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Article

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Is capital structure associated with corporate social responsibility?

Shu-Chen Hsu[1], Kun-Tsung Wu[1], Qing Wang[2] and Yuan Chang[1*]

Abstract

Based on a total of 1,590 listed non-financial firms on the Taiwan Stock Exchange and the Taipei Exchanges covering the period of 2007 ~ 2020, this study examines whether a firm's capital structure is affected by its corporate social responsibility (CSR) performance. While existing research has explored the impact of a firm's CSR performance on various financial and non-financial consequences, this study argues that firm engaging in CSR is putting greater emphasis on the financial and bankruptcy risks arising from the use of debt financing and to maintain firm's sustainability, firm with better CSR performance tends to reduce the use of debt. Through descriptive statistics, correlation analysis and multiple regression estimation, principal outcome shows that firm with better CSR performance tends to use less debt financing and inter-temporally reduce the use of debt.

Keywords Capital Structure, Corporate Social Responsibility

Introduction

In addition to continuing to pursue profits, more and more firms are also actively undertaking corporate social responsibility (CSR) to enhance the corporate sustainability. At the same time, the endless international versus domestic environmental pollution and food safety scandals, such as the long-term counterfeiting of diesel engine by the Germany Volkswagen Group, the waste water pollution incident by the ASE Inc. and oil incident by the Ting-Hsin International Group etc., all showed that the violation of laws, regulation and expectation of the consumers and the society may result in serious loss and decline in stock price, and ultimately, all of above corporate wrongdoings have negative influence on the sustainability. In order to comply with the international trend, most of firms either passively or actively participate in CSR initiatives, hoping to maintain and establish the corporate reputation and image to improve the value and sustainability of the firm.

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Nowadays, the academics have engaged in research on examining the relationship between firm's CSR performance and economic consequences, e.g., the impacts of CSR on the quality of accounting reporting (Choi et al., 2013; Kim et al., 2012), marketing (Hildebrand et al., 2011; Luo & Bhattacharya, 2006) and business strategy (McWilliams et al., 2006). The various consequences of CSR engagement has also been extensively discussed in the finance research, such as the relationship between social responsibility and firm performance (Jiao, 2010; Kim & Statman, 2012; McWilliams & Siegel, 2000; Shen & Chang, 2009; Waddock & Graves, 1997; Wu & Shen, 2013), firm's risk (Godfrey et al., 2009; Lee & Faff, 2009), and the insurance effects of CSR was also proposed and proved (Peloza, 2006; Minor & Morgan, 2011). Some studies explored the benefits and costs of CSR on various capital market benefits and costs (EI Ghoul et al., 2011; Dhaliwal et al., 2011; Goss & Roberts, 2011; Cheng et al., 2014; Chang et al., 2014).

While existing studies have discussed how CSR affects various aspects of economic consequence of firms, there are still relatively few studies discussing the impacts of CSR firm's capital structure decision, namely, choice of the equity financing versus debt financing. To the author's knowledge, Girard-Potin, Jimenez Garces and Louvet (2011) studied the

relationship between CSR performance and capital structure by European firms, and the empirical result showed that firms with poor CSR performance tends to have higher degree of debt. Based on European listed firms, Matthijs Jan van der Leest (2018) found that firms higher corporate social performance significantly experience lower debt ratios. In fact, while firm with better CSR performance tends to have better financial versus stock market performance and lower risks, making firms have lower costs of equity and cost of debt (Goss & Robert, 2011; EI Ghoul, 2011), firm with better CSR performance tends to reduce risk-taking (Harjoto & Laksmana, 2018), so they use less debt financing that may result in greater bankruptcy and litigation risk. At present, there is a relative lack of research on the relationship between CSR performance and capital structure of public-traded firms in Taiwan's financial market, and the government authorities in Taiwan's financial market have also followed the global trend of paying attention to the sustainability, and have successively issued several policy norms and guidelines on CSR for public-traded firms. Based on the data of non-financial industry listed firms on the Taiwan Stock Exchange (TWSE) and Taipei Exchange Market (TPEx) in recent decades, this study examines the effects of CSR performance on corporate capital structure to fill the research gap.

Through descriptive statistics, correlation analysis and multiple regression estimation, the empirical result generally shows that firm's CSR performance does affect corporate financing decision. Firm with better CSR performance tends to have lower debt use, and those firms with better CSR performance also tend to reduce debt use over time. The empirical result of the research helps government authorities to comprehend whether the policies and regulations strengthening and encouraging the public-traded firms to fulfill CSR should be continuously implemented, and the investors can also understand whether to allocate more money to the firms fulfilling CSR by knowing how CSR affects the financial risk of their investment targets. The next section is literature review and hypothesis development. "Variable, econometric model, firm samples and data source" section introduces variables, econometric model, samples and data sources. "Empirical result" section presents empirical result and discussion, and the last section is the conclusion.

Literature review and hypothesis development

The development of CSR and related norms

The concept of CSR is generally believed to have been first proposed by Sheldon (1924). Sheldon (1924) indicated that CSR refers to the responsibility of entrepreneurs in meeting the needs of all types of people in the industry. Bowen (1953) proposed "social responsibilities of the businessman" and defined CSR as an obligation that entrepreneurs should consider social values and corporate goals when making policies and taking corporate actions. Elkington (1997) put forward the theory named "Triple Bottom line", indicating that firm should consider the result of economic, social and environmental aspects. In addition to ensuring the financial strength, a firm must also pay attention to environmental protection and respect from the society.

Several multinational institutions have also put forward famous frameworks and guiding principles of CSR for global business world, including the United Nations' Global Compact, OECD's Guidelines for Multinational Enterprises, the Global Reporting Initiatives (GRI), ILO Conventions, Global Sullivan Principles, Social Responsibility SA8000, International Standards Organizations ISO 14000 and AA1000, World Business Council for Sustainability and Development (WBCSD), and above guidelines are commonly known as the Global Eight (McIntosh et al., 2003).

In response to international trends, Taiwan's securities authorities, Financial Supervisory Commission of the Executive Yuan (FSC) and TWSE have strengthened the CSR performance of publicly traded firms, promoted the sound development of social responsible investment in the capital market, and enhanced the competitiveness of publicly traded firms and soundness of financial markets development. In 2010, they announced the "Corporate Social Responsibility (Sustainable Development) Best Practice Principles for TWSE/TPEx Listed Companies" and the "Ethical Corporate Management Best Practice Principles for TWSE/GTSM Listed Companies", it is clearly stated that public-traded firms should pay attention to the improvement and strengthening of social responsibility information disclosure and reduce information asymmetry. The FSC also emphasizes on CSR disclosure standards, such as Article 10 of the "Regulations Governing Information to be Published in Annual Reports of Public Companies" and Article 31 of the "Regulations Governing Information to be Published in Public Offering and Issuance Prospectuses", the firm should disclose its commitment (such as the firm's commitment to environmental protection, social participation, social contribution, social welfare, consumer rights, human rights, safety and health, etc.), the systems and measures adopted and the information disclosure of CSR, so that the investing public may understand the firm's fulfillment of CSR.

The FSC announced in 2014 that starting from 2015, the listed firms on the TWSE and TPEx (food industry, financial industry, chemical industry and firm with paid in capital of more than 10 billion NTD) are required to prepare CSR reports, representing firm's efforts and implementation of CSR. At the same time, the TWSE also encouraged firms to devote resource to CSR and launched a number of CSR indexes, including (1) the "Taiwan Employment 99 Index", consists of firms sharing greater proportion its revenue to employee, which is in line with the government's

policy of reducing the unemployment rate and encouraging firms to hire more employees. (2) the "Taiwan High Salary 100 Index", consists of firms hiring greater number of employees, which in line with the spirits of making profits, enterprises can also take care of and give back to improves employees' salaries and benefits. (3) The "Taiwan Corporate Governance 100 Index", consists of firms following better and advanced corporate governance guidelines, showing that firm with good corporate governance are suitable for investors' long-term investment.[1]

[1] Other government measures and policy directions regarding the regulation and promotion of CSR include: first, in line with the Republic of China government's goal of achieving net-zero carbon emissions by 2050, the Financial Supervisory Commission officially released the "Sustainable Development Pathway for Listed and Over-the-Counter Companies" in March 2022. This pathway involves phased implementation of greenhouse gas inventory disclosure for all listed and over-the-counter companies, encouraging companies to voluntarily set greenhouse gas reduction targets. The greenhouse gas inventory includes Scope 1 (direct emissions) and Scope 2 (indirect emissions from energy sources). Second, regarding the establishment of ESG information disclosure platforms, the Financial Supervisory Commission revised Appendix 2–2 of the annual report in 2021 to include the disclosure of company-related ESG information. This includes carbon emission information, targets and policies, water resource management information and policies, waste management information and policies, labor safety, workplace diversity, and equality indicators. The principles of compliance or explanation are followed to encourage transparent disclosure of corporate information. In response to this, the stock exchange plans to establish a dedicated section for "Corporate ESG Information Disclosure" on the Public Information Observation System. The disclosed information is divided into three dimensions: environment, society, and governance, with a total of 29 disclosure indicators. Third, through diversified index-based financial products, capital markets can channel funds into companies that prioritize sustainable development, while also encouraging companies to focus on the opportunities and risks associated with their own ESG development to achieve a balance between economic development and social benefits. Since 2010, the stock exchange has been compiling socially responsible investment theme indices, including the "Taiwan Employment 99 Index," "Taiwan High Salary 100 Index," and "Taiwan Corporate Governance 100 Index." As ESG has gained attention from domestic investors, Taiwan Index Plus Corporation collaborated with FTSE Russell to use FTSE4Good ESG assessment information for index compilation and released the "Taiwan Sustainable Index" in December 2017, which is the first comprehensive ESG index in Taiwan that incorporates environmental, social, and corporate governance dimensions. In terms of market investments, ETFs and ETNs linked to relevant sustainable indices have also been issued to guide market funds into companies that value sustainable performance. In addition, the Labor Pension Fund and Labor Retirement Fund have also gradually incorporated corporate social responsibility into their investment selection considerations. Through index design and product launches, they encourage companies to implement sustainable development. Fourth, sustainable development bonds have been established by the GreTai Securities Market to assist the green energy technology industry in obtaining funding and promoting environmental sustainability. The Green Bond Trading System was established in April 2017, successfully driving the development of the domestic green bond market. In recent years, as the international market has shifted its focus from environmental issues to social development, green bonds have expanded to include social bonds and sustainable development bonds. Drawing on international experiences in promoting sustainable development bonds and considering the issuance framework and management mechanisms of green bonds, the GreTai Securities Market established the sustainable development bond market in 2021 and will continue to promote green bonds, sustainable development bonds, and social bonds, while planning to expand the range of available products as needed.

