

CORPORATE SOCIAL PERFORMANCE, COST OF CAPITAL AND THE OWNERSHIP IN TAIWANESE ADVANTAGE TECHNOLOGY INDUSTRY

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Abstract

This study discusses how corporate social responsibility (CSR) affects firm's cost of capital in Taiwan advantage technology industry including semiconductor and photoelectric industry in the Taiwan Stock Market with different ownership structure. We match sample by propensity matching method and analyze the relationship between corporate social performance (CSP) and the cost of capital. Our results show the CSP has negative significant effects with cost of capital under family-owned companies, but no significant effects with non-family-owned companies. This study further address how media reported CSR news affects both shareholders' reaction and firm's cost of capital.

Keywords: CSR, Ownership, Family firm, Cost of Capital

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1. Introduction

Corporate Social Responsibility (CSR) involved issues such as environment protection, corporate government and the other public welfare activities have gained more respect from the public in recent years. For example, the low-carbon economy issues which became an important developing tendency in firm's operating strategies became a vital power to sustain its life cycle after the Copenhagen Climate Conference was held. According to the World Factbook published by CIA in 2011, Taiwan has ranked as the 20th-largest worldwide country. Based on the IEK's report, Taiwan was the third-largest producer that value of output was about \$2.54 billion reached 14.2% around the world in 2005. In photoelectric industry, the Display Search's data showed that, the amount of panel produced in Taiwan reached 41.5% about in the world and there was at least third place in LED, LCD panel and digital camera industry in Taiwan in 2005. According to these, the advantage technology electric industry plays an important role in the global economy. However, Tsai (2005) indicates that the sequence of semiconductor manufacture including IC designing, wafer manufacturing, and reliability test has become maturity to form a powerful scale of economy and industrial group. On the other hand, Chen et al. (2009) points out that due to widely usage of large natural resource and the polluted or toxic emission, the advantage technology industry is also named high-

polluted industry. As polluted emission and frequent other violations with CSR, it may cause the negative impression to the stakeholders or be punished by government. Heinkel et al. (2001) show that the polluted firm's stock will not be held by green investors. Firm violating the CSR legal rules might lead to increase its risk and investors might hesitate to invest such companies. Therefore, it might be interesting for us to study the relation between CSP and the cost of capital in Taiwanese advantage technology industry.

Taiwan's market development is near to developed market and there is still many numbers of country's economy is developing in the emergency market stage. China's advantage technology is growing up quickly in the recent and following with the development of technology is the heavy pollution and social responsibility. Moreover, in the Chinese community, the culture environment lead the large part of enterprises' ownership structure be "family-owned" and the private information is not being understanding by external stakeholders. The heavy social responsibility and information asymmetry may lead the investors request the higher return premium and hence firm's cost of capital raises. In order to provide the evidence to the emergency country to give consideration to the economy development, environment protection and other social responsibility, we focused on Taiwan which is near to developed market and the advantage technology development in Taiwan is rising and flourishing to

study and we suppose that the results can provide the enterprise in the emergency market in China and Southeast Asia to consult to avoid the raising on its cost of capital.

The cost of capital is the internal rate of return (or a discount rate) that the market applies to a firm's future cash flows to determine its current market value. In other words, it is the required rate of return given the market perception of a firm's riskiness. Pastor et al. (2008) show analytically that under plausible conditions, the implied cost of equity is perfectly correlated with the conditional expected stock return. Previous studies have documented CSR has negative relationship with idiosyncratic risk (Lee and Faff, 2009). Ghoul et al. (2011) investigated the connection between their financial and corporate social performance as well as the cost of capital (Jiao, 2010; Ghoul et al., 2011). It also indicates that the cost of capital has played an important role in financial decisions and could effectively reduce the risk of future cash flow (Dhaliwal et al. 2011; Reverte, 2011). Due to almost half of the listed firms being electronic industry in Taiwan stock market, the structure in Taiwan stock market is different with the other major stock markets. Moreover, Liao et al. (2011) indicate that the development of economy in Taiwan is still located in emergency market. Compare emergency market with developed market, and there is large difference in both society culture environment and regulatory structures. Few researches focused on the CSP and the cost of capital in either Taiwanese firms or Taiwanese advantage technology firms.

