Board Diversity, Firm Performance, Dividend Payout and Corporate Social Responsibility

Miao-Yu Hsu [1], Hsin-Yu Hsu [1], Mazurina Mohd Ali [2], and Yuan Chang[1,#]

1. National Changhua University of Education, Taiwan, R.O.C.
2. Universiti Teknologi MARA Cawangan Selangor,Kampus Puncak Alam, Selangor, Malaysia

A B S T R A C T

Existing research on corporate board diversity has focused on gender and ethnic diversity. This research considers eight dimensions of diversity on board members (gender, education, tenure, professionalism, independence, busyness, political connection and cross-cultural experience). It borrows the Simpson Index from biodiversity in constructing the overall board diversity index. Then, this research examines how the constructed board diversity index affects financial performance, performance volatility, dividend payout and performance on Corporate Social Responsibility (CSR). The samples are listed non-financial companies on the Taiwan Stock Exchange (TWSE), and yearly data of 2010 to 2015 is employed. Through summary statistics, correlation analysis and multiple regression estimations, empirical evidence shows that the higher the diversity of the firm's board of directors, the better the financial performance and the greater the firm's value. The firm's dividend payout and CSR performance are also positively associated with the board diversity index. The empirical result generally shows that diversity on board members should be considered to form a corporate board.

Keywords: Board Diversity, Firm Performance, Dividends Payout, Corporate Social Responsibility

Corresponding author, Professor, Department of Finance, National Changhua University of Education, No.2, Shi-Da Road, Changhua City, Taiwan, R.O.C. Tel.: 047-232105 ext. 7350; Fax: 047-211290; e-mail: ychang@cc.ncue.edu.tw

1. Introduction

The Asian financial crisis in 1997, the Enron and World.com cases in the United States after the 2000s, and a series of major corporate financial scandals in the domestic financial market after 2008 have substantially impacted the financial market and eroded investor trust. Good corporate governance measures are urgently needed in light of these corporate scandals. Corporate governance is a system for overseeing and managing a business to protect the interests of shareholders and other stakeholders while also may increase the firm's value. To achieve sustainable operation and stable development of the financial markets, a good corporate governance mechanism requires internal reinforcement of corporate board functions, enhanced information disclosure transparency, and external amendment and reinforcement of updating laws and regulations and supervision by the authority or stock exchange.

The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), also known as the "Women's Human Rights Code" was passed by the United Nations General Assembly in 1979. The content emphasizes gender equality, ensuring that men and women have equal opportunities in education, politics, law, society, and the economy. In Taiwan, CEDAW was explicitly stipulated to have the same effect as domestic law in 2011. Gender Equality Policy Guidelines were also created in the same year. In the first article, Power, Decision-making and Influence, when gender equality is pursued, women's participation is also upgraded to economic and social fields. To promote gender equality in high-ranking positions in corporations, an increasing number of countries have enacted legislation and policies to encourage board diversity. Europe began developing a quota system for female directors in 2003. Other countries also began to pay attention to the importance of gender ratio in the board. According to the study *Women on Boards: Progress Report* from the business MSCI in the United States, the proportion of female directors in the United States corporations in 2017 was 21.7 percent. From the statistics, the number of female directors is still significantly fewer than that of male directors. According to *The Credit Suisse Gender 3000: Women in Senior Management* by Credit Suisse Group AG in 2016, the proportion of female directors in Norway is the highest (46.7%), while in Taiwan (4.5%), South Korea (4.1%) and Japan (3.5%), it is relatively low.

In recent years, the Securities and Exchange Commission (SEC) in the United States has begun to review and amend board diversity standards. In 2009, a law was established requiring publicly traded firms to publish the criteria for selecting board members. The implementation of the law helps investors and shareholders to understand the board's operation better. At the same time, it emphasizes the importance of board diversity for its efficiency. In Taiwan, Article 20 of Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies established by the Stock Exchange and the OTC, based on the G20/OECD corporate governance principles, proposes that "*The composition of the board of directors shall be determined by taking diversity into consideration. It is advisable that directors concurrently serving as company officers do not exceed one-third of the total number of the board members, and that an appropriate policy on diversity based on the company's business operations, operating dynamics, and development needs be formulated and include, without being limited to, the following two general standards: Basic requirements and values: Gender, age, nationality, and culture. Professional knowledge and skills: A professional background (e.g., law, accounting, industry, finance, marketing, technology), professional skills, and industry experience*". These findings suggest that, in addition to gender diversity, board members' basic conditions and values and their own knowledge and professional skills, such as law, accounting, and finance, are essential factors in determining the diversity of the board.

Many academic studies have looked at how board diversity affects board effectiveness.

Some of the studies focus on gender diversity (Adams and Ferreira, 2009; Abbott, Parker, and Presley, 2012; Wang and Chang, 2016) and others, focus on ethnic diversity (Hillman, Cannella and Harris, 2002; Bernardi, Bean and Weippert, 2005; Cook and Glass, 2015). Women are more loving, kind, helpful, empathetic, interpersonally sensitive, eager to raise and care for others' welfare, careful and attentive, and risk-averse in decision-making than men (Eagly et al., 2003). As a result, female directors are frequently better at performing their monitoring duties on the board. Due to variances in the environment and cultural background, directors of different races can provide more diversified viewpoints and resources in business decision-making and perform more diverse advising roles.

From the perspective of how board members' diversity benefits the organization, first, the company's operational challenges arise from various aspects, and each board member is not a complete replacement for the others. The more diversified the board, the more it will be able to combine each member's background, intelligence, and abilities, which has a beneficial impact on the board's efficiency and corporate value (Van der Walt and Ingley, 2003; Robinson and Dechant, 1997; Catalyst, 2004; Carter, Souza, Simkins and Simpson, 2007). Second, a diverse board allows it to be more connected with external organizations and the environment (Pfeffer and Salancik, 1978). For example, the higher the ratio of gender and different races, the better the company's understanding of these ethnic groups' laws, labor market and product market (Brancato and Patterson, 1999). Third, from the standpoint of agency issues (Jensen and Meckling, 1976), a diverse board helps increase its overall independence, making it less likely to collude with management (Carleton, Nelson and Weisbach, 1998; Carter, Simkins and Simpson, 2003). However, board diversity is not without costs. The majority of directors may marginalize those female or minority directors for various reasons, including societal customs or human nature issues (Westphal and Milton, 2000). The majority may not consider their opinions. In addition, diversification of the board will also weaken its cohesion. Directors must spend more time communicating, and mistrust among them may result in a lack of collaboration, communication, and coordination. Sometimes company director candidates are considered to meet superficial board diversity, but they may not be professional in operation and management, and even conflicts of interests between directors may occur. A diverse board may result in a drop-in board efficiency, a longer decision-making time, or a decrease in decision-making quality, all of which exacerbate agency issues (Earley and Mosakowski, 2000; Williams and O'Reilly, 1998; Lau and Murnighan, 1998).

This study employs a multi-dimensional indicator to quantify board diversity. Therefore, the dimensions of evaluating board diversity are not limited to gender diversity. The board diversity indicators of this study are established according to the board dimensions of Zahrra and Pearce (1989). The indicator includes gender, tenure, with or without professional knowledge, education, busyness, cross-culture, independence, and politics. This study explores the impact of board diversity indicators on company performance, value, performance volatility, dividend policies and social responsibility performance through the diversity indicator being constructed by these eight dimensions.

This study is divided into five sections. The following section is literature review and hypothesis development. Section 3 introduces variables, econometric models, firm samples and data. Section 4 reports empirical result. The last section is conclusion and implication.

2. Literature Review and Hypothesis Development

2.1 The Importance and Function of Corporate Board

OECD (2004) defines corporate governance as a system of guidance and monitoring, corporate governance structure should promote market's efficiency, and supervision and control are

clearly divided. Therefore, the core of corporate governance is to regulate the organization of shareholders and the board to ensure the company's sustainable operation. In the theoretical backgrounds of corporate governance, three representative theories are the Agency Theory, the Resource Dependence Theory and the Human Capital Theory.

Agency Theory points out that managers can use company resources in ways not conducive to shareholders (Jensen, 1986). The opaque information between shareholders and agents will also cause agency problems. This will make shareholders hold negative or pessimistic ideas about the company's future cash flow and want to reduce agency problems through a sound supervision and management system (Fama and Jensen, 1983). For example, paying higher dividends to shareholders to reduce the amount of cash available for managers is a way to reduce agency problems (Firth et al., 2016). However, poorly managed companies may use dividends to build a good reputation and reduce shareholders' interests. If the board is diverse and can perform effective supervision, it is not possible for companies to use dividends to build their reputation (Boumosleh and Cline, 2015). In contrast, a company with a diverse board can improve the board's efficiency, and diversification can be an alternative to reducing agency problems. Therefore, a diverse board can achieve better corporate governance and make itself a strong organization to protect shareholders' interests.

Resource Dependence Theory believes that the more diverse the board members, the more diverse professional knowledge and background experiences, which provides different benefits and resources (Carter et al., 2012). This can improve the board's decision-making quality, promote the board to practice the role of supervision and management, and improve business performance. Chen, Hsu and Chang (2016) mentioned that independent directors with social capital could contribute to internationalization. Background resources and industry-specific experiences of these independent directors can provide the company with sufficient international resources and create higher value for the company. Hillman et al. (2002) also pointed out that if external directors can be introduced, the company's environmental uncertainty can be reduced through directors' relevant experiences passing on. These directors who pass on experiences can bring new ideas and concepts to the company and enable company managers to learn new decision-making processes. Hence, when faced with information asymmetry, company managers can highly reduce the risk faced by the company through experiences passing on (Carpenter and Westphal, 2001). Resource Dependence Theory provides a foundation and convincing theory for board diversification, indicating that it will have more extensive, diverse, and better director relationships. In addition, board diversity can also send a positive and active signal to the labor market.

Human Capital Theory points out that directors with different experiences, skills, and educational backgrounds may lead to a more diverse board. The diversity of the board may benefit the company's overall performance (Terjesen, Sealy and Singh, 2009) and improve the company's financial performances, such as increased return on total assets and return on shareholders' equity (Skaggs and Youndt, 2004). According to the Resource-Based View, Bendickson and Chandler (2017) surveyed American companies. They found that excellent human capital is competitive and can improve operational performance, which can lead to higher revenue and sales. Human capital also represents knowledge, skills, background, experience, and abilities possessed by members of the entire organization, which is also the organization's overall competitiveness (Chen, 2003). In addition, diversified directors with different views and skills considered intangible assets are more valuable to the company. The efficiency of resource utilization can be increased through human capital, which enables the company to have better management quality, thereby improving financial performance (Terjesen et al., 2009; Bontis and Fitz-enz, 2002). Human Capital Theory complements Resource Dependence Theory, and board diversity positively affects the company's financial

performance (Carter et al., 2010).