The benefit and cost of CSR

The core value of CSR refers to firm's not only create profits to be responsible for the interests of shareholders, but also take into account the rights and interests of stakeholders such as customers, employees, suppliers, society and the environment. While more and more firms have engaged in CSR in practice, in order to judge whether it is worth investing in CSR, and comprehend whether put resources in CSR bring enough benefits to cover costs for firms in various aspects, the academics has examined how CSR engagement affects various aspects of economic consequences.

Generally, there are two competing views regarding the impacts of CSR. The social impact hypothesis, proposed by Cornell and Shapiro (1987) and Preston and O' Bannon (1997), summarizes positive association between CSR and economic consequences. Firm's good performance in CSR meeting stakeholders from all levels of the society, thus improving corporate reputation and trust, which will have a positive help to the firm's financial performance. Porter and Kramer (2002) believed that firm incorporating CSR into corporate strategies, and a definitely positive CSR strategy not only enhances the positive image, but also makes firm gain competitive advantages and increased profitability. Elliott et al. (2014) found that investors tend to evaluate firms CSR engagement and are willing to invest in firms with better CSR performance thus result in firm's better stock market performance. Firms paying attention to the performance on CSR tend to improve reputation, and positively affect compensation and market evaluation (Argenti & Druckenmiller, 2004; Dowling, 2006; Brammer & Pavelin, 2006). Not only that, firms that are good at CSR can reduce corporate risks, reduce corporate cost of capital, and increase investors base, and increase the willingness of investors' stock-holding (El Ghoul et al., 2011; Fauzi et al., 2007; Graves & Waddock, 1994; Sharfman & Fernando, 2008). Several channels could explain this positive effect such as providing better working place improves employee productivity (Turban & Greening, 1997); donation to the public benefits increases social reputation, trust (Bowman & Haire, 1975; Alexander & Bucholtz, 1978) and brand image and product competitiveness (Porter & van der Linde, 1995; Fombrun et al., 2000). Studies by Moskowitz (1972), Parket and Eibert (1975) and Soloman and Hansen (1985) also claimed that CSR leads to more benefits than the cost incurred, suggesting that there is positive relation between CSR and financial performance.

Waddock and Grave (1997), Shen and Chang (2009) and Wu and Shen (2013) pointed out that CSR performance has a significant positive impact on performance and value. Increase in the management of CSR initiatives leads to the improvement of firm's operating results and thus obtain better stock market performance (Griffin & Mahon, 1997; Margolis & Walsh, 2003; Orlitzky et al., 2003). Firm's CSR performance also affects firm-specific risk indicators such as earnings volatility, leverage usage, and the stock return market risk (Orlitzky & Benjamin, 2001).CSR helps to improve firm's risk management and acts as performance insurance (Chen et al., 2015; Godfrey et al., 2009; Koh et al., 2014; Minor & Morgan, 2011; Peloza, 2006). CSR also has an impact on the firm's stock price crash risk (Kim et al., 2014), and also affects the company's financing costs in the financial market, including the cost of equity funds and debt funds (Dhaliwal et al., 2011; El Ghoul et al., 2011; Goss & Roberts, 2011). CSR has benefit on earnings reporting quality (Kim et al., 2012), financial market trust (Lins et al., 2017), analyst recommendations (Ioannou & Serafeim, 2015), credit rating (Chang & Shen, 2014), analyst forecast error (Dhaliwal et al., 2012), and access to financing (Cheng et al., 2014) and other financial consequence indicators.

However, Friedman (1970) believes that the market itself creates social welfare, and opposes firms engaging in CSR. Friedman (1970) suggested that the only responsibility of firm is to maximize firm's profits. When a firm engages in CSR, it incurs costs. Aupperle et al. (1985) indicated that if a firm allocates resource to CSR such as environmental protection and charity. Firms put resource in social activities may lose competitiveness in the industry by increasing operational costs and reducing profitability (Preston & O'Bannon, 1997; Hess et al., 2002). Some studies have pointed out that although engaging in CSR helps firms build a good reputation, the reputation may not bring performance improvement (McWilliams & Siegel, 2000; McWilliams et al., 2006; Porter & Kramer, 2006; Hillenbrand & Money, 2007). From the perspective of agency theory, managers who want to gain social recognition in pursuit of personal interests or reputation are prone to over-invest in CSR activities, resulting in the abuse of corporate resources and result in decline of performance and value, in turn, damage shareholders' wealth (Beltratti, 2005; McWilliams et al., 2006; Jizi et al., 2014).[2]

The determinants of capital structure

Modigliani and Miller (1958, 1963) put forward several theories about capital structure, which claimed that under the complete capital market and without considering the existence of income tax, the firm's cost of capital would not be affected by the capital structure, and the value of firm is irrelevant to the capital structure, namely,

[2] In June 2020, Professor A. Lucian Bebchuk from Harvard Law School and Professor Colin Mayer from Saïd Business School, University of Oxford, engaged in a debate regarding a major controversy in today's business world: whether corporations should prioritize the interests of shareholders or stakeholders. Lucian Bebchuk argued that the interests of shareholders should take precedence (Bebchuk and Tallarita, 2020). Managers of companies should focus on maintaining long-term shareholders' value but should also be subject to "very substantial constraints and regulations that would make them internalize externalities". After all, relying on corporate leaders to independently decide whether to make substantial contributions to saving the planet in the face of climate change risks would not yield efficient results, as the incentives for managers to make efforts in this regard are insufficient. Stakeholderism would exempt top executives from the punishment of poor performance, indirectly encouraging managerial complacency. Lucian Bebchuk presented his own research findings, which indicated that in 100 U.S acquisitions of companies governed by constituency statutes authorizing managers to protect stakeholder interests, corporate leaders selling their companies to private equity firms used their bargaining power to the benefit of themselves and their shareholders but not to provide stakeholders with any material benefits. In any case, stakeholderism would instead bring more risks and dangers to companies, granting broader powers to corporate leaders and making them less susceptible to effective monitoring, while leaving stakeholders' interests unprotected. It also generates a "chilling effect" on government reforms or policies aimed at protecting stakeholders, along with "false hope". Conversely, Colin Mayer supported a model promoting corporate purposes that produce profitable solutions to the problems of people and planet, and do not profit for producing problems for either (Mayer, 2020). Mayer said that companies which promote the interests of stakeholders deliver superior performance—through, for example, motivating employees—in a way in which shareholder driven companies do not. According to Mayer, purpose-focused businesses can solve problems profitably and sustainably, while improving the lives of both stakeholders and shareholders. With the support of clear indicators, this approach enables directors to manage the "trade-offs" between shareholder and stakeholder interests in a way that pure shareholder-driven businesses cannot achieve. Mayer argues that regulations alone cannot fix corporate culture because the culture itself prioritizes shareholder returns and "excessive" managerial compensation. Despite strengthened regulations, misconduct persists in the banking industry because the industry's goals, culture, and values remain unchanged. This approach that ensures companies do not benefit from causing harm to people or the planet by measuring profits and taking responsibility for any damages caused. It is now the time for companies to calculate the potential negative outcomes, such as environmental damage.

equity financing versus debt financing. Modigliani and Miller (1963) pointed out that when a firm takes income tax into account, the interest expense of its debt can be viewed as an expense to offset the income tax burden, therefore, the higher the degree of debt use, the lower the cost of capital and the more the value of the firm. Modigliani and Miller (1963) and Miller (1977) proposed that the interest expenditure of debt financing has the effect of tax shield and affects the capital structure of firm. Jensen and Meckling (1976) proposed the agency theory, pointing out that debt financing cause a conflict between shareholders and creditors. When firm borrows more, greater potential financial and bankruptcy risk affect shareholders' rights and interests, but it can also reduce the conflict between managers and shareholders. By paying interests from borrowing, it can reduce the agency problem. Therefore, a firm will consider the agency costs versus the tax shield benefits of debt financing to achieve the optimal capital structure, and the trade-off theory also considers the trade-off between the tax shield of debt and the bankruptcy cost.

The pecking order theory of Myers and Majluf (1984) indicated that a firm tends to choose to borrow first, and then consider issuing shares to raise funds. There are also well-documented studies about capital structure, including the effects of personal tax (Miller, 1977), non-debt tax shield (DeAngelo & Masulis, 1980), agency cost (Jensen, 1986), stock return (Welch, 2004), analyst report (Chang et al., 2006), liquidity (Lipson & Mortal, 2009), information asymmetry (Autore & Kovacs, 2010; Bessler et al., 2011) and employee relations (Bae et al., 2011; Verwijmeren & Derwall, 2010).

Baskin (1989) took the top 500 enterprises in the Fortune magazine as the research sample and found that the profitability is negatively correlated with the debt ratio. Firm with better profitability tends to use internal retained earnings to meet the fund demand instead of borrowing externally, resulting in a low debt ratio. Hall, Hutchinson and Michaels (2000) took 3,500 UK small and medium-sized firms as samples in 1995, and found that profitability, growth, value and size positively affect long-term debt use, but profitability, value and size negatively affect short-term debt use. Panno (2003) used logit and probit regression models to find that the choice of financing for firm was internal financing in priority to external financing, while the debt ratio was positively correlated with scale and profitability, and negatively correlated with liquidity, financial leverage and other bankruptcy risk indicators. Based on the data of firm in developing economies such as india from 1991 to 2007, Kumar and bodla (2014) found that borrowing cost, scale, asset mortgage price and liquidity are important determinants of capital structure.

Pai (2007) studied the influencing factors of capital structure of 214 listed firms in Taiwan from 1986 to 2005, and found that there was a significant positive correlation between firm size, operational risk, growth rate and total debt ratio, furthermore, profitability, long-term investment and total debt ratio are significantly and negatively correlated. Lu (2012) studied the determinants of the capital structure of Taiwan's IC industry, and found that Taiwan's IC industry has a positive correlation between capital structure and firm size, mortgaged assets and operating risks, and a negative correlation between profitability and firm uniqueness. Chao et al. (2012) conducted empirical research on 400 listed firms in Taiwan from 2001 to 2010, and found that firm size has negative impact on debt ratio, while growth and sales of related parties have positive impact on debt ratio. The research result of Yang et al. (2015) showed that the size of the board of directors, the firm size, the number of board meetings and the shareholding ratio of directors and supervisors of Taiwan's listed construction industry are positively related to the capital structure, and the CEO duality and equity concentration are negatively related to the capital structure.