Aboody et al. (2008) adapted Fama and French three-factor model to price the earning quality, and the cost of capital is proxied by the stock return. Therefore, we conform to Aboody's research to use the return in Fama and French three-factor model as our dependent variable which is the cost of capital and insert CSP into Fama and French three-factor model to study the relation between CSP and the cost of capital. Finally, Taiwan stock market firms have about half of the listed firms to be family firms and scholars still have different viewpoints in literatures. Dyer and Whetten (2006) indicate that family firm respects the benefit about itself only but Miller et al. (2008) point out that whether firm is family-owned or not, the CSR appearance is always an important part in its corporate performance. Based on this discussion, we also analyze the difference in the connection of CSP and the cost of capital between family firm and non-family firm.

In previous studies, scholars usually adopt total assets or sales as a factor to match their samples, and this matching method may cause the error in sample selection. In order to avoid the error in sample selection, we follow Rubin (1973) to use the quarterly data in 2005-2011 to estimate the propensity score and match samples by propensity score matching method to avoid the bias of sample selection. Ghoul et al. (2011) indicate that the higher CSR score firm has

the lower cost of capital firm pays. In the other hand, if the negative CSR event is reported on the media, it will damage the impression of firm and lead the cost of capital increase. According to these, our results provide some evidence to senior management to make decisions carefully and extensively because the negative CSR event will reduce the firm's corporate social performance and cause the damage to the corporate, managers and all stakeholders. Since the market in Taiwan is near to developed market, our results can also provide the evidence to the emergency market such as China and the countries in Southeast Asia for country and enterprise to give consideration to the technology development, pollution prevention and other social responsibility executing.

2. Literature review and hypothesis

2.1 CSR and the cost of capital

Boutin-Dufresne and Savaria (2004) investigated the relation between social actions and financial risks. They suggested that there is negative connection between CSR and the level of specific risk and the managers shall take more social responsible activities to help the financial risk reducing. Because the higher corporate social performance firms might lead the lower level of firm-specific financial risks explosion. Ghoul et al. (2011) also investigated the relation between CSR and the cost of capital by collecting 12,915 firms for the period of 1992 to 2007. They concluded that except "sin" industry, the better firm's CSR performance will lead its cost of capital less. Moreover, Reverte (2011) examined the affection of CSR on the cost of capital in Spanish firms and suggested that better CSR performance could reduce the transaction costs and information asymmetry in the capital markets to make the cost of capital decreasing. Dhaliwal et al. (2011) focused on the voluntary non-financial disclosure such as CSR and suggested that although CSR activities could increase firm's beginning setup cost, but CSR disclosure will lead to a lower cost of capital extensively. In summary, we conclude that firms with better corporate social performance will lead their cost of capital decrease. Our study will analyze that if the less negative CSR event firm occurred, the lower cost of capital firm has. Therefore, we inference that the lower CSP in a firm will lead its cost of capital increase and our first hypothesis is following:

H1: *Firms with the lower corporate social performance will increase its cost of capital.*

2.2 Ownership structure and board size

Based on the prior studies, there is family-owned character in many Taiwanese listed companies (Yeh et al., 2002 and Li et al., 2003), and the organization structure in family firms differ with non-family firms obviously. Because of the dual system, the controller