To sum up, agency theory focuses on whether shareholders and managers effectively monitor and manage company operation and agency issues arising from asymmetric information between the two parties. Companies can encourage shareholders to supervise whether agents' behaviors are unfavorable to the company through establishing the board (Claessens et al., 2002). Hence, under Agency Theory, after the board is established, the company's supervision will improve corporate performance (Osterloh and Frey, 2006). Yet, according to Resource Dependence Theory, participation of external directors can bring in their experiences, assist the company in evaluating whether business strategies can enhance the company's value, and enhance managers' in-depth and complete understanding of the knowledge field (Reuer et al., 2004). Therefore, relying on the background knowledge and resources of the board members, the company thus brings in theoretical perspectives of human capital. The board is an organization that supervises and manages. When human capital in the company gets richer, it means that the knowledge and background experiences of the company's internal members will be richer. Therefore, the company's operating environment and operational efficiency will be better. Thus, human capital has a positive effect on the company. It can help enhance functions of the board and improve the company's operational performance.

2.2 Diversity on the Corporate Board

The board of directors is closely related to company performance. In recent years, board diversity has caught more and more attention worldwide. Many studies have explored the influence of gender diversity on the board of directors since the adoption of the female quota law in Europe to achieve equality between men and women. Those studies examined the relationship between board gender diversity and company performance (Green et al., 2018; Ahern and Dittmar, 2012), company risk (Sila, Gonzalez and Hagendorff, 2016), dividend policies (Saeed, 2017), and company's social responsibility behaviours (Bear, Rahman and Post, 2010). Yet, the board's composition is not just a single aspect which is gender. Article 20 of Corporate Governance Best Practice Principles for TWSE/TPEx Listed Companies also specifies the overall capabilities of the board. "*1. Basic requirements and values: gender, age, nationality, and culture. 2. Professional knowledge and skills: A professional background (e.g., law, accounting, industry, finance, marketing, technology), professional skills, and industry experience*". Hence, the board diversity indicator of this study includes not only gender diversity but also the next second to eighth dimensions.

The second dimension is directors' tenure. Zona (2016) found that directors' tenure affects the board's investment amount for the company. The length of directors' tenure determines whether directors understand the company's overall operating conditions clearly and thoroughly. The longer the tenure, the more experiences of monitoring financial reports directors have, the more knowledge of the company's internal control and operational activities they get. However, the tenure being too long may lead to improper behaviors through their high positions due to familiarity with the company environment. Altunbaş et al. (2017) explored the early and late periods of tenure and found that the board's independence will reduce research and development expenses in the early period. Still, in the later period, research and development expenses will increase due to the reduced independence of the board. This shows the length of a director's tenure will impact the company's major decisions.

The third dimension is education. Human capital and organizations are interdependent, so professional knowledge and academic background are significant capital in companies. Zlate and Enache (2015) found that higher education can cultivate professional knowledge, experiences, and innovative talents. People with higher education can adapt to changes more

quickly and innovate, which can bring changes and innovations to the organization and affect its performance. King et al. (2016) found that a CEO with an MBA degree can reduce a company's risk and increase profitability significantly when facing high risks (such as large stock price fluctuations). A CEO with higher education is relatively better at the company's performance.

The fourth dimension is professionalism. In addition to board members' education, the importance of professional knowledge is also mentioned in human resources research. Zalata et al. (2018) studied the impact of auditors' financial expertise and gender on earnings management and used sample data from US companies. It is found that female auditors with finance expertise are significantly related to earnings management. On the other hand, men with finance expertise have no significant influence, which also shows auditors' gender and professional financial background will affect the company's earnings management. Chen and Chen (2008) found that directors and supervisors with professional knowledge and skills in accounting or law can improve corporate investment performance and reduce credit risk. Therefore, experts in the board with financial, legal, accounting and other related backgrounds can improve the board's functions, enhance supervision and control, and strengthen the process of preparing financial statements, thereby enhancing transparency and reducing investors' risks.

The fifth dimension is independence, in which independent directors play the supervising role in fulfilling contracts. They must give full play to their supervisory effectiveness and reduce financial fraud. Scholars have also advocated the importance of independent directors in recent years, and the independent director system has also been promoted in Taiwan for more than ten years. Chen et al. (2016) studied Taiwanese companies and found a positive impact between the proportion of independent directors and innovation performance, which contributes to better corporate governance. Reguera-Alvarado and Bravo (2017) analyzed how the independent directors' tenure and number affect the board's independence and company performance. The research results confirm that the board's independence positively impacts company performance, which not only makes the board make decisions with efficiency but with external directors, the board's performance is also improved. Chou, Hamill and Yeh (2016) reported a positive relationship between independence of the board and the cash flow of controlling shareholders, and it helps reduce agency problems. However, Faleye (2015) aimed at an entirely independent board in the United States and found that an entirely independent board may make the company less valuable. The result shows that although board independence is a corporate governance method that can improve the board's efficiency, the company cannot ignore employees and directors because they are equipped with valuable resources of in-depth understanding.

The sixth dimension is busyness. It is a common phenomenon for company directors to be part-time in practice. Many scholars at home and abroad have conducted in-depth research on the busyness of board members. Wang and Chang (2016) also researched directors working part-time. They found that their busyness has a significant positive impact on accounting performance, whether for internal or external directors. Employing busy directors with a reputation and rich contacts and relationships can bring more resources and make the company develop more stably. Busy directors can provide resources and make a company competitive, but they may not be able to take care of each company's needs and meet the responsibility of director supervision due to too much working load. Therefore, excessively busy directors, on the contrary, may negatively affect companies (Cashman, Gillan and Jun, 2012; Field, Lowry and Mkrtchyan, 2013).

The seventh dimension is politics. Companies provide political contributions to support politicians, while politicians use their power to pay back, which is called political-business

linkage. Zhang, Wanyu and Zhang Kaiwen (2011) took Taiwan listed companies as research samples and divided company directors' individual political color into three categories, pan-blue, pan-green, and others. The empirical results found that when the director of a particular political color is elected, companies with the same political color are likely to win and have a positive and significant return in the stock market. Directors with political-related backgrounds may have better political, interpersonal relationships and banks connections, so they are more competitive and supervise more casually in terms of corporate loans, obtaining tax discounts, and competing government contracts. Also, they are more likely to win the court's support and win the case of commercial dispute, reduce external uncertainty, and affect the company's value (Goldman, Rocholl and So, 2009; Hung et al., 2017). However, La Porta et al. (2002) once proposed the Grabbing Hand theory. When company directors are politically related, the government may interfere with the company's transactions and operations, resulting in poor company operations. But this problem results from direct or indirect influences from the government rather than corporate governance problems. Hence, the political-business relationship may have positive and negative effects.

The eighth dimension is cross-culture. Now it is a global village. Under the interaction of different cultural backgrounds, ideas and concepts of companies in different cultures are possible to be understood. In the operation and management process in multinational companies, diversified cultural issues may occur, and cultural differences are one of them. Cultural differences of places, organizations, and countries may lead to cultural conflicts, making multinational companies face situations of deviating from expected return (Lin, Guo and Xue, 2007; Yang and Chang, 2010). Frijns, Dodd and Cimerova (2016) use the average cultural distance between directors to construct indicators to measure cultural diversity. The empirical research results show that cultural diversity on the board has a negative impact on company performance. Nam et al. (2018) studied whether the board's work experiences in the government, multinational companies, and the proportion of external directors affect the export performance of Korean companies. It is found that in Korean companies, employees with work experiences in multinational companies show higher export propensity and performance. The board's cross-culture can provide more resources, thereby affecting company performance. Therefore, in today's increasingly borderless world, directors with multicultural and transnational cultures can understand the cultures of different companies more deeply and increase the company value.

The aforementioned diversity of the board can be considered to evaluate the valuable knowledge and expertise sources of company strategies (Chen, 2014). Different work experiences (Hillman et al., 2007), values and opinions (Ward and Forker, 2017) can also create higher value for the company. A more diverse board can also play a more effective role in supervision (Adams and Ferrerira, 2009), providing independent, innovative and diverse ideas to improve corporate governance (Carter et al., 2007). Therefore, this study believes that board diversity can benefit the company, and we use the eight board dimensions mentioned above to measure it.

2.3 The Impact of Board Diversity on Performance and Performance Volatility

Conyon and He (2017) found the presence of female directors has a positive impact on company performance. He also divided companies into two types, high-performance companies and low-performance companies. Through classification, it is found that female directors had a more significant impact on high-performance companies than low-performance ones, so there is a positive correlation between corporate performance and gender diversity. In addition to gender diversity, Frijns, Dodd and Cimerova (2016) studied the impact of the board's cultural diversity on corporate performance and found that national and cultural diversity would have a negative

impact on Tobin's Q and return on assets. Low, Roberts and Whiting (2015) used samples of Asian companies, such as Hong Kong, South Korea, Malaysia, and Singapore, and found that an increasing number of female directors on the board positively impacts company performance. Therefore, the first hypothesis to be tested is as follows:

Hypothesis 1: Diversity of the board of directors is positively related to company performance; the more diverse the board, the better the company's performance.

After the recent debt crisis in Europe, Farag and Mallin (2017) studied the impact of board diversity and the performance of European banks. They found that a higher proportion of women on the board and the supervisory board may reduce the financial vulnerability of banks. Bernile, Bhagwat and Yonker (2018) studied the impact of board diversification on company policies and risk volatility. Higher board diversity leads to lower volatility because the board will make financial decisions whose risk is lower. From previous discussions, we know that women are more cautious and attentive in behaviors, and they tend to avoid risk in decision-making. Female directors often perform their supervisory functions in the board better. Therefore, this study believes board diversity helps reduce company performance volatility. Therefore, the second hypothesis to be tested is as follows:

Hypothesis 2: Diversity of the board of directors is inversely related to company performance volatility; the more diverse the board, the lower company performance volatility.

