.

Porter, M. E., & Kramer, M. R. (2006). Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard business review*, 84(12), 78- 92.

Wu, J., & Shanley, M. T. (2009). Knowledge stock, exploration, and innovation: Research on the United States electromedical device industry. *Journal of Business Research*, 62(4), 474-483.

Zhou, Z., Zhang, Q., Su, C., & Zhou, N. (2012). How do brand communities generate brand relationships? Intermediate mechanisms. *Journal of Business Research*, 65(7), 890- 895.