who also serves as manager concurrently in a family-owned company possesses more internal information than external shareholders and it leads external shareholders unable to join company's decision making actually. DeAngelo and DeAngelo (2000) indicate that there is information asymmetry between controller and external shareholders. The Securities and Exchange Commission, SEC (2000) points out that the information asymmetry would increase investors' risk premium and then firm's cost of capital could be raised. Many prior studies examine that the information asymmetry would increase firm's cost of capital. (O'Hara, 2003, and Hughes et al., 2007). Since information asymmetry is existed in family-owned company seriously, it may lead the higher cost of capital. Previous studies suggested that earnings reported in family firms have higher quality than non-family firms, because there is more analyst following and informational forecasts leading less bid/ask spread (Ali et al., 2007). Literatures also point out that good corporate governance and good information disclosure can reduce the degree of information asymmetry and agency problem (Chen et al., 2009; Hail and Leuz, 2006) leading the company to reduce its cost of capital (Hail et al., 2006; Chen et al., 2009). According to above points and that family firms have better earnings quality, we inference that compare with non-family firms, family firms with better CSR performance will lead its cost of capital decrease. In summary, the predictions of the theoretical models and empirical findings discussed previously leads to our second hypothesis:

H2: *Compare with non-family firm, family firm with lower corporate social performance will increase its cost of capital.*

Since corporate governance is an important part in CSR and it can help corporate to reduce its cost of capital, the size of board of directors shall be a factor of that CSR affects corporate's cost of capital. Previous studies examine that better corporate governance would reduce the cost of capital (Chen, C. W., Z. H. Chen, and K. C. Wei, 2009) through reducing the cost of monitoring (Lombardo and Pagano, 2002) and the insider trading (Hung and Trezevant, 2003). Klein (2002) reports that both audit committee and board independence affect abnormal accruals negatively. Felo et al. (2003) suggests that the larger size of audit committee will leads firm to report higher quality of financial reports. He also indicates that the higher quality of financial report is, the lower cost of capital firms pay. According to above literatures, we inference that compare with the larger size of board of directors, the negative CSR event occurs in firm with smaller size of board of directors will make its cost of capital increase and leads to our third hypothesis:

H3: *The lower corporate social performance will increase the cost of capital in the firms with smaller size of the board.*

3. Methodology and data

In order to test the hypothesis, we analyze the connection between the corporate social responsibility and the cost of capital in high-tech industry in Taiwan. We adopt some research methods in our study and the data is collected from Taiwan Economic Journal database (TEJ).

3.1 Matching method development

Rubin (1973) point out that the results will be interference by the difference in characteristic variables between experimental and control sample, and these situation is called the bias of sample selection. In order to avoid the bias of sample selection, we match our sample to analyze the relation between corporate social performance and the cost of capital and hence we adopt the propensity score matching method¹⁷ to match one experimental sample and two control samples in two stages. First, we evaluate a probability value by several firms' important characteristic variables with probit model and this probability value is the propensity score. Further, we find the propensity score of two firms without negative events occurring in the period nearest from experimental sample firm as control samples, and this is the nearest-neighbor propensity score matching method. We adopt the firm's important characteristic variables which is also used in Shen and Chang (2007)¹⁸ who are good to use matching method to reduce the difference between experimental and control sample effectively.

3.2 Regression models

In order to test the hypotheses, we develop models based on Fama and French three-factor model¹⁹. The

17 Rosenbaum and Rubin (1983) provided matching method which using a single probability variable instead of the multiple characteristic variables through an estimating function to transform the multi-dimension into single dimension to decrease the dimensions in a regression formula.

18 They estimate the firm's propensity score through probit model describing following:

$$P_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 SA_{it} + \beta_3 NI_{it} + \beta_4 OI_{it} + \beta_5 TAT_{it} + \varepsilon_{it}$$

$$C(P) = \min |P_i - P_j|$$

Where $P_{i,t}$ is firm's propensity score in the period t , TA_{it} is firm's total asset in the period t , SA_{it} is firm's sales in the period t , NI_{it} is firm's net income in the period t , OI_{it} is firm's operation income in the period t , TAT_{it} is firm's turnover rate of total asset in the period t , and $C(P)$ is the set of sample firm and the matching firms.