2.4 The Impact of Board Diversity on Dividend Payout

According to Agency Theory, managers may manage the company in ways not conducive to shareholders. Therefore, dividend policies are considered a way to alleviate free cash flow problems in corporate governance (Jensen, 1986). Through different experiences, backgrounds and genders being incorporated, diverse board members can enhance the board's independence and may affect the decision-making of the entire company, including dividend payment policies. Chen, Leung and Goergen (2017) studied whether diverse independent directors strengthened higher dividend distribution and linked diversity with dividend payment policies. They found that companies with more diverse board members have higher dividend payouts. They also divide the samples into companies with strong and weak governance. The results show that dividend payments are more influential in companies with a more diverse board but weak governance. This indicates that the diversity of directors may increase the use of dividend policies, which will be a method of corporate governance. On the one hand, to alleviate the agency problem of free cash flow, female directors tend to pay more dividends, but at the same time, they are likely to make relatively conservative decisions due to market uncertainty so that less cash will be distributed as dividend interest.

Saeed and Sameer (2017) studied samples from India, China, and Russia and found that gender diversity on the board is negatively correlated with cash dividend payments in emerging economy countries, especially during the financial crisis. However, the board of directors is the primary supervisory mechanism in a company, and it helps adjust the interests of managers and shareholders. Therefore, a more diverse board can be more effectively supervised through strong control and supervision, and the board's composition is positively correlated with dividend payment. Governance in companies with a diversified board will be better. The board's efficiency will be enhanced. The board will be a mechanism to reduce agency problems, ultimately becoming strong protection for shareholders (Chen, Crossland and Huang, 2016). Therefore, the third hypothesis to be tested in this study is as follows:

Hypothesis 3: Diversity of the board of directors is positively related to the company's dividend payment; the more diverse the board, the more company's dividend payment.

2.5 The Impact of Board Diversity on Corporate Social Responsibility

Good company management will inevitably take social responsibility seriously. A company with a sense of responsibility and sustainable operation must consider that creating the company's own financial value has a more positive impact on relevant stakeholders and society. In academic research, corporate social responsibility is essential in all aspects, like relevant stakeholders (García-Jiménez et al., 2017; Duthler, Dhanesh, 2018), social performance (Nazari, Hrazdil and Mahmoudian, 2017) and investment decisions (Cullinan, Mahoney and Roush, 2017; Boubakary and Moskolaï, 2016). Previous studies also mention that members of the senior management team being more heterogeneous will positively impact company performance and innovation capabilities (Chen and Chang, 2009). However, a more diverse company means the board can take different individuals into account through the board's heterogeneity. This is consistent with the purpose of corporate social responsibility. A company should consider society and stakeholders' rights and interests, fulfil social responsibilities, seek maximum welfare for society, and pursue maximization of shareholders' interests.

McGuinness, Vieito and Wang (2017) conducted research on female directors of listed companies in China and found that gender diversity of senior management can further enhance corporate social responsibility performance. When women serve as CEOs, corporate social responsibility will be better. Eberhardt-Toth (2017) also specifically studied the corporate social responsibility committee composition in the board of directors. According to the 2002 Bloomberg World Index's survey, smaller companies with a female chairperson, higher proportion of independent directors, higher average age of non-chief executives and directors have better corporate social performance. The survey used companies with a corporate social responsibility group on the board, and the findings suggested that the board's diversity can positively affect corporate social responsibility. Therefore, the fourth hypothesis to be tested in this study is as follows:

Hypothesis 4: Diversity of the board of directors is positively related to corporate social responsibility performance; the more diverse the board, the better the performance of corporate social responsibility.

3. Variables, Econometric Models, Samples and Data

3.1 Variables

3.1.1 Explained Variables

Performance measures are mostly divided into two categories in previous studies, the first is accounting-based, such as return on assets, return on equity and earnings per share. Most of these indicators use firm's accounting numbers to reflect firm's backward looking operating result. The second is market-based, such as firm's market value of equity, stock return and Tobin's Q. Most of these indicators are based on investor's perception and evaluation on firm's instant and future operating perspectives. This research employs both types of performance indicators. First, return on assets (*roa*), which evaluates profitability generated by firm's assets. The higher the *roa*, the better firm's profitability by use of assets. The second is return on equity (*roe*), which evaluates profitability generated by equity. The higher the *roe*, the better firm's profitability by use of equity. The third is Tobin's Q ratio (*tq*), and according to Chung and Pruitt (1994), which is calculated by sum of book value of liability and market value of equity and then divided by book value of asset. Higher *tq* implies investor's perception and evaluation of firm is better. Refers to the method of Adams et al. (2005) and Cheng (2008), the standard deviation of return on assets from period t-4 to t is used as the indicator of firm's performance volatility (*roavar*). The larger the value, the greater firm's performance volatility, and the greater the risk.

With separation of firm's shareholders' ownership and the management's control rights,

conflicts of interest between managers and shareholders and agency costs are emerged (Jensen and Meckling, 1976; Jensen, 1986). In previous studies, dividend payment is considered to be a means of corporate governance by reducing wealth entrenchment of annual earnings by the management. By paying greater cash dividends to shareholders, free cash flow of managers are reduced, which in turn can reduce agency problems. This research use firm's total cash dividend payout (*dividend*) (takes the natural logarithm) and cash dividend payout ratio (*dividrate*) (cash dividend per share/earnings per share) as two proxies of firm's dividend payout. Larger cash dividend payout and cash dividend payout ratio represents sounder corporate governance.[1]

Following Hsu (2017), four proxies for firm's performance on CSR, which is based on annual name-lists of the "CSR Award" winners by the *Global Views Monthly* and the "Best Corporate Citizens" by the *Common Wealth*. First, current CSR performance (*csr1*), if a firm has been chosen as either in one or both awards in a specific year, *csr1* is equal to 1 and 0 otherwise. Second, cumulative CSR performance (*csr2*), defined as the number of years that a firm has been chosen as either one of two annual lists of CSR awards winners. Third, continuous CSR performance (*csr3*), defined as whether a firm has continuously been chosen as either one of two annual name lists of CSR awards winners. If a firm has obtained one of the two awards every year during data period, *csr3* is equal to 1, and 0 otherwise. Fourth, overlapping CSR performance (*csr4*), if a firm has won both awards in a particular year, *csr4* is equal to 1 and 0 otherwise. Greater value of above four CSR measures represents better CSR performance.

According to Hsu (2007), alternative measure of CSR performance is introduced. The Shanghai Stock Exchange (SSE) in China constructed SSE Social Responsibility Index by the computation of social contribution value, including firm's annual cash payment toward main stakeholders, e.g., payment to employee (employee salary and benefits), creditors such as banks (loan interest), government (tax) and stockholders (cash dividends). Summarize above payments as a total value called social contribution value (*scv*) to proxy for firm's value creation for society (main stakeholders). Divided *scv* by firm's total asset to obtain social returns on asset (*sroa*). Divided *scv* by firm's shares outstanding to obtain social contribution value per share (*scvps*). Greater value of *scv*, *sroa* and *scvps* corresponds to better CSR performance.

3.1.2 Main Explanatory Variable: Board Diversity Index

Most of the existing studies discussed the two dimensions of board diversity, gender diversity and ethnic diversity. Recently, while other board member characteristics may affect board functioning, it has begun to include other dimensions of diversity such board member education, experience, age, seniority, independence, and board busyness. The proportion of board member with finance, accounting, and law expertise is also discussed and included in the consideration of the diversity of the board of directors. The difference between this research and existing research is that multiple dimensions of board diversity are considered at the same time to and construct a single board diversity index through several dimension of diversity and then the firm performance, performance volatility, dividend payout and CSR performance are predicted by the constructed board diversity index. In this research, the eight diversity dimensions are gender, education level, seniority, professionalism, independence, busyness, cross-cultural experience and political connection. According to above eight dimensions of board diversity (each of which is calculated by the Simpson's diversity index), the diversity degree of the eight dimensions is finally added with equal weight to become the overall board diversity index. The following is a brief statement of calculation of eight individual diversity dimension.

In calculating gender diversity in this study, according to the gender of board members of

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[1] In addition to incorporate firm size in regression equation to control for scale effect (firm with larger scale tends to pay greater amount of cash dividends), while larger firms do not necessarily have greater dividend payout ratio, this study employs cash dividend payout ratio to control for the scale effect.

each firm year samples, the female ratio and the male ratio are calculated, and the sum of the two is 100%. In calculating the diversity dimension of education level, divide the board members into four groups: bachelor's degree, master's degree, doctorate degree and others. For each firm-year samples, the board members' education level are divided into four groups, and the sum of the four ratios is 100%. In calculating the diversity dimension of seniority is to divide board members into four groups according to seniority: less than 10 years, 10 to 20 years, 20 to 30 years, and more than 30 years, and calculate the ratio of each seniority group. The sum of the four ratios is 100%. In calculating the dimension of professional diversity is to divide the board members into four categories based on whether they have financial, accounting, and legal backgrounds, specialized with none, one, two and three professional. The sum of the four ratios is 100%. In calculating the dimension of board independence is to calculate the ratio of independent directors and non-independent directors. The sum of the two ratio is 100%. In calculating the dimension of board busyness is to divide board members into two groups: those who hold other company's positions and those who do not concurrently hold other company's positions, and calculate the ratio of each group. The sum of the two ratios is 100%. In calculating the dimension of board member has cross-culture, board members of each firm-year are divided into two types, with cross-cultural experience and without cross-cultural experience based on whether they have foreign education or foreign employment experience, and then the respective ratios are obtained. The sum of the two ratios is 100%. In calculating the dimension of board member has political connection, politically-connected directors and non-politically-connected directors is classified based on whether they have served in government organizations or public opinion representatives. The ratios of the two types of directors are calculated and their respective ratios are summed with 100%.

Based on the ratios of board member for a specific individual diversity, the degree of that specific individual diversity is calculated by following formula:

$$\text{Board Diversity} = (1 - \sum P_i{}^2) \times \frac{K}{K-1} \qquad (1)$$

where Pi is the ratio (or percentage) of the each group for a specific individual diversity dimension. K represents the number of groups classified by that diversity dimension. For example, according to definition of the seniority diversity dimension, and suppose the distribution ratio of each group is the most even, that is, the situation of highest diversity is calculated: board members with a seniority of less than 10 years account for 25%, 10 years to 20 years account for 25%, 20 to 30 years account for 25%, and more than 30 years account for 25%, so the calculation method of the diversity dimension indicators of the seniority is $[1-(0.25^2+0.25^2+0.25^2+0.25^2)] \times \frac{4}{4-1} = 1$. From the above calculation, it can be seen that the highest score for each board diversity dimension is 1, and the lowest score is 0. The higher the score, the higher the degree of a specific diversity dimensions. Finally, this study constructs a total of eight dimensions of board diversity index (*diversity*), and the highest score is 8 points, and the lowest score is 0 point.