CSR and capital structure

Past literature has shown that when firms are willing to take CSR, they are less likely to violate the interests of stakeholders. Bènabou and Tirole (2010) indicated that through firm's engaging in CSR, various stakeholders have more opportunity in participating in corporate decision-making, formally and informally, which can reduce the possibility of short-term speculative behaviors by the management or controlling shareholders. The research results of Kim et al. (2012) also found that firms that implement CSR are less likely to engage in earnings management, means that CSR encourages firms to improve financial information transparency. Gao et al. (2014) pointed out that the top management of firm with good CSR performance are less likely to engage in insider trading than firms with worse CSR performance. Cai et al. (2011) and Kong et al. (2022) also confirmed that firm with better CSR performance are more able to alleviate the phenomenon of pay inequity in terms of the pay gap between the management and employees. Eccles et al. (2014) stated that firms with higher CSR are more inclined to establish a decision-making process in which stakeholders can participate more and disclose firm's non-financial-related information. It can be seen from the above literature that CSR indeed helps to alleviate the agency problem by taking more care of stakeholders' interest instead of just shareholders or controlling shareholders' interests.

More specifically, Girerd-Potin et al. (2011) studied the correlation between CSR performance and capital structure, and found that firms that are good at CSR tend to issue equity securities to raise funds due to the advantage of reducing securities costs, and CSR performance and debt ratio show a significant negative correlation. Hong and Kacperczyk (2009) found that tobacco, gambling and alcohol firms are prone to litigation costs due to the norms of social standards, which is reflected in the firm's cost of capital. In addition, the firm's stock price will be undervalued on the market, so that the firm may have higher financial leverage, that is, using more debt financing. Pijourlet (2015) found that when enterprises implement social responsibility, it is negatively correlated with capital structure. For financing decisions, they tend to issue equity securities, mainly because the implementation of CSR reduces information asymmetry and lower capital costs.

Based on the discussion of the above studies, it is generally showed that the firm's capital structure is highly related to firm's CSR performance. For firms that are good at CSR tend to reduce corporate financial and bankruptcy risk, increase the issuance of equity securities to raise the required funds in financing decisions, and then reduce the firm's debt ratio. Firm with good CSR performance have greater incentives to reduce the bankruptcy risk of the firm in order to maintain the interests of all stakeholders, not just the interests of shareholders, so they tend to use less debt. The checking hypothesis is:

> *Hypothesis*: the better the performance of CSR, the lower the degree of debt use.

Variable, econometric model, firm samples and data source

Variable

Explained variable-capital structure

This study refers to the existing literature (Fama & French, 2002) and employs eight proxy variables for capital structure. First, leverage ratio (*lev*), defined as the total liabilities divided by total equity. Second, whether the leverage ratio is greater than the average in current period (*levab*), when the leverage ratio is higher than the average of all firms in in current period, *levab* is 1, and 0 otherwise. Third, the difference of firm's leverage ratio (*levdif*) between the two consecutive years, defined as the leverage ratio of year *t* minus the leverage ratio of year *t*-1. Fourth, whether the difference of leverage ratio is positive (*levdifd*), if the leverage ratio of year *t* is greater than the leverage ratio of year *t*-1, *levdifd* is 1, and 0 otherwise. Fifth, debt ratio (*debt*), defined as the total liabilities divided by total assets. Sixth, whether the debt ratio is greater than the average in current period (*debtab*), when the debt ratio is higher than the average of all firms in in current period, *debtab* is 1, and 0 otherwise. Seventh, the difference of firm's debt ratio (*debtdif*) between the two consecutive years, defined as the debt ratio of year *t* minus the debt ratio of year *t*-1. Eighth, whether the difference of debt ratio is positive (*debtdifd*), if the debt ratio of year *t* is greater than the debt ratio of year *t*-1, *debtdifd* is 1, and 0 otherwise. The larger the value of these eight variables, the more inclined the firm's capital structure is to use debt financing, and vice versa.

Main explanatory variable-CSR performance

Refers to the concept of social contribution value per share proposed in the guidelines on strengthening the social responsibility of listed firms and environmental information disclosure of listed firms of Shanghai Stock Exchange issued by Shanghai Stock Exchange in 2008, this study calculates the total amount created by the firm for main stakeholders, including after-tax earnings (to the shareholders), taxes (to the government), interests (to the creditors) and employee salaries and benefits (to the employees), and this total amount is defined as firm's social contribution value (*scv*). In addition, to exclude scale effect, the social contribution value is divided by the total assets and then is defined as the social returns of assets (*sroa*), and the social contribution value is also divided by the number of shares outstanding and then is defined as the social contribution value per share (*scvps*). Greater value of social contribution value, social return rate of assets and social contribution value per share refers to better CSR performance.

Control variables

In addition to CSR performance variables, this study considers other determinants of corporate capital structure. Referring to existing studies such as Kumar and Bodla (2014), Hall et al. (2000), Baskin (1989), Frank and Goyal (2003), DeAngelo and Masulis (1980), Flannery and Rangan (2006), Crutchley et al. (1999), Panno (2003), Kumar and Bodla (2014) and Lee and Yeh (2004), capital structure determinants include firm's size (natural logarithm of total assets: *asset*), market to book value (market value of common equity to book value of common equity: *mtb*), fixed assets ratio (non-current assets to total assets: *tang*), depreciation expense ratio (depreciation to total assets: *dep*), R&D expense ratio (R&D expense to net sales: *rd*), institutional shareholdings (the number of shares hold by institutional investors divided by the number of shares outstanding: *insthold*), directors' shareholding ratio (the number of shares hold by directors divided by the number of shares outstanding: *dirhold*) and the shareholding pledge ratio of directors (the ratio of all

directors' pledged shares to total shares hold by all directors: *pledge*). Finally, while the research samples cover 31 industries and 14 years, and considering the differences of capital structure in various industries and years, the 30 industry dummy variables (INDUSTRY) and 13 yearly dummy variables (YEAR) are incorporated into the regression equation. The abbreviations and brief definitions of the above variables are summarized in Table 1.

Econometric model

This research employs multiple regression estimation to examine the effects of CSR performance on capital structure. The regression equation is:

$$\begin{aligned}\mathbf{CAPITAL}_{i,t} = {} & \beta_0 + \beta_1 \cdot \mathbf{CSR}_{i,t} + \beta_2 \cdot asset_{i,t} \\ & + \beta_3 \cdot mtb_{i,t} + \beta_4 \cdot tang_{i,t} + \beta_5 \cdot dep_{i,t} \\ & + \beta_6 \cdot rd_{i,t} + \beta_7 \cdot insthold_{i,t} \\ & + \beta_8 \cdot dirhold_{i,t} + \beta_9 \cdot pledge_{i,t} + \varepsilon_{i,t} \\ & + \gamma \mathbf{INDUSTRY}_i + \delta \mathbf{YEAR}_t + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where subscript i and t represent firm i in year t, respectively. CAPITAL is a vector of capital structure variable, including leverage ratio (*lev*), whether the leverage ratio is greater than mean (*levab*), yearly change in leverage ratio (*levdif*), whether yearly change in leverage ratio is positive (*levdifd*), debt ratio (*debt*), whether the debt ratio is greater than mean (*debtab*), yearly change in debt ratio (*debtdif*) and whether the yearly change in debt ratio is positive (*debtdifd*). CSR is a vector of CSR performance variable, including social contribution value (*scv*), social return on assets (*sroa*) and social contribution value per share (*scvps*). The control variables include firm size (*asset*), the ratio of market value to book value (*mtb*), the ratio of fixed assets to total assets (*tang*), the ratio of depreciation to total assets (*dep*), the ratio of R&D expense to net sales (*rd*), institutional investors' shareholding ratio (*insthold*), directors' shareholding ratio (*dirhold*), directors' shareholdings pledge ratio (*pledge*), vector of industry dummies (INDUSTRY) and vector of yearly dummies (YEAR). The regression equation is pooled-OLS estimated.

Sample selection and data source

This study takes listed non-financial industry firms on the Taiwan Stock Exchange (TWSE) and the Taipei Exchange (TPEx) (excluding the firms of banking, insurance, billing, securities and financial holdings) as the research samples, with a total of 1,590 firms. The data is yearly ranged from 2007 to 2020, which forms 22,260 firm-year observations for each variable (yet some variables have missing data). The data source of firm's financial characteristics and governance variables is Taiwan Economic Journal (TEJ) database.

Empirical result

Descriptive statistics and correlation analysis

Table 2 reports descriptive statistics of full samples (panel A), the samples of firm with above-median *scvps* (panel B) and the samples of firm with below-median *scvps* (panel C). The difference in mean of each variable is reported in rightmost column. Observing the mean differences of eight capital structure variables between two sub-samples, it can be found that they are all negative, and most of them reaches 1% statistical significance level, indicating that the sample of firms with better CSR, on average, have significantly lower leverage ratios, lower probability that the leverage ratio is higher than the averages, a smaller number of leverage ratio increases relative to the previous year and a lower probability that the leverage ratio increases relative to the previous year. There is also a lower probability that the debt ratio is higher than the average of the current year, the debt ratio increases less compared with the previous year, and there is a lower probability that the debt ratio increases compared with the previous year.

Numerically, the samples with better CSR performance tend to have lower leverage ratio (69.02% versus 79.5%), lower probability of having above-mean leverage ratio (0.3115 versus 0.3449) and lower probability of having inter-temporal increase in leverage ratio (0.4819 versus 0.5473). Similar result is also hold for the debt ratio. The samples with better CSR performance, on average, the leverage ratio and debt ratio are decreasing compared with the previous year (decreased by -2.5771% and -0.3426%, respectively), while the samples with worse CSR performance, on average, the leverage ratio and debt ratio are indeed increasing compared with the previous year (increased by 3.9681% and 0.4437%, respectively). The result shows that firms with better CSR performance tend to raise funds by issuing equity securities, which is in line with the hypothesis of the study. Firms with better CSR performance pay more attention to the overall interests of the stakeholders and sustainability of firm, not just the interests of stockholders and short-term profitability. Firms engaging in CSR also pay more attention to the financial and bankruptcy risks arising from the use of liabilities, so it tends to use equity funds rather than debt funds in financing.