19 Fama and French (1993) brought up the three-factor model to test the stock return in NYSE, Amex and Nasdaq, and the results shown that three factors including market investment portfolio, size and book-

results we propose that if the corporate social responsibility is significantly associated with the cost of capital after controlling market risk, size, and book-to-market premium. The definition of the variable "CSP" is the performance about corporate social responsibility and we use the number of negative CSR event which is collected from the CSR database in Taiwan Economic Journal (TEJ) as the corporate social performance. The smaller number of negative CSR event is reported, the higher corporate social performance firm has. In addition, in order to see whether the relationship between corporate social responsibility and the cost of capital have different between the family firm and non-family firm, we separate our sample based on the firm's ownership into family firm and non-family firm and analyze the regression result through the model in the following regression.

$$\text{Return}_{i,t} = \beta_{0,i} + \beta_{1,i}MR_{m,t} + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}CSP_{i,t} + \varepsilon_{i,t}$$

Where $\text{Return}_{i,t}$ is firm i 's the stock return in the period t , $MR_{m,t}$ is the market risk premium in the period t , SMB_t is the risk factor associated with size in the period t , HML_t is the risk factor associated with book-to-market value in the period t , $CSP_{i,t}$ is the corporate social performance which is defined by the number of negative corporate social responsibility event reporting on the media in the period t , and $\varepsilon_{i,t}$ is the error term in the period t .

3.3 Data

The data of this study is collected from Taiwan Economic Journal (TEJ) database during the period from 2005 to 2011 quarterly and we gather these sample firms' quarterly financial accounting variables from TEJ database. Our experimental sample firms which have been reported the negative CSR events on the media are selected from the CSR database in TEJ but control sample firms which are never reported such events. After the matching, we have 125 experimental sample firms and 250 matched control firms in advantage technology industry including semiconductor and photoelectric industry. The variable of the number of negative corporate social responsibility event report are used to identify the relationship between the cost of capital and the corporate social performance.

4. Empirical result

4.1 Descriptive Statistics and correlation coefficient matrix

Table 1 shows the distribution of the number of firm's negative corporate social responsibility event reported by media quarterly. In the table 1, there is 114 firms

have been reported one negative CSR event in a quarter, 8 firms have been reported two events, and only one firm have been reported three and four events in a quarter in each. Table 2 shows the descriptive statistics of variables used in our regression, and the average of stock return, market risk premium, size premium and book-to-market premium are -2.47, -2.75, 1.39 and 1.35, and the average of negative CSR events of pooled sample is 0.37. Table 3 shows the Pearson correlation matrix that all the coefficients have less than 0.7, and we conclude that the co-linearity do not exist in our regression.

4.2 Empirical analysis

The results of pooled sample testing hypothesis H1: *Firms with the lower corporate social performance will increase its cost of capital* shown in Table 4. We found that there is positive relation between CSP and the cost of capital significantly (6.96, <0.01), and this result that the more negative CSR event reported in a quarter which means the lower corporate social performance, the higher cost of capital firm has supports the hypothesis 1. The lower CSP will lead the higher cost of capital in Taiwan market and the investors will request the high return premium. It might affect firm to raise the capital and hence affects firm's operation. In terms of the firms' market risk, size and book-to-market premium are all positive relation with the cost of capital. Except for size premium (0.70, <0.01), the relations between other two factors and the cost of capital conform to the results studied by Fama and French (1993) significantly (1.52, <0.01; 0.24, <0.01). The adjusted R^2 is 0.422 in pooled data in table 4 and it provides us a good ability in explaining the relation between CSP and the cost of capital. Further, we separate the pooled sample into two industries, semiconductor and photoelectric industry. The result show that there is the same direction of the relation between CSP and the cost of capital significantly (7.08, <0.05; 7.11, <0.05), and the adjusted R^2 are 0.397 and 0.537 in each sample. This result implied that comparing with western developed country, Taiwanese firms should be alert against the negative CSR events occurring and make sure not only the better financial performance but also non-financial performance such as CSR.

The results which we show below are the difference conditions in family-owned or non-family-owned, and the size of board. Then, we analyze the relation between CSP and the cost of capital in above two conditions. First, in order to test the hypothesis H2: *Compare with non-family firm, the lower corporate social performance will increase the cost of capital in family firm* shown in table 5, we report the result of the relation between the number of negative CSR event and the cost of capital in the different ownership including family firm and non-family firm.

to-market value was enough to explain the stock return.