3.1.3 Control Variables

In addition to board diversity, this research considers controlling the following variables' impact on firm performance, performance volatility, dividend payout and CSR performance. First of all, the size of a firm is one of the important variables that affect performance (Pan and Li, 2000). Large-scale firms are more likely to achieve economies of scale, and obtain relatively more resources and information. This reduces uncertainty resulting from company's dependence on external resources, so the performance is better and stable, and more resources can be invested in social responsibility. This study uses the natural logarithm of total assets (*scale*) as the proxy of firm scale. Second, the firm age (*age*). On the one hand, as a firm with

longer period of survival tends to have relatively stable industry reputation, market share and profitability. On the other hand, young firm has greater ability of adapting to the environment more quickly and respond market information efficiently. Nevertheless, firm age has potential influence on firm performance. Third, the board size (*boardsize*). The board is the internal core mechanism of corporate governance, and its main responsibility is to monitor and provide advice for the management. The larger the board size, the free-rider problem emerges among directors and the more inefficient communication and coordination among directors, which reduce the board's effectiveness on board function and negatively affect firm performance. This study uses the number of board members to measure board size.

Fourth, the degree of financial leverage (*leverage*). The main benefit of using debt in corporate financing is to use financial leverage to create higher firm value, but the higher the debt ratio, the greater the pressure of repayment and the risk of default or bankruptcy the firm will face. This study defines financial leverage as firm's operating profit being divided by differences between operating profit subtracting interest expenses. Fifth, the research and development expense ratio (*rd*). The higher the innovation capability of the company, the higher the company value. R&D investment will help strengthen the company's ability to face external competition and environmental changes. Therefore, the increase in R&D costs can improve company performance and long-term development stability. The research and development expense ratio is defined as research and development expense being divided by net sales revenue. Sixth, the growth rate (*growth*). The growth of a company is an important element for the company to achieve its operational goals and market share. Higher growth rate indicates the improvement and stability of future company performance. This study uses annual growth rate of shareholder equity as a proxy variable for company growth. Seventh, the shareholding ratio of directors (and supervisors) (*dirhold*). The higher the shareholding ratio of the company's directors and supervisors, the more the consistent interests of the directors and supervisors with those of the company, and the more eager directors and supervisors will be to perform their supervisory and consulting duties, and this improves company performance and stability. The shareholding ratio of directors and supervisors is defined as the number of shares held by directors and supervisors being divided by the number of shares outstanding. Table 1 summarizes mnemonics and brief definition of variables.

Table 1 Mnemonics and Definition of Variables

Variable	Mnemonics	Definition
Explained variable: firm performance, performance volatility, dividend payout, corporate social responsibility performance		
Return on assets	*roa*	After-tax net profits / total assets
Return on equity	*roe*	After-tax net profits / total equity
Tobin's Q	*tq*	(Market value of equity + book value of liabilities) / book value of assets
Performance volatility	*roavar*	Standard deviation of firm's ROA from year t-4 to t
Cash dividend	*dividend*	The total amount of dividends (take the natural logarithm)
Cash dividend payout ratio	*dividrate*	Dividend per share / earnings per share
Current CSR Performance	*csr1*	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, *csr1* is equal to 1, and 0 otherwise.
Cumulative CSR Performance	*csr2*	The cumulative years of a firm 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*
Continuous CSR Performance	*csr3*	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, *csr3* is equal to 1, and 0 otherwise.
Overlap CSR Performance	*csr4*	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, *csr4* is equal to 1, and 0 otherwise.
Social contribution value	*scv*	Sum of cash dividend, employee salary, interest expense and tax, and then take natural logarithm.
SCV per share	*scvps*	social contribution value / shares outstanding
Social returns on assets	*sroa*	social contribution value / total assets
Explanatory variable: board diversity		
Board Diversity Indicators	*diversity*	Corporate board members' gender ratio, length of tenure, education, whether they have relevant professionalism in finance, accounting or law, independence, busyness, political connection, and cross-culture, and these eight dimensions are transformed into eight diversity scores by using the board diversity formula (Simpson's Index). The highest score for each diversity dimension is 1 point, and the lowest score is 0 point. Finally, the diversity scores of the eight dimensions are added up to become the board diversity index, and the maximum board diversity index is 8 points and the lowest is 0 point.
Control variable		
Firm Size	*scale*	Natural logarithm of total assets
Age	*age*	Years of company establishment (years)
Board size	*boardsize*	Total number of board seats (person)
Financial leverage	*leverage*	operating profit/(operating profit-interest expense)
Research and development	*rd*	(Research and development expenses/net operating income) *100 (%)
Growth rate	*growth*	(Shareholders' equity-shareholders' equity in the same period last year) / shareholders' equity in the same period last year *100%
Directors' shareholding	*dirhold*	Number of shares held by directors and supervisors/total number of shares outstanding* 100%
Diversity dummy variable	*d1 , d2*	This variable uses the first quartile (Q1), median (Q2) and third quartile (Q3) of the board diversity index to divide the board diversity index into four categories: high diversity (*d1* and *d2* are equal to 1), second highest diversity (*d2* is equal to 1), medium diversity (*d1* is equal to 1), and low diversity companies (Both *d1* and *d2* are equal to 0).

Note: All definitions of variables are from the Taiwan Economic Journal (TEJ). Construction of CSR measurement is based on annual name lists of "CSR Award" by the *Global Views Monthly* (https://csr.gvm.com.tw/2021/award.html) and "Top Corporate Citizens" by the *Common Wealth* (https://topic.cw.com.tw/csr/report.aspx).

3.2 Econometric Model

Multiple regressions estimation is employed to examine the effects of board diversity on firm performance, performance volatility, dividend payout and corporate social responsibility. While the data is unbalanced panel rata, the estimation adopts pooled OLS method. The regression equations are:

$$\textbf{PERF}_{i,t} = \beta_0 + \beta_1 diversity_{i,t}$$
$$+\beta_2\, scale_{i,t} + \beta_3\, age_{i,t} + \beta_4\, boardsize_{i,t} + \beta_5\, leverage_{i,t}$$
$$+\beta_6\, rd_{i,t} + \beta_7\, growth_{i,t} + \beta_8\, dirhold_{i,t} + \varepsilon_{i,t} \qquad (2)$$

$$\textbf{PERFVAR}_{i,t} = \beta_0 + \beta_1 diversity_{i,t}$$
$$+\beta_2\, scale_{i,t} + \beta_3\, age_{i,t} + \beta_4\, boardsize_{i,t} + \beta_5\, leverage_{i,t}$$
$$+\beta_6\, rd_{i,t} + \beta_7\, growth_{i,t} + \beta_8\, dirhold_{i,t} + \varepsilon_{i,t} \qquad (3)$$

$$\textbf{DIVIDEND}_{i,t} = \beta_0 + \beta_1 diversity_{i,t}$$
$$+\beta_2\, scale_{i,t} + \beta_3\, age_{i,t} + \beta_4\, boardsize_{i,t} + \beta_5\, leverage_{i,t}$$
$$+\beta_6\, rd_{i,t} + \beta_7\, growth_{i,t} + \beta_8\, dirhold_{i,t} + \varepsilon_{i,t} \qquad (4)$$

$$\textbf{CSR}_{i,t} = \beta_0 + \beta_1 diversity_{i,t}$$
$$+\beta_2\, scale_{i,t} + \beta_3\, age_{i,t} + \beta_4\, boardsize_{i,t} + \beta_5\, leverage_{i,t}$$
$$+\beta_6\, rd_{i,t} + \beta_7\, growth_{i,t} + \beta_8\, dirhold_{i,t} + \varepsilon_{i,t} \qquad (5)$$

where **PERF** is a vector of firm performance variables which includes return on assets (*roa*), return on equity (*roe*) and Tobin's Q (*tq*). **PERFVAR** is a vector of performance volatility variables, which is standard deviation of return on assets (*roavar*). **DIVIDEND** is a vector of dividend payout variables which includes total amounts of cash dividend *(dividend)* and dividend payout ratio (*dividrate*). **CSR** represents the vector of corporate social responsibility performance variables which includes current corporate social responsibility performance (*csr1*), cumulative corporate social responsibility performance (*csr2*), continuous corporate social responsibility performance (*csr3*), overlap corporate social responsibility performance (*csr4*), social contribution value (*scv*), social contribution value per share (*scvps*) and social returns on asset (*sroa*). *diversity* is an indicator of board diversity. Regression control variables include firm size (*scale*), firm age (*age*), board size (*boardsize*), financial leverage (*leverage*), research and development ratio (*rd*), sales growth rate (*growth*), directors (and supervisors') shareholding ratio (*dirhold*). The regression equation is pooled OLS estimated.

3.3 Another Regression Specification

According to the first quartile (*Q1*: 2.83), median (*Q2*: 3.5) and third quartile (*Q3*: 4.15) of board diversity, all samples are divided into four groups, high-diversity firms, second-highest diversity firms, medium-diversity firms and low-diversity firms. Then, two dummy variables (*d1, d2*) are assigned to each firm group. For low-diversity firms, two dummies are equal to zero. For medium-diversity firms, *d1* is equal to 1. For second-highest diversity firms, *d2* is equal to 1. For high-diversity firms, *d1* and *d2* are equal to 1. The regression coefficient of *d1* represents the incremental factor of medium-diversity firms relative to low-diversity firms. The regression coefficient of *d2* represents the incremental factor of second-highest diversity firms relative to low-diversity firms. The sum of regression coefficient of *d1* and *d2* represents the incremental factor of high-diversity firms relative to low-diversity firms. The specification of regression estimation is reported in Table 2.

Table 2 Dummy variables Settings for Firm Groups by Board Diversity Quartiles

	d1	d2	Coefficient
Low-Diversity Firms	0	0	
Medium-Diversity Firms	1	0	β_1
Second-Highest Diversity Firms	0	1	β_2
High-Diversity Firms	1	1	$\beta_1+\beta_2$

Note: this table reports that firms grouped by the board diversity quartiles and dummy variables are assigned to each group.

3.4 Samples and Data

This research employs 803 non-financial listed firms on Taiwan Stock Exchange as the research samples. The data period is from 2010 to 2015, and the data frequency is yearly. The research collects the data of firm financial characteristics, corporate governance variables and corporate board members characteristics from the Taiwan Economic Journal (TEJ) database. The former four corporate social responsibility performance measures are based on the annual name lists of award-winning firms in the "Top Corporate Citizenship" in the *Common Wealth* and "Corporate Social Responsibility Award" in the *Global Views Monthly*.