The lower triangular elements of Table 3 report the Pearson correlation coefficients among variables. By observing the intersection of the $9^{th} \sim 11^{th}$ row and the $1^{st} \sim 8^{th}$ columns, it is found that the correlation coefficients of three CSR performance variables and eight capital structure variables are all negative and reach at least 5% significance level, indicating that firm with higher social contribution value, social return rate on

Table 1 Abbreviations and definitions of variables

Variable	Abbreviation	Definition
Explained variable–capital structure		
Leverage ratio	*lev*	Total liabilities/total equity
Leverage ratio greater than mean	*levab*	If the leverage ratio is larger than the mean of all firms in specific year, it is equal to 1, and 0 otherwise
Change in Leverage ratio	*levdif*	Leverage ratio at year *t* minus Leverage ratio at year t-1
Change in Leverage ratio greater than 0	*levdifd*	If the change in leverage ratio is greater than zero, it is equal to 1, and 0 otherwise
Debt ratio	*debt*	Total liabilities/total assets
Debt ratio greater than mean	*debtab*	If the debt ratio is larger than the mean of all firms in specific year, it is equal to 1, and 0 otherwise
Change in debt ratio	*debtdif*	Debt ratio at year *t* minus debt ratio at year *t*-1
Change in debt ratio greater than 0	*debtdifd*	If the change in debt ratio is greater than zero, it is equal to 1, and 0 otherwise
Main explanatory variable–CSR performance		
Current CSR performance	*csrdummy*	If a firm is either in annual name-list of the winners of "CSR Award" by the *Global Views Monthly* or the "Best Corporate Citizens" by the *Common Wealth* in a particular year, *csrdummy* is equal to 1, and 0 otherwise
Cumulative CSR performance	*csrcumu*	The cumulative years of a firm being either in the annual name-list of the winners of "CSR Award" by the *Global Views Monthly* or the "Best Corporate Citizens" by the *Common Wealth*
Continuous CSR performance	*csrcont*	If a firm is continuously being either in annual name-list of the winners of "CSR Award" by the *Global Views Monthly* or the "Best Corporate Citizens" by the *Common Wealth* in sample period, *csrcont* is equal to 1, and 0 otherwise
Overlap CSR performance	*csrovlp*	If a firm is in the annual name-list of the winners of "CSR Award" by the *Global Views Monthly* and the "Best Corporate Citizens" by the *Common Wealth* in a particular year, *csrovlp* is equal to 1, and 0 otherwise
Social contribution value	*scv*	Sum of cash dividend, employee salary and benefits, interest expense and tax, and then takes natural logarithm
Social returns on assets	*sroa*	social contribution value / shares outstanding
Social contribution value per share	*scvps*	social contribution value / total assets
Control variable		
Scale	*asset*	The total amount of assets and then takes the natural logarithm
Market-to-book ratio	*mtb*	(Market value of common equity / book value of common equity)
Fixed assets to total assets	*tang*	(Non-current assets/total assets) × 100%
Depreciation to total assets	*dep*	(Depreciation/total assets) × 100%
R&D expense to net sales	*rd*	(R&D expenses/net sales) × 100%
Institutional investors shareholding	*insthold*	(Number of shares hold by institutional investors / number of shares outstanding) × 100%
Directors shareholding	*dirhold*	(number of shares hold by directors / number of shares outstanding) × 100%
Directors' shareholding pledge ratio	*pledge*	(Number of shares pledged by all directors / number of shares hold by all directors) × 100%
Industry dummies	INDUSTRY	Industry dummies vector, including 30 industry dummies (sample belongs to 31 industries)
Yearly dummies	YEAR	Year dummies vector, including 13 industry dummies (sample is divided into 14 years)

This table reports the abbreviations and brief definitions of variables. The definition of variables refers to the Taiwan Economic Journal (TEJ)

assets and social contribution value per share tends to have lower leverage ratio, lower probability of having above-mean leverage ratio, less increase in leverage ratio compared with the previous year, lower probability of having increasing leverage ratios, lower debt ratio, lower probability of having above-mean debt ratio, less debt ratio increase compared with the previous year, lower probability of having increasing debt ratios. The upper triangular elements of Table 3 report the Spearman rank correlation coefficient among variables, and the result is similar. The principal outcome of correlation analysis is similar to the result of descriptive statistics, such that firm with better CSR performance tends to raise funds by issuing equity securities, which

Table 2 Descriptive statistics

Variable	Panel A. Full samples					Panel B. Samples of CSR-firms (samples of firms that *scvps* greater than median)					Panel C. Samples of non CSR-firms (samples of firms that *scvps* smaller than median)					Difference in mean
	Num. of obs	Mean	Std. Dev	Min	Max	Num. of obs	Mean	Std. Dev	Min	Max	Num. of obs	Mean	Std. Dev	Min	Max	
lev	21,155	75.381	79.976	1.3618	722.01	8,565	69.020	62.054	1.7480	640.62	8,566	79.500	91.603	1.3618	722.01	-10.480***
levab	21,155	0.3351	0.4721	0.0000	1.0000	8,565	0.3115	0.4631	0.0000	1.0000	8,566	0.3449	0.4753	0.0000	1.0000	-0.0334***
levdif	20,896	-0.4555	47.604	-701.76	662.40	8,564	-2.5771	38.718	-701.76	434.76	8,560	3.9681	50.851	-678.4	662.40	-6.5451***
levdifd	20,896	0.5064	0.5000	0.0000	1.0000	8,564	0.4819	0.4997	0.0000	1.0000	8,560	0.5473	0.4978	0.0000	1.0000	-0.0654***
debt	21,155	35.767	16.671	7.9020	70.340	8,565	35.468	15.323	7.9020	70.340	8,566	35.701	17.563	7.9020	70.340	-0.2336
debtab	21,155	0.4783	0.4995	0.0000	1.0000	8,565	0.4605	0.4985	0.0000	1.0000	8,566	0.4860	0.4998	0.0000	1.0000	-0.0255***
debtdif	20,896	-0.1023	7.9304	-59.931	61.942	8,564	-0.3426	7.0098	-55.144	57.156	8,560	0.4437	8.0058	-58.411	61.942	-0.7863***
debtdifd	20,896	0.4973	0.5000	0.0000	1.0000	8,564	0.4819	0.4997	0.0000	1.0000	8,560	0.5297	0.4991	0.0000	1.0000	-0.0478***
scv	19,390	10.376	7.5924	-17.733	20.366	8,565	13.689	1.2551	10.366	20.366	8,566	7.0623	9.8360	-17.733	17.639	6.6271***
sroa	19,390	12.409	14.038	-175.96	131.92	8,565	19.253	9.3212	1.6005	113.11	8,566	3.5287	11.126	-175.09	60.336	15.724***
scvps	17,131	4.6566	8.3704	-15.873	336.94	8,565	8.3796	10.475	3.0966	336.94	8,566	0.9340	1.6391	-15.873	3.0938	7.4456***
asset	21,155	15.007	1.4492	4.6052	21.924	8,565	15.446	1.3606	12.002	21.924	8,566	14.930	1.3445	10.179	20.326	0.5155***
mtb	19,727	1.8970	2.9026	0.0800	192.99	8,565	2.0983	1.5607	0.2600	22.670	8,565	1.5159	3.5536	0.0900	192.99	0.5824***
tang	21,154	52.426	23.387	0.0000	100.00	8,565	50.269	22.295	0.1203	99.967	8,566	57.493	23.061	0.1251	100.00	-7.2238***
depc	20,977	2.0025	2.5891	0.0000	61.812	8,565	1.9996	2.3645	0.0000	20.342	8,564	1.8971	2.6247	0.0000	54.092	0.1025***
rd	20,129	71.925	2665.0	0.0000	233489.1	8,343	4.1320	6.2753	0.0000	85.320	8,170	123.05	3511.0	0.0000	233489.1	-118.92***
insthold	19,990	39.006	22.806	0.0000	100.00	8,565	42.699	22.792	0.0000	100.00	8,562	33.701	21.256	0.0000	97.920	8.9977***
dirhold	20,011	21.825	14.894	0.0000	99.710	8,565	21.780	14.950	0.1200	87.830	8,565	20.030	13.175	0.0000	84.260	1.7500***
pledge	20,011	7.4121	16.373	0.0000	100.00	8,565	6.2826	14.071	0.0000	100.00	8,565	9.4013	19.048	0.0000	100.00	-3.1188***

This table reports the basic statistics of each variable, including the number of non-missing observations, mean, standard deviation, minimum and maximum of full samples (Panel A), samples of CSR-firms (samples of firm that *scvps* are greater than median, Panel B) and samples of non CSR-firms (samples of firm that *scvps* are smaller than median, Panel C). The rightmost column reports the differences (and *t*-statistics) in means of each variable, and *, ** and *** indicate a statistically significant difference at the 10%, 5%, and 1% level in means for two groups of samples on a specific variable, respectively

* indicates a statistically significant difference at the 10% level in means for two groups of samples on a specific variable

** indicate a statistically significant difference at the 5% level

*** indicate a statistically significant difference at the 1% level in means for two groups of samples on a specific variable

is consistent with the hypothesis that CSR engagement pushes firms to reduce the use of debt financing.

Baseline regression result

Table 4 reports the regression estimation results of the effect of CSR performance (proxied by the social contribution value: *scv*) on the firm's capital structure. The capital structure variables in models (1) ~ (8) are leverage ratio (*lev*), whether the leverage ratio is greater than the average of all firms in the current year (*levab*), whether the leverage ratio is relative to the previous period (*levdif*), whether the leverage ratio is positive relative to the previous period (*levdifd*), debt ratio (*debt*), whether the debt ratio is greater than the average of all firms in the current year (*debtab*), whether the debt ratio relative to the change of the previous period (*debtdif*) and the debt ratio relative to the change of the previous period are positive (*debtdifd*), respectively. Observing the estimated coefficients on *scv* in models (1) ~ (8), it is found that they are all negative and reach a less-than 10% statistical significance level, indicating that the firm's social contribution value has negative impact on eight variables of the capital structure. Firm with higher social contribution value tends to have lower leverage ratio, lower probability of having above-average leverage ratio, less inter-temporal increase in leverage ratio, lower probability of having positive inter-temporal increase in leverage ratio. Similarly, firm with higher social contribution value tends to have lower debt ratio, lower probability of having above-average debt ratio, less inter-temporal increase in debt ratio and lower probability of having positive inter-temporal increase in debt ratio.

The estimation result of main explanatory variable is consistent with the prediction of hypothesis in the study, firm's CSR performance tends to reduce the use of debt financing and use more equity funds. When firm has greater commitment and engagement in CSR and has better CSR performance, information asymmetry problem between firm and financial markets participants is less severe and the firm has a lower cost of capital. Furthermore, firm with better CSR performance pays more attention to the interests of the all stakeholders to achieve sustainability, and tends to raise required funds by issuing equity securities without bankruptcy risk, which makes the debt ratio tend to be lower.

The estimation result of control variables in Table 4 shows that the estimated coefficients on asset, market value to book value, directors' shareholding ratio and directors' shareholding pledge ratio are mostly positive and significant, indicating that firm with larger scale, higher market value to book value, directors' shareholding ratio and directors' shareholding pledge ratio tends to use more debt financing. In addition, estimated coefficients on R&D ratio and institutional investors' shareholding ratio are mostly negative and significant, indicating that firm with higher R&D ratio and higher institutional investor shareholding ratio tends to use equity funds instead of debt.

Table 5 and Table 6 report the estimation results of the effects of CSR performance (proxied by social return on assets: *sroa* and social contribution per share: *scvps*) on the firm's capital structure. Similar to the result of Table 4, in model (1) ~ (8), estimated coefficients on social return on assets and social contribution per share are both negative and reach a statistical significance level, indicating that social return on assets and social contribution per share both negatively affect eight capital structure variables. Firm with higher social return on assets and social contribution value per share tends to use less debt financing. Firm with higher social return on assets and social contribution value per share tends to have lower leverage (debt) ratio, lower probability of having above-mean leverage (debt) ratio, less inter-temporal increase in leverage (debt) ratio and lower probability of having positive inter-temporal increase in leverage (debt) ratio. Estimation result of Tables 4, 5 and 6 generally support the hypothesis of the study, firm with better CSR performance tends to raise funds through equity financing instead of debt financing.