In the family-owned sample, the result shows that there is positive relation between the number of negative CSR event and the cost of capital significantly (7.90, <0.05), and the adjusted R^2 is 0.428. In the non-family sample, there is no significant relation between the number of negative CSR event and the cost of capital. This result implied that comparing with non-family firm; family firm should be concerned with the CSR performance more carefully. Although the non-significant connection between CSP and the cost of capital in non-family firm does not exist, the managers shall pay more attention to the CSP because of the positive coefficient in the result.

Second, we test the hypothesis H3: *The lower corporate social performance will increase the cost of capital in the firms with smaller size of the board of directors* shown in table 5. We analyze the relationship between CSP and the cost of capital in the different board size. The result shows that there is positive between CSP and the cost of capital in the sample firms with smaller board size significantly (14.54, <0.01) and the adjusted R^2 is 0.424. But in the firms with larger size of the board of directors, CSP has no significant affection in the cost of capital. According to the R^2 in our empirical results, the model which we use has strong enough to explain the relation between CSP and the cost of capital and firm's CSP actually affects its cost of capital which is supported by the results in previous studies (Ghoul et al., 2011, Reverte, 2011, and Dhaliwal et al., 2011).

5. Conclusion and discussion

Since this study uses Taiwanese advantage technology firms which have been reported the negative CSR events on media as the main analysis rather than the CSR rating or truly performance, this study still provides greater insight into this issue. We use the stock return in Fama and French three-factor model as the cost of capital and investigate the relationship between CSP and the cost of capital through pricing the social responsibility performance. In general, our results suggest that the firms with the lower CSP have higher cost of capital when using the return as the cost of capital in Fama and French three-factor model. This result indicates that investors concern about social responsible performance and related news in advantage technology firms over time, and the cost of capital will increase when the negative social responsibility event is reported on the media.

Our results also provide the evidence that relative to non-family firm, family firm with lower CSP would lead their cost of capital increase in the advantage technology industry. In the other words, when the corporate social performance in family firm is disclosed being poor, its cost of capital will increase to reflex the negative impression of investors. This may suggest that the family firms in advantage technology industry in Taiwan tend to

spend more time and efforts on their social activities and related issues performance and investors will decrease the demand the stocks of the firms with worse social performance if firms violate the related rule about social responsibility such as environment protection, information disclosure, and employee's working hours. For example, green investors increase their demand to the stocks of the firms with better corporate social performance (Ghoul et al. 2011).

Finally, the results also indicate that when the firm with smaller size of the board of the directors has the lower CSP, their cost of capital will increase and there is positive relation between the number of negative CSR event and the cost of capital. The results suggest that the larger size of the board of directors may lead the higher quality in firm's financial report and decrease the information asymmetry between senior management and stakeholders. These results are also getting support from Klein (2002) and Felo et al. (2003).

In summary, our results which the more negative CSR events are reported on the media meaning the lower corporate social performance in Taiwan advantage technology industry suggest that the senior management should be more carefully and extensively in making choices and decisions especially in family firm and smaller size of the board of directors. Miller (2006) indicates that there is about 40% enterprise being family-owned in the 500-biggest global enterprises and family firms have advantages in continuity, community, connection and direction. If family firm can invest social responsibility moderate and combine with the original advantages, it could be more powerful in highly competition market not only in Taiwan but also in the whole Eastern Asia. According to the statistics in the Ministry of Finance in Taiwan, there are about 97.91% enterprises being small and medium enterprise (SME) in 2009 and the manufacturing industry is about 18.75% in the SME. If the SME want to operate sustainably, the capital raising is an important part in the firm's operation and hence the cost of capital becomes more important to enterprise. Since the cost of capital is important to SME in Taiwan which is near to developed market, it is more important to the emergency market especially in China which is also Chinese community. Finally, if top management makes one wrong decision which lead the negative CSR event be reported, it may cause the damage not only enterprise which is the increasing on the cost of capital but also all stakeholders' benefits.