4. Empirical result

4.1 Descriptive Statistics and Correlation Analysis

Table 3 shows descriptive statistics of eight individual board diversity dimensions. The maximum value of each dimension is 1 and the minimum value is 0. Based on the column of mean, it is shown that the corporate board is more diverse in education, seniority and cross-cultural experiences, and the scores are higher than 0.6. But for political experiences and busyness, the average values are 0.1366 and 0.2458, and diversity of these dimensions is lower.

Table 3 Descriptive Statistics of Individual Board Diversity Dimension

Individual board diversity dimensions	Number of observations	Mean	Standard deviation	Minimum	Maximum
Gender	4,656	0.3451	0.3367	0.0000	1.0000
Tenure	4,651	0.6003	0.2641	0.0000	0.9941
Education	4,657	0.6998	0.2039	0.0000	1.0000
Professionalism	4,657	0.3334	0.2521	0.0000	0.8707
Independence	4,679	0.4235	0.4293	0.0000	1.0000
Busyness	4,655	0.2458	0.3500	0.0000	1.0000
Political connection	4,655	0.1366	0.2579	0.0000	1.0000
Cross-culture	4,655	0.6940	0.3249	0.0000	1.0000

Note: This table reports descriptive statistics of individual board diversity dimension, include the number of samples, mean, standard deviation, minimum and maximum. The data period is from 2011 to 2015.

Table 4 reports the descriptive statistics of all samples. In terms of accounting performance indicators, the mean of return on assets (*roa*) is 7.5275%, standard deviation is 9.1893, the average of return on equity (*roe*) is 7.1619%, and standard deviation is 102.02. In terms of market performance, the mean of Tobin's Q (*tq*) is 2.2366. In terms of performance volatility, the mean of performance volatility (*roavar*) is 4.1008. In terms of dividend payout, the average of total cash dividends (*dividend*) and dividend payout ratio (*dividrate*) are 14.2988 and 0.6100 (61%). In terms of CSR performance, the mean of current CSR performance (*csr1*) is 0.0500, which means only 4.58% of the company samples were selected as socially responsible companies by the *Common Wealth Magazine* or the *Global Views Monthly*. The average of cumulative CSR performance (*csr2*) is 0.1571, and the maximum value is 6, which means that some companies in the samples were indeed selected as socially responsible companies during the sample period from 2010 to 2015. The average of continuous CSR performance is 0.0037. The average of overlap CSR performance (*csr4*) is 0.0097, which represents that only 0.97% of the company samples have been both selected by the aforementioned two media as

companies with outstanding performance on CSR. The average of social contribution value (*scv*) is 18.5994, the average of social contribution value per share (*scvps*) is 0.7982, and the average of social contribution rate (*sroa*) is 24.3392%. The average score of the board diversity index (*diversity*) is 3.4776, with the lowest score of 0, and the highest score of 6.7287.

Table 4 Summary Statistics of Full Samples

Variables	Number of obs.	Mean	Std. dev.	Min.	Max.
diversity	4,637	3.4776	0.9455	0.0000	6.7287
roa	4,787	7.5275	9.189	-51.480	82.790
roe	4,786	7.1619	102.02	-2118.3	6620.6
tq	4,805	2.2366	11.703	0.0000	426.78
roavar	4,761	4.1008	3.6248	0.0000	35.348
dividend	4,795	14.299	8.7831	0.0000	25.925
dividrate	4,794	0.6100	2.2847	-20.000	100.00
csr1	4,823	0.0500	0.2179	0.0000	1.0000
csr2	4,823	0.1571	0.6895	0.0000	6.0000
csr3	4,823	0.0037	0.0610	0.0000	1.0000
csr4	4,823	0.0097	0.0982	0.0000	1.0000
scv	4,619	18.5994	1.1945	11.776	23.227
scvps	4,469	0.7982	1.6038	0.0009	38.639
sroa	4,619	24.339	30.917	0.0184	461.33
scale	4,805	22.710	1.3553	11.513	28.700
age	4,816	31.445	13.942	0.0000	70.000
boardsize	4,727	7.3740	2.3121	2.0000	21.000
leverage	4,586	1.9915	10.674	-110.42	284.18
rd	4,639	4.0774	18.974	0.0000	832.45
growth	4,787	9.3054	121.53	-156.12	6343.7
dirhold	4,727	22.127	14.718	0.1200	99.710

Note: This table reports summary statistics, including the number of observation, mean, standard deviation, minimum and maximum values of each variable. The data period is from 2011 to 2015.

In Table 5, the median of board diversity indicators (*diversity*) is used to divide the full samples into two groups of sub-samples, where panel A shows samples with a low degree of board diversity (*diversity* is less than its median), and panel B shows   samples with a high degree of board diversity (*diversity* is larger than its median). The last column of Table 5 shows the mean difference (*t* test) of each variable between high-diversity samples and low-diversity samples. Observing the mean difference of firm performance indicators, we find average differences of return on assets (*roa*), return on equity (*roe*), and Tobin's Q (*tq*) are 0.6721%, 1.8137%, and 0.8570. The differences are positive and all reach statistically significant levels, which indicates performance of companies with high board diversity is better than that of companies with low board diversity. In addition, mean differences for total cash dividend (*dividend*), dividend payout rate (*dividrate*), and current, cumulative and overlap CSR performance (*csr1*, *csr2*, *csr4*), as well as social contribution value (*scv*), social contribution value per share (*scvps*) and social returns on assets (*sroa*) are all positive and statistically significant, which means in companies with higher board diversity, more dividends are paid, dividend payout rates are higher, and that corporate social responsibility performance is significantly better than that of companies with lower board diversity. In summary, in companies with higher board diversity, the performance is better, dividend payout is higher, and social responsibility performance is better.

Table 5 Summary Statistics of Sub-Samples

Variable	Panel A. Samples with lower board diversity (samples with *diversity* lower than the median)					Panel B. Samples with greater board diversity (Samples with *diversity* higher than median)					Mean Diff.
	# of Obs.	Mean	St. dev.	Min.	Max.	# of Obs.	Mean	St. dev.	Min.	Max.	
diversity	2,321	4.2371	0.5410	3.5000	6.7287	2,316	2.7163	0.5820	0.0000	3.5000	1.5208 ***
roa	2,320	7.7087	9.4024	-51.480	82.790	2,316	6.9466	8.6384	-36.4500	60.290	0.7621***
roe	2,320	6.3499	17.740	-205.25	244.42	2,316	4.5362	47.6751	-2118.26	139.970	1.8137**
tq	2,320	2.5439	15.487	0.0534	426.78	2,316	1.6869	4.1356	0.0523	101.672	0.8570***
roavar	2,318	4.0689	3.5733	0.0000	34.780	2,314	4.1503	3.6382	0.0000	35.3483	-0.0814
dividend	2,316	15.076	8.4434	0.0000	25.483	2,316	13.8402	8.9489	0.0000	25.0768	1.2360***
dividrate	2,319	0.6021	1.5960	-10.000	50.000	2,311	0.5353	1.3374	-20.0000	40.0000	0.0668***
csr1	2,321	0.06420	0.2451	0.0000	1.0000	2,316	0.0389	0.1933	0.0000	1.0000	0.0253***
csr2	2,321	0.2141	0.8168	0.0000	6.0000	2,316	0.1118	0.5599	0.0000	6.0000	0.1023***
csr3	2,321	0.0047	0.0687	0.0000	1.0000	2,316	0.0030	0.0549	0.0000	1.0000	0.0017
csr4	2,321	0.0147	0.1201	0.0000	1.0000	2,316	0.0056	0.0747	0.0000	1.0000	0.0091***
scv	2,260	18.721	1.2439	11.776	23.227	2,261	18.5005	1.1353	12.8388	22.6762	0.2205***
scvps	2,216	0.8800	1.9638	0.0009	38.639	2,223	0.7133	1.1389	0.0031	19.8256	0.1667***
sroa	2,260	24433.0	29870.2	18.423	403378.	2,261	23220	27952.2	97.7365	300711.	1213.03*
scale	2,320	22.837	1.4349	18.047	28.582	2,316	22.6712	1.2147	18.0270	27.3584	0.1658***
age	2,321	31.451	13.905	1.0000	70.000	2,316	32.6352	13.4435	1.0000	69.0000	-1.1841***
boardsize	2,321	7.8096	2.4748	2.0000	21.000	2,316	6.9538	2.0755	3.0000	21.0000	0.8558***
leverage	2,224	1.8751	10.862	-110.42	284.18	2,219	2.0864	10.4064	-18.6500	166.060	-0.2113
rd	2,264	4.7076	25.453	0.0000	832.45	2,245	3.3956	9.0622	0.0000	217.900	1.312**
growth	2,318	6.1373	58.090	-81.930	1970.9	2,316	9.7854	155.408	-90.040	6343.65	-3.6481
dirhold	2,321	21.616	14.181	0.3700	94.560	2,314	22.1444	14.8348	0.1200	99.7100	0.5286

Note: This table reports summary statistics of sub-samples (number of observation, mean, standard deviation, minimum and maximum). See Table 1 for variable definitions. Yearly data is ranged from 2010 to 2015. Panel A is the result of samples with lower board diversity (samples with the value of *diversity* less than the median), and panel B is the result of samples with greater board diversity (samples with the value of *diversity* larger than the median). The last column shows the mean differences of each variable, and *, ** and *** represent that the difference in mean reaches at least 10%, 5% and 1% significance level.

Table 6 shows Pearson correlation coefficient among variables. Observing coefficients in the first column of correlation coefficient matrix, we can see that the correlation coefficients between board diversity (*diversity*) and firm performance indicators, return on assets (*roa*), return on equity (*roe*) and Tobin's Q (*tq*) are significantly positive (0.0426, 0.0232, and 0.0643). This represents that the higher the board diversity, the better firm's asset and equity utilization efficiency, and obtains a better evaluation in financial markets. The correlation coefficients between board diversity, and total dividend payout, dividend payout ratio are all significantly positive (0.0488 and 0.0336). This indicates that the more diverse the board of directors, the higher the total cash dividend payout, and the higher the cash dividend payout rate. The correlation coefficients between board diversity and the 5 CSR performance variables (*csr1, csr2, csr4, scv* and *scvps*) are all positive and reach a significant level of at least 5%. This shows that the higher the board diversity, the easier it is selected as firms with outstanding CSR performance by the *Common Wealth* and the *Global Views Monthly*, and the higher the social contribution value and social contribution value per share. This means that companies with diversified corporate board tends to have invested more in caring the interests of stakeholders. From the results of correlation analysis, the more diverse the board, the better company's accounting and market performance, the higher the total dividend payout and the dividend payout rate, and the better company's CSR performance, which is consistent with the previous descriptive statistics.