Additional tests

Moderating effect of family control

While a large number of firms in Taiwan's financial market are family controlled firms (Claessens et al., 2000; Yeh, 2005; Yeh et al., 2001), and the impacts of family control on firm's performance were divided into positive views such as stewardship theory (Davis et al., 1997; Corbetta & Salvato, 2004a, b) and negative views such as agency theory (Jensen & Meckling, 1976; Fama & Jensen, 1983). Because firm's commitment and engagement in CSR is also an investment which consumes corporate resources, the motivation and consequences of CSR engagement may be distinguished between family-controlled firms and non-family-controlled firms. Under the stewardship theory, family controlled firms are more likely to engage in CSR in order to enhance firm's social reputation, social legitimacy and corporate sustainability, then to limit itself to use debt financing. On the contrary, under the agency theory, the CSR investment of family-controlled-firms are more likely to be used as highlighting the reputation of the family or family members rather than really beneficial to firm's sustainability, such that the relationship between CSR performance and debt use is weakened in family-controlled-firms.

Table 3 Correlation coefficients matrix

variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) *lev*	1.0000	0.8080*	0.2409*	0.1851*	0.9998*	0.8632*	0.2239*	0.1939*	0.0523*	-0.1953*	-0.0123	0.2226*	0.0026	-0.0704*	-0.0013	-0.2387*	0.0405*	-0.0370*	0.1078*
(2) *levab*	0.6667*	1.0000	0.2070*	0.1451*	0.8080*	0.7347*	0.1806*	0.1450*	0.0034	-0.2067*	-0.0537*	0.1650*	0.0105	-0.1086*	-0.0141*	-0.2013*	0.0411*	-0.0045	0.0764*
(3) *levdif*	0.2843*	0.1217*	1.0000	0.8657*	0.2404*	0.2002*	0.9415*	0.8161*	-0.1034*	-0.1746*	-0.1087*	0.0289*	0.0309*	0.0108	-0.0141*	0.0206*	0.0057	-0.0080	0.0166*
(4) *levdifd*	0.1576*	0.1362*	0.4369*	1.0000	0.1849*	0.1549*	0.8498*	0.9387*	-0.0781*	-0.1346*	-0.0855*	0.0241*	0.0298*	0.0080	-0.0229*	0.0271*	-0.0017	-0.0118	0.0144*
(5) *debt*	0.8077*	0.8191*	0.1556*	0.1739*	1.0000	0.8632*	0.2252*	0.1949*	0.0527*	-0.1952*	-0.0120	0.2229*	0.0020	-0.0702*	-0.0020	-0.2392*	0.0405*	-0.0369*	0.1083*
(6) *debtab*	0.5930*	0.7415*	0.1008*	0.1436*	0.8352*	1.0000	0.1900*	0.1600*	0.0304*	-0.1919*	-0.0378*	0.1869*	-0.0148*	-0.0587*	-0.0045	-0.1984*	0.0212*	-0.0302*	0.0970*
(7) *debtdif*	0.1769*	0.1932*	0.6496*	0.6272*	0.2346*	0.1924*	1.0000	0.8660*	-0.0806*	-0.1500*	-0.0848*	0.0276*	0.0287*	0.0146*	-0.0198*	0.0301*	0.0055	-0.0073	0.0175*
(8) *debtdifd*	0.1310*	0.1383*	0.3887*	0.9366*	0.1851*	0.1509*	0.6329*	1.0000	-0.0596*	-0.1169*	-0.0654*	0.0309*	0.0242*	0.0040	-0.0265*	0.0260*	0.0026	-0.0118	0.0146*
(9) *scv*	-0.1051*	-0.0492*	-0.1473*	-0.1162*	-0.0192*	-0.0176*	-0.1139*	-0.0933*	1.0000	0.5793*	0.7396*	0.7215*	0.2101*	0.0418*	0.0148*	-0.0550*	0.3906*	-0.0933*	0.1267*
(10) *sroa*	-0.1826*	-0.1431*	-0.1965*	-0.1329*	-0.1353*	-0.1269*	-0.1758*	-0.1152*	0.5967*	1.0000	0.8698*	-0.0038	0.4463*	-0.2258*	0.1539*	0.1581*	0.1235*	0.0792*	-0.0773*
(11) *scvps*	-0.0528*	-0.0362*	-0.0467*	-0.0416*	-0.0220*	-0.0352*	-0.0373*	-0.0332*	0.3167*	0.4983*	1.0000	0.2523*	0.4248*	-0.1804*	0.0419*	0.0850*	0.2609*	0.0568*	-0.0495*
(12) *asset*	0.1079*	0.1249*	0.0532*	0.0363*	0.1734*	0.1460*	0.0520*	0.0415*	0.2776*	-0.0367*	0.1880*	1.0000	-0.0894*	0.2420*	-0.0648*	-0.1800*	0.4029*	-0.2018*	0.2293*
(13) *mtb*	0.1518*	0.0287*	0.0548*	0.0196*	0.0332*	0.0052	0.0077	0.0075	-0.0355*	0.0943*	0.1531*	-0.1198*	1.0000	-0.1712*	0.0732*	0.1744*	0.1913*	0.0810*	-0.0525*
(14) *tang*	-0.1031*	-0.1203*	0.0351*	0.0155*	-0.1006*	-0.0708*	0.0335*	0.0126*	-0.0501*	-0.2026*	-0.1037*	0.2957*	-0.1007*	1.0000	0.1639*	-0.0796*	0.0866*	-0.0602*	0.1805*
(15) *dep*	0.0812*	0.0511*	0.0252*	-0.0150*	0.0670*	0.0504*	0.0040	-0.0198*	-0.0477*	0.0481*	0.0239*	0.0096	0.0692*	0.1490*	1.0000	0.1795*	0.0166*	0.0629*	0.0309*
(16) *rd*	-0.0216*	-0.0181*	0.0011	0.0042	-0.0387*	-0.0226*	0.0025	0.0028	-0.0689*	-0.0547*	-0.0256*	-0.0117*	0.0485*	-0.0308*	-0.0081	1.0000	-0.1632*	-0.0831*	-0.0707*
(17) *insthold*	0.0516*	0.0383*	-0.0058	-0.0063	0.0391*	0.0195*	0.0051	-0.0033	0.1696*	0.1275*	0.2125*	0.3901*	0.0970*	0.0731*	0.1020*	0.0155*	1.0000	0.2925*	0.0255*
(18) *dirhold*	0.0420*	0.0180*	-0.0176*	-0.0141*	-0.0013	-0.0084	-0.0084	-0.0132*	0.0232*	0.1083*	0.0467*	-0.1384*	0.0533*	-0.0747*	0.0906*	-0.0078	0.4234*	1.0000	-0.1215*
(19) *pledge*	0.0576*	0.0843*	0.0142*	0.0165*	0.0991*	0.0962*	0.0218*	0.0159*	-0.0250*	-0.1009*	-0.0681*	0.1481*	-0.0315*	0.1423*	0.0068	0.0292*	-0.0077	-0.1210*	1.0000

This table reports the pairwise Pearson correlation coefficients (lower triangular elements) and Spearman rank correlation coefficients (upper triangular elements) among variables. The data period is from 2007 to 2020. The asterisk mark means that a correlation coefficient reaches a significance level of 5%. Please refer to Table 1 for the definitions of variables

Table 4 Regression result of the effects of CSR (Social Contribution Value: *scv*) on the capital structure

Explanatory variables	Explanatory variables (capital structure)							
	lev	***levab***	***levdif***	***levdifd***	***debt***	***debtab***	***debtdif***	***debtdifd***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
scv	-1.899***	-0.00810***	-1.082***	-0.00895***	-0.250***	-0.00603***	-0.145***	-0.00749***
	(-24.80)	(-17.05)	(-23.33)	(-17.12)	(-15.20)	(-11.80)	(-18.28)	(-14.30)
asset	13.88***	0.0857***	3.487***	0.0270***	3.576***	0.0895***	0.492***	0.0270***
	(27.58)	(27.44)	(11.44)	(7.87)	(33.10)	(26.66)	(9.45)	(7.85)
mtb	4.443***	0.00544***	1.178***	0.00544***	0.293***	0.00355***	0.0520**	0.00292**
	(22.38)	(4.41)	(9.81)	(4.02)	(6.88)	(2.68)	(2.53)	(2.15)
tang	-0.589***	-0.00411***	-0.0124	-0.000281	-0.135***	-0.00321***	-0.000729	-0.000336*
	(-22.89)	(-25.79)	(-0.79)	(-1.60)	(-24.54)	(-18.71)	(-0.27)	(-1.91)
dep	2.026***	0.00951***	0.292**	-0.00417***	0.392***	0.00981***	-0.0290	-0.00473***
	(9.09)	(6.88)	(2.16)	(-2.74)	(8.19)	(6.60)	(-1.26)	(-3.10)
re	-0.00139***	-0.00000651***	-0.000265*	-0.00000206	-0.000354***	-0.00000672***	-0.0000258	-0.000000524
	(-6.09)	(-4.59)	(-1.91)	(-1.32)	(-7.21)	(-4.41)	(-1.09)	(-0.33)
insthold	-0.187***	-0.00122***	-0.0558***	-0.000273	-0.0559***	-0.00176***	-0.00343	-0.000244
	(-5.96)	(-6.25)	(-2.94)	(-1.28)	(-8.31)	(-8.42)	(-1.06)	(-1.14)
dirhold	0.384***	0.00214***	0.0440	0.000237	0.0647***	0.00178***	0.00787*	0.000269
	(8.55)	(7.66)	(1.62)	(0.77)	(6.70)	(5.94)	(1.69)	(0.87)
pledge	0.284***	0.00240***	-0.00224	0.000174	0.0891***	0.00260***	0.00409	0.000162
	(8.27)	(11.27)	(-0.11)	(0.74)	(12.08)	(11.34)	(1.15)	(0.69)
INDUSTRY dummies	yes	yes	yes	yes	yes	yes	yes	yes
YEAR dummies	yes	yes	yes	yes	yes	yes	yes	yes
constant	-100.7***	-0.712***	-41.95***	0.213***	-9.898***	-0.661***	-5.998***	0.196***
	(-14.08)	(-16.04)	(-9.69)	(4.37)	(-6.45)	(-13.87)	(-8.11)	(4.01)
Num. of obs	17,548	17,548	17,542	17,542	17,548	17,548	17,542	17,542
Adj. *R*-square	0.104	0.077	0.038	0.018	0.092	0.060	0.021	0.013
Prob. of *F*-stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimation results of the effects of CSR performance (proxied by the social contribution value: *scv*) on the corporate capital structure. The capital structure variables in model (1) ~ (8) are leverage ratio (*lev*), leverage ratio greater than mean (*levab*), change in leverage ratio (*levdif*), change in leverage ratio greater than 0 (*levdifd*), debt ratio (*debt*), debt ratio greater than mean (*debtab*), change in debt ratio (*debtdif)* and change in debt ratio greater than 0 (*debtdifd*). The control variables include firm scale (*asset*), market-to-book ratio (*mtb*), fixed assets to total assets (*tang*), depreciation to total assets (*dep*), R&D expense to net sales (*rd*), institutional investors' shareholding (*insthold*), directors' shareholding(*dirhold*), directors' shareholding pledge ratio(*pledge*), industry dummies vector (INDUSTRY) and yearly dummies vector (YEAR). The values in brackets are the *t*-statistics of estimated coefficients (calculated by the White's heteroscedasticity consistency robust standard error), and *, ** and *** indicates that the estimated coefficients reach significance level of 10%, 5% and 1%, respectively