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Appendix

Table 1. The frequency of firm in the number of negative CSR event is reported

The number of negative CSR event reported on the media	Frequency	Percentage	Aggregate percentage
0	251	66.9	66.9
1	114	30.4	97.3
2	8	2.1	99.5
3	1	.3	99.7
4	1	.3	100.0
summary	375	100.0	-

This table reports that firm's frequency in the number of negative CSR event reported on the media quarterly.

Table 2. Descriptive statistics

	N	Minimum	Maximum	Average	Standard deviation
The cost of capital	375	-68.2637	232.6554	-2.478450	34.1134444
MR	375	-26.4969	22.0589	-2.758798	13.4227692
SMB	375	-8.4902	24.4738	1.388991	7.7427429
HML	375	-18.3203	32.7721	1.352954	9.7866736

This table reports the results of descriptive statistics, and the variables that we used including corporate social performance (CSP, the number of negative CSR event), market risk premium (MR), size premium (SMB), and book-to-market premium (HML).

Table 3. Pearson correlation coefficients between regression variables

	COC	CSP	SMB	HML	MR
COC	1				
CSP	0.134** (0.009)	1			
SMB	0.246** (0.000)	0.005 (0.921)	1		
HML	0.015 (0.765)	0.029 (0.575)	-0.254** (0.000)	1	
MR	0.625** (0.000)	0.025 (0.630)	0.174** (0.001)	-0.029 (0.580)	1

1. This table reports the results of Pearson correlation coefficient between regression variables: cost of capital (COC, proxies by the return in Fama and French three-factor model), corporate social performance (CSP, the number of negative CSR event), market risk premium (MR), size premium (SMB), and book-to-market premium (HML).

2. * Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 4. CSR and the cost of capital regression

Variables	Pooled Sample	Photoelectric Industry	Semiconductor Industry
Intercept	-2.143 (-1.289)	-0.974 (-0.428)	-5.797*** (-2.771)
CSP	6.967*** (2.953)	7.083** (2.215)	7.106** (2.374)
MR	1.516*** (14.942)	1.717*** (11.601)	1.222*** (10.402)
SMB	0.701*** (3.856)	0.417 (1.528)	1.126*** (5.655)
HML	0.243* (1.712)	-0.015 (-0.069)	0.549*** (3.656)
Adj-R ²	0.422	0.397	0.537
N	375	237	138

- This table reports the results of H1. The variables are: corporate social performance (CSP, the number of negative CSR event), market risk premium (MR), size premium (SMB), and book-to-market premium (HML). The different industry is shown in the regression models.
- * Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 5% level.

Table 5. CSR and the cost of capital regression in the different ownership structure

Variables	Family-owned	Non-family-owned
Intercept	-1.105 (-0.473)	-2.268 (-0.943)
CSP	7.900** (2.453)	4.692 (1.345)
MR	1.660*** (10.992)	1.347*** (10.127)
SMB	0.671*** (2.724)	0.676** (2.509)
HML	0.398** (1.991)	0.001 (0.005)
Adj-R ²	0.428	0.416
N	214	161

- This table reports the results of H2. The variables are: corporate social performance (CSP, the number of negative CSR event), market risk premium (MR), size premium (SMB), and book-to-market premium (HML). The different ownership is shown in the regression models.
- * Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 5% level.

Table 6. CSR and the cost of capital regression in the different size of board

Variables	Larger size in the board of directors	smaller size in the board of directors
Intercept	-1.463(-0.819)	-4.156 (-1.309)
CSP	3.335(1.365)	14.546*** (3.013)
MR	1.350*** (11.888)	1.705*** (9.423)
SMB	0.681*** (3.330)	0.766** (2.366)
HML	0.100(0.612)	0.473* (1.929)
Adj-R ²	0.441	0.424
N	217	158

1. This table reports the results of H3. The variables are: corporate social performance (CSP, the number of negative CSR event), market risk premium (MR), size premium (SMB), and book-to-market premium (HML). The different size of the board of directors is shown in the regression models.
2. * Statistical significance at the 10% level.
 ** Statistical significance at the 5% level.
 *** Statistical significance at the 1% level.