Table 6 Correlation Coefficients Matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)diversity	1.0000													
(2)roa	0.0426***	1.0000												
(3)roe	0.0232	0.1542***	1.0000											
(4)tq	0.0543***	0.0292**	-0.0041	1.0000										
(5)roavar	-0.0073	-0.1229***	-0.0503***	0.0128	1.0000									
(6)dividend	0.0488***	0.5764***	0.0765***	-0.0096	-0.2774***	1.0000								
(7)dividrate	0.0336**	0.0441***	0.005	-0.0057	-0.0531***	0.1492***	1.0000							
(8)csr1	0.0802***	0.1127***	0.0122	-0.0123	-0.0997***	0.1756***	0.0226	1.0000						
(9)csr2	0.1009***	0.1036***	0.0107	-0.0106	-0.0917***	0.1607***	0.0217	0.7551***	1.0000					
(10)csr3	0.0108	0.0771***	0.0065	-0.0001	-0.0328**	0.0658***	0.001	0.2669***	0.3126***	1.0000				
(11)csr4	0.0673***	0.0980***	0.0094	-0.002	-0.0391***	0.0889***	0.0063	0.4325***	0.4630***	0.5131***	1.0000			
(12)scv	0.1271***	0.2823***	0.1304***	-0.0644***	-0.2011***	0.3693***	0.0191	0.3481***	0.3676***	0.1601***	0.2048***	1.0000		
(13)scvps	0.0502***	0.1988***	0.0755***	0.0139	-0.0576***	0.1563***	0.0234	0.0542***	0.0568***	-0.005	0.0424***	0.3113***	1.0000	
(14)sroa	-0.0350**	0.0995***	-0.0517***	0.0211	-0.0036	0.0495***	0.0191	-0.0099	-0.0371**	-0.0212	-0.0027	0.1937***	0.6736***	1.0000

Note: This table reports pair-wise Pearson correlation coefficients among variables. See Table 1 for the definition of variables. Yearly data is ranged from 2010 to 2015. Correlation coefficients followed by an asterisk means that it reaches at least 5% significance level.

4.2 Regression Results

Recall that the board diversity index (*diversity*) is constructed by eight individual diversity dimensions, that is, board members' gender ratio, tenure, education, whether they have professionals on finance, law and accounting, independence, busyness, political connection, and cross-culture experience. This study uses the diversity index to predict firm's performance, performance volatility, dividend policies and CSR performance. Table 7 reports regression result of how board diversity affects firm's accounting performance (*roa, roe*), market performance indicator (*tq*) and performance volatility (*roavar*). The estimated coefficients in the first column of Table 7 shows that the influence coefficient of board diversity on return on assets (*roa*) is significantly positive (0.329). It shows the more diversified of company's board members, the higher company's return on assets. The influence coefficients of board diversity on return on equity (*roe)* and Tobin's Q (*tq*) are both significantly positive (0.857 and 0.87), which indicates firms with diverse board members tend to have greater return on equity, and the significantly higher the growth opportunity by market evaluation. However, the influence coefficient of board diversity on performance volatility (*roavar*) is positive yet has not reached a statistically significant level, and this indicates that board diversity has limited influence on reducing performance volatility. The estimation results of control variables are omitted from reporting. The empirical result in Table 7 tends to support Hypothesis 1 but Hypothesis 2.

Table 7 Regression Result on the Effects of Board Diversity on Performance and Performance Volatility

Explanatory Variable	Explained: Performance and Performance Volatility			
	(1) *roa*	(2) *roe*	(3) *tq*	(4) *roavar*
diversity	0.329**	0.857**	0.870***	0.0195
	(2.44)	(2.06)	(2.65)	(0.36)
scale	1.277***	3.506**	-0.724***	-0.325***
	(9.97)	(2.51)	(-5.30)	(-5.64)
age	-0.0724***	-0.0183	0.0131	-0.0597***
	(-7.42)	(-0.94)	(1.48)	(-14.76)
boardsize	-0.00544	-0.357***	-0.100*	-0.0571**
	(-0.09)	(-2.64)	(-1.91)	(-2.26)
leverage	0.00235	0.0200	-0.0113***	0.00371
	(0.21)	(1.15)	(-4.37)	(0.58)
rd	-0.0283***	-0.0309*	-0.00874*	0.00533
	(-4.08)	(-1.78)	(-1.76)	(0.83)
growth	0.00827*	0.0316*	0.000427	0.000687
	(1.93)	(1.68)	(0.89)	(0.83)
dirhold	0.0680***	0.0883***	0.0146***	-0.00197
	(7.41)	(3.98)	(3.06)	(-0.55)
constant	-21.56***	-75.46**	15.67***	13.77***
	(-7.50)	(-2.30)	(6.24)	(10.29)
Num. of obs.	4,298	4,298	4,298	4,295
Adj. *R*-square	0.0713	0.0266	0.0118	0.0794
Prob.of *F*-stat.	0.0000	0.0000	0.0000	0.0000

Note: This table reports the regression results of the effects of board diversity on firm's performance and performance volatility. The numbers in the brackets are *t*-values of estimated coefficients. *, **, and *** show that coefficients reach the significant levels of 10%, 5%, and 1%, respectively. Please refer to Table 1 for definition of variables.

Table 8 shows the regression estimation results of whether board diversity *(diversity)* affects firm's dividend payout. Two variables, total cash dividend payout (*dividend*) and cash dividend payout ratio (*dividrate*) are used as dividend payout proxies. From estimated coefficients in the first column of Table 8, it can be seen that the influence coefficients of board diversity on total cash dividend payout and dividend payout ratio are significantly positive (0.342 and 0.0962), means the more diverse the board member, the greater the total amount of cash dividends, and the higher the ratio of cash dividends payout, representing that the firm's

agency problem is relative small. According to previous research, distribution of dividends helps reduce agency problem of management using company's resource, and distribution of dividends is helpful for enhancing corporate governance. The result in Table 8 proves the increase in the degree of board diversity can strengthen corporate governance by pay more cash dividends. The empirical result of Table 8 tends to support Hypothesis 3.

Table 8 Regression Result on the Effects of Board Diversity on Dividend Payout

Explanatory Variable	Explained: Dividend payout	
	(1) *dividend*	(2) *dividrate*
diversity	0.342**	0.0962*
	(2.56)	(1.78)
scale	1.990***	-0.0237
	(19.07)	(-0.66)
age	0.00527	0.000528
	(0.54)	(0.18)
boardsize	-0.0197	-0.00675
	(-0.34)	(-0.50)
leverage	0.00146	-0.000832
	(0.12)	(-0.85)
rd	-0.0258***	-0.00121**
	(-4.00)	(-2.43)
growth	-0.000177	-0.000176***
	(-0.13)	(-2.59)
dirhold	0.0337***	-0.00141
	(3.71)	(-0.66)
constant	-32.51***	0.908
	(-13.90)	(1.19)
Num. of obs.	4,298	4,289
Adj. *R*-square	0.1003	0.0017
Prob. of *F*-stat.	0.0000	0.0202

Note: This table shows whether company's board diversity affects the regression estimation results of dividend policies. The brackets include the t values of the estimated coefficients. *, **, and *** means the correlation coefficients reach significant levels of 10%, 5%, and 1%. Please refer to Table 1 for variable definitions.

Table 9 shows regression results of how board diversity index (*diversity*) affects corporate social responsibility performance. Observing estimated coefficients in the first column of Table 9, we can see that only one of the influence coefficients of board diversity on CSR performance measures is positive (0.0208) and reaches statistically significant level (cumulative CSR performance: *csr2*), and that none of others have reached statistically significant level. This means that the companies with a more diverse board tend to have more years to be selected as firms with excellence CSR performance by aforementioned two business media. Hypothesis 4 is still supported yet weaker.

Table 9 Regression Result on the Effects of Board Diversity on Corporate Social Responsibility Performance

Explanatory Variable	Explained: Measures of CSR performance			
	(1) *csr1*	(2) *csr2*	(3) *csr3*	(4) *csr4*
diversity	0.00382	0.0208*	-0.000989	0.00193
	(1.05)	(1.80)	(-1.57)	(1.10)
scale	0.0514***	0.161***	0.00806***	0.0145***
	(12.51)	(11.48)	(3.94)	(5.62)
age	-0.000522**	-0.00127*	-0.000146***	-0.000379***
	(-2.05)	(-1.66)	(-2.67)	(-3.65)
boardsize	0.0113***	0.0413***	0.00120**	0.00146*
	(5.20)	(6.47)	(2.03)	(1.69)
leverage	-0.000125*	-0.000390*	0.0000149	0.0000221

	(-1.69)	(-1.68)	(1.22)	(1.11)
rd	0.000189	0.000736	0.0000246	0.00000755
	(1.36)	(1.39)	(1.25)	(0.33)
growth	0.00000409	0.00000519	0.00000227**	0.00000321
	(0.84)	(0.27)	(2.06)	(1.37)
dirhold	-0.000797***	-0.00277***	-0.000260***	-0.000243**
	(-3.61)	(-3.93)	(-4.10)	(-2.51)
constant	-1.180***	-3.773***	-0.174***	-0.321***
	(-12.99)	(-11.95)	(-4.01)	(-5.71)
Num. of obs.	4,297	4,298	4,297	4,297
Adj. *R*-square	0.1324	0.1417	0.0367	0.0479
Prob.of *F*-stat.	0.0000	0.0000	0.0147	0.0000

Note: This table shows whether company's board diversity affects the regression estimation results of corporate social responsibility performance. The brackets include the t values of the estimated coefficients. *, **, and *** means the correlation coefficients reach significant levels of 10%, 5%, and 1%. Please refer to Table 1 for variable definitions.

Table 9 (continued) is the estimated results of whether the other three CSR performance measures are affected by board diversity index (*diversity*). The coefficients in the first column show that estimated coefficients of social contribution value, social contribution value per share and social contribution rate are all positive, the first two are highly significant, and the coefficient of social contribution rate is also almost marginally significant. This indicates that the more diverse the board member, the higher company's social contribution value, social contribution value per share, and social contribution rate. The results in Table 9 and Table 9 (continued) basically prove that when the company has a higher degree of board diversity, it can make company pay attention to rights and interests of social, labor, consumer and other related parties, and make the company's social responsibility performance better. The empirical result tends to support Hypothesis 4.