In order to test the moderating effect of family control on the negative relationship between CSR and capital structure, this study incorporates the cross-product term of CSR and dummy of family-controlled-firm and re-estimates the regression. The estimated results are reported in the model (1) ~ (4) in Table 7. By observing the coefficients on cross-product term, it is shown that they are all positive and reach a statistically significance level, indicating that the effect of performance of CSR in family controlled firms are weaker than the effect in non-family-controlled-firms. Under the agency theory of family firm (Jensen & Meckling, 1976; Fama & Jensen, 1983), the non-separation of ownership and control fosters conflicts of interests between controlling shareholders and other stakeholders, thus weakens of effects of firm's engaging in CSR on debt use. The effect of CSR performance on capital structure is relatively weak in family-controlled-firms.

Insurance effects of CSR on capital structure

Second, according to Lins et al. (2017), the public tends to have greater confidence and trust toward firms with better CSR performance, thus during the period of loss confidence and trust of financial markets such as the financial tsunami (2008–2009) period, firm with good CSR performance achieved better profitability, sales growth and employee productivity than firms with poor CSR performance. Based on the arguments and findings of Lins et al. (2017), this study proposes that firm with better CSR

Table 5 Regression result of the effects of CSR (Social Returns on Assets: *sroa*) on the capital structure

Explanatory variables	Explanatory variables (capital structure)							
	lev	***levab***	***levdif***	***levdifd***	***debt***	***debtab***	***debtdif***	***debtdifd***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
sroa	-1.677***	-0.00805***	-0.811***	-0.00538***	-0.277***	-0.00732***	-0.114***	-0.00468***
	(-39.18)	(-30.05)	(-30.87)	(-17.98)	(-29.97)	(-25.38)	(-25.40)	(-15.58)
asset	11.19***	0.0745***	1.910***	0.0136***	3.238***	0.0816***	0.283***	0.0158***
	(23.56)	(25.08)	(6.55)	(4.10)	(31.57)	(25.48)	(5.66)	(4.76)
mtb	5.028***	0.00821***	1.468***	0.00743***	0.387***	0.00603***	0.0925***	0.00463***
	(25.91)	(6.76)	(12.32)	(5.47)	(9.24)	(4.61)	(4.53)	(3.41)
tang	-0.706***	-0.00472***	-0.0621***	-0.000539***	-0.157***	-0.00381***	-0.00806***	-0.000571***
	(-27.79)	(-29.70)	(-3.98)	(-3.03)	(-28.70)	(-22.27)	(-3.01)	(-3.21)
dep	2.654***	0.0124***	0.621***	-0.00170	0.485***	0.0122***	0.0162	-0.00263*
	(12.22)	(9.10)	(4.66)	(-1.12)	(10.34)	(8.33)	(0.71)	(-1.73)
re	-0.00154***	-0.00000747***	-0.000299**	-0.00000187	-0.000394***	-0.00000792***	-0.0000325	-0.000000424
	(-6.92)	(-5.36)	(-2.19)	(-1.20)	(-8.18)	(-5.27)	(-1.38)	(-0.27)
insthold	-0.116***	-0.000860***	-0.0245	-0.0000960	-0.0431***	-0.00141***	0.00111	-0.0000856
	(-3.79)	(-4.48)	(-1.30)	(-0.45)	(-6.51)	(-6.83)	(0.34)	(-0.40)
dirhold	0.400***	0.00224***	0.0482*	0.000227	0.0687***	0.00190***	0.00863*	0.000266
	(9.13)	(8.15)	(1.79)	(0.74)	(7.25)	(6.43)	(1.87)	(0.87)
pledge	0.234***	0.00214***	-0.0230	0.0000719	0.0795***	0.00233***	0.000999	0.0000682
	(6.99)	(10.21)	(-1.12)	(0.31)	(10.97)	(10.32)	(0.28)	(0.29)
INDUSTRY dummies	yes	yes	yes	yes	yes	yes	yes	yes
YEAR dummies	yes	yes	yes	yes	yes	yes	yes	yes
constant	-58.53***	-0.523***	-19.39***	0.387***	-3.787**	-0.508***	-2.920***	0.343***
	(-8.46)	(-12.08)	(-4.57)	(7.99)	(-2.53)	(-10.89)	(-4.01)	(7.08)
Num. of obs	17,548	17,548	17,542	17,542	17,548	17,548	17,542	17,542
Adj. *R*-square	0.148	0.107	0.059	0.020	0.125	0.086	0.038	0.015
Prob. of *F*-stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimation result of the effects of CSR performance (proxied by the social returns on assets: *sroa*) on the corporate capital structure. The capital structure variables in model (1) ~ (8) are leverage ratio (*lev*), leverage ratio greater than mean (*levab*), change in leverage ratio (*levdif*), change in leverage ratio greater than 0 (*levdifd*), debt ratio (*debt*), debt ratio greater than mean (*debtab*), change in debt ratio (*debtdif)* and change in debt ratio greater than 0 (*debtdifd*). The control variables include firm scale (*asset*), market-to-book ratio (*mtb*), fixed assets to total assets (*tang*), depreciation to total assets (*dep*), R&D expense to net sales (*rd*), institutional investors' shareholding (*insthold*), directors' shareholding(*dirhold*), directors' shareholding pledge ratio(*pledge*), industry dummies vector (INDUSTRY) and yearly dummies vector (YEAR). The values in brackets are the *t*-statistics of estimated coefficients (calculated by the White's heteroscedasticity consistency robust standard error), and *, ** and *** indicate that the estimated coefficients reach significance level of 10%, 5% and 1%, respectively

tends to reduce more of debt use because firm's profitability and equity price decline is less in period of losing confidence, namely, insurance effect of CSR emerges. To test the moderating effect of financial tsunami period on the negative relationship between CSR and capital structure, this study incorporates the cross-product term of CSR and dummy of financial tsunami period and re-estimates the regression. The estimated results are reported in the model (5) ~ (8) in Table 7. By observing the coefficients of cross-product term of CSR and dummy of financial tsunami period, it is shown that they are all negative and reach statistically significance level, indicating that better CSR performance has greater effects in reducing the use of debt in financial tsunami period. The debt-reducing effect of CSR is more pronounced during the period of losing confidence by the insurance effect of CSR.

Alternative measure of CSR performance

The quantification and precision of a firm's involvement in CSR is a crucial aspect that the researchers and investors considering a firm's CSR performance must pay attention to. Apart from donations or the establishment of charitable foundations and related philanthropic activities, how to quantitatively measures its social responsibility contributions and ensures the accuracy of measures become important consideration. Financial statements primarily disclose financial information, and the disclosure of non-financial information often relies on a firm's willingness to provide it. Even in the case of CSR reports or sustainability reports, there is still a relative lack of examples where firms disclose the actual amount of their investments in various aspects of CSR engagement. Existing studies on CSR performance evaluation often utilize assessment criteria developed by

Table 6 Regression result of the effects of CSR (Social Contribution Value Per Share: *scvps*) on the capital structure

Explanatory variables	Explanatory variables (capital structure)							
	lev	***levab***	***levdif***	***levdifd***	***debt***	***debtab***	***debtdif***	***debtdifd***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
scvps	-1.204***	-0.00524***	-0.364***	-0.00314***	-0.174***	-0.00494***	-0.0441***	-0.00259***
	(-16.82)	(-11.96)	(-8.42)	(-6.48)	(-11.48)	(-10.53)	(-6.05)	(-5.33)
asset	11.90***	0.0785***	2.053***	0.0150***	3.432***	0.0876***	0.284***	0.0166***
	(22.74)	(24.55)	(6.50)	(4.24)	(30.99)	(25.52)	(5.33)	(4.67)
mtb	5.480***	0.00913***	1.504***	0.00757***	0.427***	0.00715***	0.0824***	0.00465***
	(25.86)	(7.05)	(11.75)	(5.28)	(9.53)	(5.15)	(3.82)	(3.24)
tang	-0.586***	-0.00411***	0.0114	-0.000118	-0.136***	-0.00324***	0.00211	-0.000211
	(-21.82)	(-24.99)	(0.70)	(-0.65)	(-23.99)	(-18.42)	(0.77)	(-1.16)
dep	2.345***	0.0108***	0.469***	-0.00228	0.406***	0.0100***	-0.000574	-0.00299*
	(10.07)	(7.59)	(3.33)	(-1.45)	(8.23)	(6.57)	(-0.02)	(-1.90)
rd	-0.00104***	-0.00000500***	-0.0000517	-0.000000212	-0.000302***	-0.00000560***	0.00000173	0.00000112
	(-4.45)	(-3.51)	(-0.37)	(-0.13)	(-6.12)	(-3.67)	(0.07)	(0.71)
insthold	-0.162***	-0.00114***	-0.0540***	-0.000280	-0.0551***	-0.00178***	-0.00349	-0.000237
	(-4.81)	(-5.52)	(-2.66)	(-1.23)	(-7.74)	(-8.06)	(-1.02)	(-1.04)
dirhold	0.330***	0.00179***	0.0353	0.000208	0.0517***	0.00155***	0.00660	0.000217
	(6.91)	(6.14)	(1.23)	(0.64)	(5.12)	(4.96)	(1.36)	(0.67)
pledge	0.291***	0.00250***	0.00229	0.000245	0.0932***	0.00270***	0.00501	0.000223
	(8.24)	(11.57)	(0.11)	(1.03)	(12.46)	(11.68)	(1.39)	(0.93)
INDUSTRY dummies	yes	yes	yes	yes	yes	yes	yes	yes
YEAR dummies	yes	yes	yes	yes	yes	yes	yes	yes
constant	-87.50***	-0.674***	-31.73***	0.303***	-9.775***	-0.679***	-4.354***	0.278***
	(-11.55)	(-14.54)	(-6.94)	(5.90)	(-6.09)	(-13.67)	(-5.64)	(5.42)
Num. of obs	16,507	16,507	16,501	16,501	16,507	16,507	16,501	16,501
Adj. *R*-square	0.093	0.072	0.013	0.004	0.092	0.062	0.004	0.003
Prob. of *F*-stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimation results of the effects of CSR performance (proxied by the social contribution value per share: *scvps*) on the corporate capital structure. The capital structure variables in model (1) ~ (8) are leverage ratio (*lev*), leverage ratio greater than mean (*levab*), change in leverage ratio (*levdif*), change in leverage ratio greater than 0 (*levdifd*), debt ratio (*debt*), debt ratio greater than mean (*debtab*), change in debt ratio (*debtdif)* and change in debt ratio greater than 0 (*debtdifd*). The control variables include firm scale (*asset*), market-to-book ratio (*mtb*), fixed assets to total assets (*tang*), depreciation to total assets (*dep*), R&D expense to net sales (*rd*), institutional investors' shareholding (*insthold*), directors' shareholding (*dirhold*), directors' shareholding pledge ratio (*pledge*), industry dummies vector (INDUSTRY) and yearly dummies vector (YEAR). The values in brackets are the t-statistics of estimated coefficients (calculated using White's heteroscedasticity consistency robust standard error), and *, **, and *** indicate that the estimated coefficients are significant at the 10%, 5%, and 1% significance levels, respectively