Table 9 Regression Result on the Effects of Board Diversity on Corporate Social Responsibility Performance (continued)

Explanatory Variable	Explained: Measures of CSR performance		
	(5) *scv*	(6) *scvps*	(7) *sroa*
diversity	0.0325**	0.0627***	0.6087
	-2.57	-3.37	-1.56
scale	0.654***	-0.0779***	-7.2441***
	-71.86	(-3.95)	(-21.54)
age	-0.00577***	-0.0117***	-0.1478***
	(-6.45)	(-6.65)	(-5.54)
boardsize	0.0647***	0.0744***	1.7722***
	-10.75	-2.99	-6.29
leverage	0.000364	-0.000024	-0.0265
	-0.47	(-0.03)	(-1.48)
rd	-0.000599	-0.00258***	-0.0415***
	(-0.81)	(-3.33)	(-4.17)
growth	6.32E-06	0.0000928	-0.0007
	-0.11	-0.84	(-0.48)
dirhold	-0.00282***	-0.00288	-0.05123*
	(-3.42)	(-1.52)	(-1.75)
constant	3.422***	2.254***	179.38***
	-16.98	-5.84	-24.11
Num. of obs.	4,199	4,122	4,199
Adj. *R*-square	0.6062	0.023	0.1096
Prob.of *F*-stat.	0.0000	0.0000	0.0000

Note: This table shows whether company's board diversity affects the regression estimation results of corporate social responsibility performance. The brackets include the t values of the estimated coefficients. *, **, and *** means the correlation coefficients reach significant levels of 10%, 5%, and 1%. Please refer to Table 1 for variable definitions.

Table 10 shows the regression estimation results of board diversity's impact on company performance and performance volatility after dummy variables (*d1*, *d2*) are used to group board

diversity. Observing estimated coefficients in the first and second columns, we can see that when the company goes from a low-diversity company to a medium-diversity one, the increase in company performance is positive. The increasing amount in performance of the second-highest diverse companies is also significantly positive, compared to that of a low-diversity company. The increasing amount in performance of the high-diversity companies is also positive compared with that of low-diversity companies. Through the classification of board diversity, this study found that return on assets of high-diversity companies has increased significantly, and board diversity is positively correlated with return on assets compared to low-diversity ones. Similarly, return on equity and Tobin's Q of medium-diversity and high-diversity companies are significantly higher than those of low-diversity ones. However, in terms of performance volatility, medium-diversity, second-highest-diversity and high-diversity companies do not have a significantly lower level than low-diversity ones. This implies board diversity's impact on performance volatility is not obvious. The basic results in Table 10 show that even if the cluster estimation is considered, the basic empirical results are consistent with the previous ones. Board diversity has a positive and significant impact on company's accounting and market performance, but the impact on performance volatility is not significant. The empirical results support Hypothesis 1, but Hypothesis 2.

Table 10 The Effects of Board Diversity on Performance and Performance Volatility: Dummies for Board Diversity Index

Explanatory Variables	Explained: Performance and Performance Volatility Measures			
	(1) *roa*	(2) *roe*	(3) *tq*	(4) *roavar*
d1	0.125	0.983	0.842**	-0.00487
	(0.47)	(0.97)	(2.23)	(-0.05)
d2	0.625**	2.003**	1.187***	-0.0109
	(2.31)	(2.02)	(2.91)	(-0.10)
scale	1.281***	3.513**	-0.717***	-0.325***
	(10.01)	(2.51)	(-5.33)	(-5.63)
age	-0.0725***	-0.0174	0.0120	-0.0598***
	(-7.44)	(-0.88)	(1.39)	(-14.81)
boardsize	-0.00519	-0.382***	-0.0876*	-0.0549**
	(-0.09)	(-2.59)	(-1.82)	(-2.18)
leverage	0.00236	0.0200	-0.0115***	0.00371
	(0.21)	(1.15)	(-4.43)	(0.58)
rd	-0.0282***	-0.0313*	-0.00841*	0.00538
	(-4.11)	(-1.82)	(-1.75)	(0.83)
growth	0.00827*	0.0317*	0.000459	0.000684
	(1.93)	(1.68)	(0.94)	(0.83)
dirhold	0.0679***	0.0895***	0.0142***	-0.00207
	(7.39)	(4.18)	(3.07)	(-0.58)
constant	-20.88***	-74.02**	17.46***	13.83***
	(-7.31)	(-2.28)	(5.80)	(10.55)
Num. of obs.	4,298	4,298	4,298	4,295
Adj. *R*-square	0.0714	0.0270	0.0109	0.0794
Prob.of *F*-stat.	0.0000	0.0000	0.0000	0.0000

Note: Based on using two dummies for board diversity index, this table reports the regression results of the effects of board diversity on firm's performance and performance volatility. The numbers in the brackets are *t*-values of estimated coefficients. *, **, and *** show that coefficients reach the significant levels of 10%, 5%, and 1%, respectively. Please refer to Table 1 for definition of variables.

Table 11 shows the regression results of board diversity on company's dividend payout as dummy variables (*d1*, *d2*) are used to capture the effect of board diversity. Observing the estimated coefficients in the first and second columns, we can see that in companies with a high degree of board diversity, the amount of cash dividend payments are significantly more, and dividend payout ratio is also statistically and significantly higher compared to companies with a low degree of board diversity. Even the use of another regression specification, estimation results are still consistent with the previous ones. Board diversity has a positive impact on company's two dividend payout proxies. Board diversity helps to increase

company's dividend payment and strengthen corporate governance. The empirical results support Hypothesis 3.

Table 11 The Effects of Board Diversity on Dividend Payout: Dummies for Board Diversity Index

Explanatory Variables	Explained: dividend payout measures	
	(1) *dividend*	(2) *dividrate*
d1	0.277	0.0523
	(1.10)	(0.70)
d2	0.715***	0.178**
	(2.81)	(2.02)
scale	1.994***	-0.0227
	(19.10)	(-0.64)
age	0.00538	0.000489
	(0.55)	(0.17)
boardsize	-0.0243	-0.00672
	(-0.42)	(-0.51)
leverage	0.00145	-0.000834
	(0.12)	(-0.86)
rd	-0.0259***	-0.00119**
	(-4.01)	(-2.45)
growth	-0.000157	-0.000174**
	(-0.11)	(-2.56)
dirhold	0.0339***	-0.00143
	(3.73)	(-0.66)
constant	-31.87***	1.106
	(-13.82)	(1.33)
Num. of obs.	4,298	4,289
Adj. *R*-square	0.1009	0.0018
Prob.of *F*-stat.	0.0000	0.0197

Note: Based on using two dummies for board diversity index, this table reports the regression results of the effects of board diversity on firm's dividend payout. The numbers in the brackets are *t*-values of estimated coefficients. *, **, and *** show that coefficients reach the significant levels of 10%, 5%, and 1%, respectively. Please refer to Table 1 for definition of variables.

The estimated results in Table 12 and Table 12 (continued) show that when the company goes from a low-diversity company to a medium-diversity, second-highest, and high-diversity one, though the first four CSR performance measures have not increased significantly, social contribution value (*scv*) and social contribution value per share (*scvps*) tend to increase significantly. Still some significant evidences show that board diversity increases company's social contribution and social contribution per share, which means the higher the board diversity, the better it's social responsibility performance. The empirical result supports Hypothesis 4.

Table 12 The Effects of Board Diversity on Corporate Social Responsibility: Dummies for Board Diversity Index

Explanatory Variables	Explained: Measures of CSR performance			
	(1) *csr1*	(2) *csr2*	(3) *csr3*	(4) *csr4*
d1	0.00217	0.0117	-0.00412	-0.00340
	(0.34)	(0.59)	(-0.24)	(-1.14)
d2	0.00358	0.0313	-0.000792	0.00272
	(0.55)	(1.54)	(-0.39)	(0.92)
scale	0.0515***	0.161***	0.00806***	0.0146***
	(12.50)	(11.46)	(3.94)	(5.62)
age	-0.000532**	-0.00129*	-0.000146***	-0.000384***
	(-2.10)	(-1.70)	(-2.70)	(-3.74)
boardsize	0.0114***	0.0416***	0.00120**	0.00156*
	(5.27)	(6.50)	(2.00)	(1.82)
leverage	-0.000126*	-0.000392*	0.0000159	0.0000228
	(-1.68)	(-1.65)	(1.20)	(1.07)
rd	0.000192	0.000745	0.0000248	0.00000987
	(1.37)	(1.39)	(1.23)	(0.41)
growth	0.00000402	0.00000536	0.00000197*	0.00000282
	(0.82)	(0.27)	(1.89)	(1.23)

dirhold	-0.000804***	-0.00278***	-0.000263***	-0.000251***
	(-3.65)	(-3.96)	(-4.10)	(-2.59)
constant	-1.171***	-3.728***	-0.175***	-0.315***
	(-13.05)	(-12.06)	(-4.04)	(-5.72)
Num. of obs.	4,297	4,298	4,297	4,297
Adj. *R*-square	0.1323	0.1415	0.0376	0.0481
Prob. of *F*-stat.	0.0000	0.0000	0.0247	0.0000

Note: Based on using two dummies for board diversity index, this table reports the regression results of the effects of board diversity on firm's performance on corporate social responsibility. The numbers in the brackets are *t*-values of estimated coefficients. *, **, and *** show that coefficients reach the significant levels of 10%, 5%, and 1%, respectively. Please refer to Table 1 for definition of variables.

Table 12 The Effects of Board Diversity on Corporate Social Responsibility: Dummies for Board Diversity Index (continued)

Explanatory Variable	Explained: Measures of CSR performance		
	(5) *scv*	(6) *scvps*	(7) *sroa*
d1	0.00605	0.0423	472.6
	(0.26)	(0.87)	(0.58)
d2	0.0429*	0.125***	601.7
	(1.86)	(3.56)	(0.81)
scale	0.654***	-0.0770***	-7236.5***
	(71.84)	(-3.92)	(-21.48)
age	-0.00584***	-0.0117***	-149.4***
	(-6.54)	(-6.75)	(-5.63)
boardsize	0.0656***	0.0738***	1792.2***
	(10.88)	(3.02)	(6.46)
leverage	0.000362	-0.0000229	-26.31
	(0.47)	(-0.03)	(-1.49)
rd	-0.000579	-0.00258***	-41.09***
	(-0.78)	(-3.33)	(-4.11)
growth	0.00000523	0.0000957	-0.705
	(0.09)	(0.87)	(-0.47)
dirhold	-0.00287***	-0.00286	-52.19*
	(-3.49)	(-1.52)	(-1.79)
constant	3.497***	2.373***	180708.8***
	(17.62)	(6.15)	(24.59)
Num. of obs.	4,199	4,122	4,199
Adj. *R*-square	0.6059	0.0234	0.1094
Prob. of *F*-stat.	0.0000	0.0000	0.0000

Note: Based on using two dummies for board diversity index, this table reports the regression results of the effects of board diversity on firm's performance on corporate social responsibility. The numbers in the brackets are *t*-values of estimated coefficients. *, **, and *** show that coefficients reach the significant levels of 10%, 5%, and 1%, respectively. Please refer to Table 1 for definition of variables.