* indicates that the estimated coefficient of the regression is statistically significant at least at the 10% level

** indicate that the estimated coefficient of the regression is statistically significant at least at the 5% level

*** indicate that the estimated coefficient of the regression is statistically significant at least at the 1% level

impartial and objective third-party institution to assess and rank firm's social responsibility performance. These CSR rating agencies include KLD, FTSE 4GOOD Index, and others (Wu & Shen, 2013; Kim et al., 2014; Lins et al., 2017).

In this study, until now the measurement of CSR performance is quantitative which follows the inclusion criteria of constituent stocks of Shanghai Stock Exchange Social Responsibility Index. To increase the robustness of the empirical result, this study employs an alternative approach to measure the CSR performance of sample companies, specifically by examining whether a particular company is included in the prestigious list of CSR performance published by rating agencies. In Taiwan, a highly reputable business magazine, the *Common Wealth*,[3] conducts an annual assessment of the CSR performance of publicly

[3] The Digital News Report, published by the Oxford University Reuters Institute for the Study of Journalism, is a highly regarded annual report within the global media industry. It covers 46 countries and surveys 93,000 readers, and has been conducted for 10 years. The full report can be accessed at https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2022-06/Digital_News-Report_2022.pdf, and the section on Taiwan is located on pages 148–149. According to the report, the *Common Wealth* saw a 6-percentage-point increase in trust from last year, growing from 51 to 57% and rising from the third position to the top spot in rankings. The *Common Wealth* has been recognized as the most trusted media outlet in Taiwan.

Table 7 Regression result of the effects of CSR (Social Contribution Value per Share: *scvps*) on the capital structure– moderating effects of family control and financial tsunami

Explanatory variables	Explanatory variables (capital structure)							
	lev	***levab***	***debt***	***debtab***	***lev***	***levab***	***debt***	***debtab***
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
scvps	-1.835***	-0.00842***	-0.268***	-0.00761***	-1.155***	-0.00494***	-0.165***	-0.00473***
	(-15.14)	(-11.36)	(-10.42)	(-9.57)	(-16.08)	(-11.26)	(-10.84)	(-10.04)
*scvps*family*	0.841***	0.00425***	0.124***	0.00356***				
	(6.44)	(5.32)	(4.50)	(4.15)				
*scvps*tsunami*					-2.137***	-0.0128***	-0.400***	-0.00923***
					(-7.11)	(-6.95)	(-6.28)	(-4.68)
asset	12.03***	0.0792***	3.449***	0.0881***	11.97***	0.0790***	3.446***	0.0879***
	(22.99)	(24.75)	(31.14)	(25.67)	(22.90)	(24.71)	(31.14)	(25.63)
mtb	5.538***	0.00943***	0.436***	0.00740***	5.481***	0.00914***	0.428***	0.00716***
	(26.14)	(7.27)	(9.71)	(5.32)	(25.90)	(7.06)	(9.55)	(5.16)
tang	-0.610***	-0.00423***	-0.140***	-0.00335***	-0.598***	-0.00417***	-0.139***	-0.00329***
	(-22.54)	(-25.52)	(-24.45)	(-18.85)	(-22.24)	(-25.40)	(-24.35)	(-18.68)
dep	2.380***	0.0110***	0.412***	0.0102***	2.335***	0.0108***	0.404***	0.00999***
	(10.23)	(7.72)	(8.35)	(6.67)	(10.04)	(7.56)	(8.20)	(6.54)
rd	-0.00105***	-0.00000508***	-0.000304***	-0.00000566***	-0.00104***	-0.00000504***	-0.000303***	-0.00000563***
	(-4.52)	(-3.57)	(-6.18)	(-3.71)	(-4.49)	(-3.55)	(-6.16)	(-3.69)
insthold	-0.146***	-0.00105***	-0.0527***	-0.00171***	-0.159***	-0.00112***	-0.0546***	-0.00177***
	(-4.33)	(-5.12)	(-7.39)	(-7.73)	(-4.73)	(-5.45)	(-7.67)	(-8.01)
dirhold	0.313***	0.00171***	0.0490***	0.00148***	0.324***	0.00175***	0.0505***	0.00152***
	(6.56)	(5.84)	(4.84)	(4.72)	(6.79)	(6.01)	(5.00)	(4.87)
pledge	0.284***	0.00246***	0.0920***	0.00267***	0.289***	0.00249***	0.0928***	0.00269***
	(8.04)	(11.40)	(12.31)	(11.54)	(8.19)	(11.52)	(12.42)	(11.64)
INDUSTRY dummies	yes	yes	yes	yes	yes	yes	yes	yes
YEAR dummies	yes	yes	yes	yes	yes	yes	yes	yes
constant	-87.85***	-0.676***	-9.775***	-0.680***	-87.25***	-0.672***	-9.727***	-0.678***
	(-11.60)	(-14.59)	(-6.10)	(-13.69)	(-11.53)	(-14.53)	(-6.07)	(-13.66)
Num. of obs	16,504	16,504	16,504	16,504	16,507	16,507	16,507	16,507
Adj. *R*-square	0.095	0.074	0.093	0.063	0.096	0.075	0.094	0.063
Prob. of *F*-stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimation results of the effects of CSR performance (proxied by the social contribution value per share: *scvps*) on the corporate capital structure and further considers the moderating effects of family control and financial tsunami. The capital structure variables in model (1) ~ (8) are leverage ratio (*lev*), leverage ratio greater than mean (*levab*), change in leverage ratio (*levdif*), change in leverage ratio greater than 0 (*levdifd*), debt ratio (*debt*), debt ratio greater than mean (*debtab*), change in debt ratio (*debtdif)* and change in debt ratio greater than 0 (*debtdifd*). The control variables include firm scale (*asset*), market-to-book ratio (*mtb*), fixed assets to total assets (*tang*), depreciation to total assets (*dep*), R&D expense to net sales (*rd*), institutional investors' shareholding (*insthold*), directors' shareholding (*dirhold*), directors' shareholding pledge ratio (*pledge*), industry dummies vector (INDUSTRY) and yearly dummies vector (YEAR). The values in brackets are the t-statistics of estimated coefficients (calculated using White's heteroscedasticity consistency robust standard error), and *, **, and *** indicate that the estimated coefficients are significant at the 10%, 5%, and 1% significance levels, respectively

* indicates that the estimated coefficient of the regression is statistically significant at least at the 10% level

** indicate that the estimated coefficient of the regression is statistically significant at least at the 5% level

*** indicate that the estimated coefficient of the regression is statistically significant at least at the 1% level

traded firms in Taiwan. Each year, the evaluation criteria and scope may undergo slight adjustments to align with the global dynamics of CSR issues. According to Chang (2011), since 2007, the *Common Wealth* has conducted an annual survey and ranking of "Corporate Citizens" drawing references from international indicators and evaluation methods such as the United Nations principles, OECD guidelines, and the Dow Jones Sustainability Index. The assessment focuses on four dimensions: corporate governance, corporate commitments, social engagement, and environmental protection. The goal is to select the best corporate citizens among publicly traded firms in Taiwan. Corporate governance primarily measures the independence of the board of directors and the transparency. Corporate commitments

include commitments to consumers, employee development and welfare, and investment in innovation and research and development. Social engagement evaluates the firm's social contributions and influence, while environmental protection examines the firm's efforts in environmental conservation and energy efficiency.

In the annual selection process for "Corporate Citizens" by the *Common Wealth*, it begins by screening profitable companies among over 2,000 publicly traded companies (including those listed on the stock exchange, over-the-counter market, and emerging stock market) regulated by the Financial Supervisory Commission for three consecutive years. Then, more than a hundred institutional analysts, accountants, and experts from the business, government, and academics who have long been concerned with CSR, evaluate and score the firm' performance in the four dimensions mentioned above. After weighting, each company receives a total score. The *Common Wealth* names the top 50 companies as the "Best Corporate Citizens TOP50," with 30 belonging to the category of "Large Enterprises" with annual revenue exceeding 10 billion, 10 in the category of "Medium-Sized Enterprises" with annual revenue below 10 billion, and 10 "Foreign Companies".

Another reputable magazine within the same business group as the *Common Wealth* is the *Global Views Monthly*, which has also received multiple media awards.[4] The *Global Views Monthly* focuses on major international and cross-strait trends, important figures, and significant events as its primary content direction. Similarly, it conducts surveys and rankings of CSR performance for listed firms on the Taiwan Stock Exchange and Taipei Exchange Market (the predecessor was the Over-the-Counter Securities Markets), and announces the results on an annual basis.

The *Global Views Monthly* has been conducting an annual "CSR Survey" in Taiwan since 2005. It refers to the scoring and weighting criteria of OEKOM, a German CSR research institution. The survey assesses social performance, environmental performance, and financial information,[5] and examines various company-related information and news exposure, including: (1) questionnaire responses and negative news reports; (2) external audits from organizations such as the Environmental Protection Administration, the Ministry of Labor, consumer protection associations, and NGOs; (3) elimination of companies involved in significant labor disputes, environmental pollution cases, major consumer disputes, or cases where business owners are restricted from leaving the country due to litigation; (4) elimination of companies with consecutive three-year operating losses. Companies that pass the various audits and achieve higher scores are awarded the "Corporate Social Responsibility Award" annually.

Based on annual name-list of winners of the *Common Wealth* "Best Corporate Citizen" and the *Global Views Monthly* "Corporate Social Responsibility Award", two CSR performance measures are constructed.[6] First, the current CSR performance (*csrdummy*), when a firm wins either of the above two awards in a specific year, *csrdummy* is equal to 1, and 0 otherwise. Second, the cumulative CSR performance (*csrcumu*), which is defined as the cumulative years that a firm has won either one of the above two awards. For examine, if a firm has won either one of the above two awards for two years since the data starting year, then the value of *csrcumu* is equal to 2 in the third year.

Table 8 reports the regression result of the effects of CSR performance (measured by *csrdummy* and *csrcumu*) on firm's capital structure variables. In model (1) ~ (8), the estimated coefficients on *csrdummy* and *csrcumu* are both negative and both reach a less-than 10% statistical significance level, indicating that firms that are selected by the "Best Corporate Citizen" of the *Common Wealth* and the *Global Views Monthly*'s "Corporate Social Responsibility Award" tend to have lower leverage ratios and debt ratios, supporting the hypothesis that firm's better CSR performance helps to decrease firm's tendency of debt financing.

Conclusion and suggestion

This study fills the research gap by examining the effects of firm's CSR performance on capital structure decision, i.e., the use of debt versus equity financing. Based on the data of 1,590 listed non-financial-industry firms on the TWSE and TPEx from 2007 ~ 2020, by controlling firm's size, market to book value, fixed assets ratio, depreciation ratio, R&D ratio, institutional investors' shareholding, directors' shareholding and directors' shareholding

[4] Regarding the media awards received by the *Global Views Monthly* over the years, please refer to the following website: https://wp.gvm.com.tw/cwgv/awards/.

[5] The *Global Views Monthly* divides the questionnaire content into three dimensions for social responsibility evaluation. Firstly, community engagement includes items related to a company's social policies and management systems, labor relations and employee welfare, charitable donations, consumer rights and fair competition. Secondly, environmental protection consists of items such as environmental expenditure amount, the percentage of environmental expenditure to revenue, fulfilling environmental responsibilities, and whether products and services comply with ecological benefits. Thirdly, financial management and transparency include items such as regular disclosure of financial information, honest tax payment, significant impact on shareholder equity and securities prices, and the presence of independent directors. The composite score is obtained by evaluating multiple detailed items within each dimension, resulting in an overall score.

[6] The alternative measures of firm's CSR performance is based on the annual name-list of winners of the *Common Wealth* "Best Corporate Citizen"(https://topic.cw.com.tw/csr/report.aspx) and the *Global Views Monthly* "Corporate Social Responsibility Awards"(https://csr.gvm.com.tw/2022/award.html?v=1).

Table 8 Regression result of the effects of CSR on the capital structure–alternative proxies of CSR performance

Explanatory variables	Explanatory variables (capital structure)							
	lev	***levab***	***debt***	***debtab***	***lev***	***levab***	***debt***	***debtab***
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
csrdummy	-19.45***	-0.121***	-5.080***	-0.147***				
	(-6.18)	(-6.20)	(-7.54)	(-7.06)				
csrcumu					-2.512***	-0.0196***	-0.738***	-0.0265***
					(-5.04)	(-6.38)	(-6.93)	(-8.03)
asset	11.70***	0.0773***	3.424***	0.0870***	11.66***	0.0782***	3.435***	0.0887***
	(24.13)	(25.80)	(32.99)	(27.07)	(23.80)	(25.83)	(32.76)	(27.35)
mtb	4.565***	0.00719***	0.356***	0.00516***	4.568***	0.00729***	0.358***	0.00534***
	(24.37)	(6.20)	(8.87)	(4.15)	(24.36)	(6.29)	(8.93)	(4.30)
tang	-0.527***	-0.00386***	-0.131***	-0.00308***	-0.525***	-0.00385***	-0.131***	-0.00307***
	(-21.32)	(-25.30)	(-24.82)	(-18.83)	(-21.24)	(-25.23)	(-24.73)	(-18.75)
dep	2.543***	0.0118***	0.482***	0.0116***	2.536***	0.0118***	0.481***	0.0116***
	(11.81)	(8.84)	(10.44)	(8.10)	(11.77)	(8.85)	(10.42)	(8.12)
rd	-0.000954***	-0.00000429***	-0.000280***	-0.00000492***	-0.000952***	-0.00000428***	-0.000280***	-0.00000493***
	(-4.56)	(-3.32)	(-6.27)	(-3.56)	(-4.56)	(-3.32)	(-6.27)	(-3.56)
insthold	-0.227***	-0.00136***	-0.0617***	-0.00187***	-0.229***	-0.00135***	-0.0618***	-0.00185***
	(-7.46)	(-7.22)	(-9.46)	(-9.25)	(-7.50)	(-7.18)	(-9.47)	(-9.17)
dirhold	0.345***	0.00192***	0.0612***	0.00166***	0.344***	0.00191***	0.0609***	0.00165***
	(7.91)	(7.14)	(6.57)	(5.76)	(7.89)	(7.11)	(6.53)	(5.72)
pledge	0.293***	0.00242***	0.0878***	0.00259***	0.292***	0.00240***	0.0873***	0.00256***
	(8.75)	(11.70)	(12.27)	(11.69)	(8.72)	(11.60)	(12.19)	(11.55)
INDUSTRY dummies	yes	yes	yes	yes	yes	yes	yes	yes
YEAR dummies	yes	yes	yes	yes	yes	yes	yes	yes
constant	-89.68***	-0.679***	-10.40***	-0.690***	-89.12***	-0.693***	-10.60***	-0.717***
	(-12.72)	(-15.59)	(-6.89)	(-14.78)	(-12.50)	(-15.72)	(-6.94)	(-15.19)
Num. of obs	18,963	18,963	18,963	18,963	18,963	18,963	18,963	18,963
Adj. *R*-square	0.079	0.065	0.086	0.057	0.078	0.065	0.086	0.058
Prob. of *F*-stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimation results of the effects of CSR performance ((proxied by the current CSR performance (*csrdummy*) and cumulative CSR performance CSR (*csrcumu*)) on the corporate capital structure. The capital structure variables in model (1) ~ (8) are leverage ratio (*lev*), leverage ratio greater than mean (*levab*), change in leverage ratio (*levdif*), change in leverage ratio greater than 0 (*levdifd*), debt ratio (*debt*), debt ratio greater than mean (*debtab*), change in debt ratio (*debtdif)* and change in debt ratio greater than 0 (*debtdifd*). The control variables include firm scale (*asset*), market-to-book ratio (*mtb*), fixed assets to total assets (*tang*), depreciation to total assets (*dep*), R&D expense to net sales (*rd*), institutional investors' shareholding (*insthold*), directors' shareholding (*dirhold*), directors' shareholding pledge ratio (*pledge*), industry dummies vector (INDUSTRY) and yearly dummies vector (YEAR). The values in brackets are the t-statistics of estimated coefficients (calculated using White's heteroscedasticity consistency robust standard error), and *, **, and *** indicate that the estimated coefficients are significant at the 10%, 5%, and 1% significance levels, respectively

* indicates that the estimated coefficient of the regression is statistically significant at least at the 10% level

** indicate that the estimated coefficient of the regression is statistically significant at least at the 5% level

*** indicate that the estimated coefficient of the regression is statistically significant at least at the 1% level

pledge ratio, empirical evidence shows that firm with better CSR performance tends to have lower leverage ratio and debt ratio and thus use less debt financing. The evidence also shows that greater CSR performance is associated with inter-temporal reduce of debt use. Firm's taking more care of stakeholders' interests tends to be more conservative in financing decision and enjoys lower equity cost, thus tends to issue equity securities to raise required funds, thereby reducing the leverage ratio and debt ratio year by year. Furthermore, due to the core agency problem, the above effect is relatively weak in family-controlled firms. During the financial tsunami period, due to the insurance effect of CSR, the effect of firm's CSR performance on reducing the debt use is more pronounced. Overall, the principal outcome supports the hypothesis that firm's commitment on CSR helps to reduce the tendency of debt financing.

The implication of the study has three folds. First, for investors, firms with better CSR performance tend to use less debt and then incur less financial risk, and the

investors who choose to invest in firm with better CSR performance face lower investment risk. Second, for the management, firm's self-disciplined in stakeholders' interest protection and avoiding investment or involvement in controversial industries fosters firm to be more conservative in financing decision and incurs less litigation and bankruptcy risk. Third, the government authorities may continue to strengthen the regulation and encouragement of firm's CSR engagement in order to promote the financial stability of firms and financial markets soundness.[7]

Abbreviations

AA1000	AccountAbility 1000
ASE	Advanced Semiconductor Engineering
CEO	Chief Executives Officer
CSR	Corporate Social Responsibility
FSC	Financial Supervisory Commission
GRI	Global Reporting Initiatives
ILO	International Labor Organization
ISO 14000	International Organization for Standardization
NTD	New Taiwan Dollor
OECD	Organization for Economic Cooperation and Development
SA8000	Social Accountability 8000
TPEx	Taipei Exchange Market
TWSE	Taiwan Stock Exchange
WBCSD	World Business Council for Sustainability and Development

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Authors' contributions
Shu-Chen Hsu is responsible for the writing of the introduction, literature review, and the formulation of the research design. Kun-Tsung Wu is responsible for writing the empirical and conclusion part. Qing Wang is responsible for polishing and editing the full text. Yuan Chang is responsible for the implementation of econometric analysis and representation of statistical tables.

[7] In terms of regulations and norms, Taiwan's securities regulatory authority, the Financial Supervisory Commission, issued the "Corporate Governance 3.0-Sustainable Development Blueprint" for Taiwanese publicly traded companies in 2020, as well as the "Sustainable Development Pathway for Listed and Over-the-Counter Companies" in 2022. The National Development Council of the Executive Yuan proposed the "Taiwan 2050 Net-Zero Emissions Pathway and Strategy," and the Environmental Protection Administration of the Executive Yuan put forth the "Greenhouse Gas Reduction Act (Climate Change Response Act)," among others. The main objectives of these initiatives are to continuously respond to global trends, strengthen government guidance for large enterprises in the financial market to prioritize corporate social responsibility and ESG, enhance corporate sustainability information transparency, and promote sustainable operations. In terms of mandatory laws, the amendment to the Company Act passed on July 6, 2018, formally incorporated corporate social responsibility into Article 1, paragraph 2, of the Company Act. The article explicitly states that "a company shall comply with laws and ethical norms in its business operations, may adopt behaviors that enhance the public interest, and fulfill its social responsibilities." The provision explains that in addition to pursuing profit, a company should comply with relevant laws and ethical norms and is advised to consider the public interest in fulfilling its responsibility to society. Although this amendment is not a mandatory requirement, it underscores the government's emphasis on corporate social responsibility and the public's expectation for companies to fulfill their social responsibilities, in line with international trends and developments.

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Availability of data and materials
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Declarations

Competing interests
The authors declare that they have no conflict of interest.

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