5. Conclusion and Suggestion

The board of directors is the most important institution in corporate governance mechanism. The resource dependence theory and human capital theory in the literature mention that through the diversification in characteristics of corporate board member, different ideas, opinions, resources, knowledge and experiences are brought to the company, and company's relationships among stakeholders, interpersonal networks and different market opportunities can be broadened, so company decisions can be deeper and broader. A diverse board also helps increase the independence of management and monitoring efficiency, and has a positive impact on corporate performance. Based on these arguments, this study examines the impact of board diversity on firm performance, performance volatility, dividends payout and CSR performance. Board diversity is constructed by the sum of 8 individual diversity dimensions (calculated through the Simpson Index) including gender, tenure, education, professionals, independence, busyness, political connection and cross-culture experience, all of which cover the board's structure and board members' characteristics. Firm performance is measured by accounting and

market performance indicators. Firm performance volatility is measured by variation of firm's return on assets in the previous five years. Dividend payout is measured by cash dividend payouts and payout ratio. CSR performance is constructed by annual name-list of excellent performance on CSR by the two Taiwanese local but famous media and the social contribution value of each company is also calculated to quantify CSR performance.

Based on the data of non-financial industry listed companies on the Taiwan Stock Exchange from 2010 to 2015, this study found that board diversity has a positive and significant impact on corporate accounting and market performance. The more diverse the companys' board, the more cash dividend and cash dividend payout ratio, and CSR performance are also significantly better than companies with less diverse corporate board. Existing literature points out that board diversity can help improve company performance and value. When the board of directors is more diverse, dividend payout is used to reduce company's agency problem, and rights and interests of stakeholders are more taken by firms. The empirical results of this study fully confirm relevant arguments in the literature. For companies, appointing or selecting more diverse directors can not only increase resources and professional talents at all aspects of business operation, but also help improve corporate governance, gain social reputation, attract investors, and have good performance in the economics and financial market to operate sustainably.

The policy implications of this study are as followings. For government authorities, sustainable promotion of board diversity in relevant laws, regulations and codes of practice on corporate governance can help firm to enhance performance and strengthen corporate governance, and has a positive impact on operation stability and development of financial market. Regulation on board diversity can also be extended to the diversity in independent director's dedication and members of audit versus compensation committee. For the firm, the appointment or selection of board members should conform to the development of global corporate governance practices, and consider the diversity of board composition, which will help to strengthen the corporate governance mechanism and stakeholders' management, and help to build the firm's reputation and investors' trust. For investors, when selecting investment targets, firm's board diversity can be taken into account as a reference for assets allocation, and this study points out that firm with a more diverse board tends to have good performance and more dividend payments. These are all what investors like to see in wealth accumulation.

The current method of constructing board diversity index is to calculate the diversity of individual eight dimensions by using the Simpson Index and then add them under equal weights. The relative importance of each individual diversity dimension isn't taken into account. Therefore, when the overall diversity index is constructed in subsequent research, this issue can be explored more.[2] Secondly, the influence of board diversity on company performance and other financial consequences variables may be nonlinear. That is, the impact of diversity increasing under low diversity is different from that of diversity increasing under high diversity. Therefore, non-linear estimation can be considered in future evaluations. In addition, it is possible that benchmark companies or companies with good performance have more resources to achieve board diversity, and their own performance at different aspects are also better. Therefore, sample selection of board diversity cause estimation biases in estimating the impact of board diversity on performance. Future researchers can try to use two-stage estimation

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[2] Subsequent research may employ Principal Component Analysis (PCA) to develop an overall board diversity index to integrate several individual board diversity indicators. The PCA is a statistical technique for dimensionality-reduction that is often applied to reduce the dimensionality of large data sets, by transforming a large set of variables into a smaller one that still contains most of the information in the large set. PCA helps to overcome multi-dimensionality problems to calculate corporate governance scores (Gompers, Ishii and Metrick, 2003; Larcker, Richardson and Tuna, 2007). PCA is also commonly employed in governance and finance research to determine consolidated measures for several individual indicators (Tetlock, 2007; Banker and Mashruwala, 2007; Larcker, Richardson and Tuna, 2007).

(Heckman, 1979) or propensity score matching (Rosenbaum and Rubin, 1983, 1985a,b) in correcting the potential bias.[3]

Reference

Abdullah, S. N. (2014), "The Causes of Gender Diversity in Malaysian Large Firms", *Journal of Management and Governance*, 18(4), pp. 1137-1159.

Adams, R. and D. Ferreria (2009), "Women in the Boardroom and Their Impact on Governance and Performance", *Journal of Financial Economics*, 94(2), pp. 291-309.

Adams, R. B., H. Almeida. and D. Ferreira (2005), "Powerful CEOs and Their Impact on Corporate Performance", *Reviews of Financial Studies*, 18(4), pp. 1403-1432.

Ahern, K. R. and A. K. Dittmar (2012), "The Changing of the Boards: The Impact on Firm Valuation of Mandated Female Board Representation", *Quarterly Journal of Economics*, 127(1), pp. 137-197

Altunbas, Y., M. Binici. and L. Gambacorta (2017), "Macroprudential Policy and Bank Risk", *Journal of International Money and Finance*, 81, pp. 203-220.

Banker, R. D. and R. Mashruwala (2007), "The Moderating Role of Competition in the Relationship between Nonfinancial Measures and Future Financial Performance", *Contemporary Accounting Research*, 24(3), pp. 763-793

Bear, S., N. Rahman. and C. Post (2010), "The Impact of Board Diversity and Gender Composition on Corporate Social Responsibility and Firm Reputation", *Journal of Business Ethics*, 97(2), pp. 207-221.

Bendickson, J. S. and T. D. Chandler (2019), "Operational Performance: The Mediator between Human Capital Developmental Programs and Financial Performance", *Journal of Business Research*, 94, pp. 162-171.

Bernile, G., V. Bhagwat. and S. Yonker (2018), "Board Diversity, Firm Risk, and Corporate Policies", *Journal of Financial Economics*, 127(3), pp. 588-612.

Bontis, N. and J. Fitzenz (2002), "Intellectual Capital ROI: A Causal Map of Human Capital Antecedents and Consequents", *Journal of Intellectual Capital*, 3, pp. 223-247.

Boubakary and D. D. Moskolaï (2016), "The Influence of the Implementation of CSR on Business Strategy: An Empirical Approach Based on Cameroonian Enterprises", *Arab Economic and Business Journal*, 11(2), pp. 162-171.

Boumosleh, A. and B. N. Cline (2015), "Outside Director Stock Options and Dividend Policy", *Journal of Financial Services Research*, 47(3), pp. 381-410.

Carpenter, M. A. and J. D. Westphal (2001), "The Strategic Context of External Network Ties: Examining the Impact of Director Appointments on Board Involvement in Strategic Decision Making", *Academy of Management Journal*, 44(4), pp. 639-660.

Carter, D., F. D'Souza., B. Simkins. and W. Simpson (2010), "The Gender and Ethnic Diversity

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[3] The implementation of Heckman (1979) two-stage estimation to reduce the firm's self-selection of dedicating female director is as followed. First, employing factors determining firm's dedicating female director, such as firm size, board size, firm risk and family ownership (Abdullah, 2014; Saeed, Belghitar and Yousaf, 2016; Saeed, Sameer, Raziq, Salman and Hammoudeh, 2019), to estimate probability function of firm's dedicating female director by Probit model and then obtain bias correction term (inverse Mill's ratio). Second, the bias correction term (inverse Mill's ratio, lambda) is added on the estimation of equations (1), (2) and (3) in the study. The implementation of propensity score matching (PSM) of Rosenbaum and Rubin's (1983, 1985a,b) to reduce the firm's self-selection of dedicating female director is as followed. First, based on factors determining firm's dedicating female director (Abdullah, 2014; Saeed, Belghitar and Yousaf, 2016; Saeed, Sameer, Raziq, Salman and Hammoudeh, 2019), the Probit model is employed to estimate the probability function of firm's dedicating female director, namely, propensity score function (PSF) of firm's dedicating female director. Second, given PSF, the propensity score (PS) of all firm samples could be obtained (the estimated probability of firm's dedicating female director). Third, for each firm with female director, choose a firm sample without female director but with the closest PS as a matching sample (i.e one-to-one matching). Fourth, regression equations (1), (2) and (3) are estimated based on after matching samples, namely, samples with female director and samples without female director but have similar probability of dedicating female director.

of US Boards and Board Committees and Firm Financial Performance", *Corporate Governance: An International Review*, 18(5), pp. 396- 414.

Carter, D., F. P. D' Souza., B. J. Simkins. And W. G. Simpson (2007), The Diversity of Corporate Board Committees and Firm Financial Performance, SSRN.

Carter, D. E. W., D. Austin. and A. A. Trainor (2012), "Predictors of Postschool Employment Outcomes for Young Adults with Severe", *Journal of Disability Policy Studies*, 23(1), pp. 50–63.

Cashman, G. D., S. L. Gillan. and C. Jun (2012), "Going Overboard? On Busy Directors and Firm Value", *Journal of Banking and Finance*, 36(12), pp. 3248-3259.

Chen, C. J., B. W. Lin., Y. Lin. and Y. C. Hsiao (2016), "Ownership Structure, Independent Board Members and Innovation Performance: A Contingency Perspective", *Journal of Business Research*, 69(9), pp. 3371-3379.

Chen, G., C. Crossland. and S. Z. Huang (2016), "Female Board Representation and Corporate Acquisition Intensity", *Strategic Management Journal*, 37(2), pp. 303-313.

Chen, H. L., W. T. Hsu. and C. Y. Chang (2016), "Independent Directors' Human and Social Capital, Firm Internationalization and Performance Implications: An Integrated Agency-Resource Dependence View", *International Business Review*, 25(4), pp. 859-871.

Chen, H. L. (2014), "Board Capital, CEO Power and R&D Investment in Electronics Firms", *Corporate Governance: An International Review*, 22(5), pp. 422-436.

Chen, J., W. S. Leung. and M. Goergen (2017), "The Impact of Board Gender Composition on Dividend Payouts", *Journal of Corporate Finance*, 43, pp. 86-105.

Cheng, S. (2008), "Board Size and the Variability of Corporate Performance", *Journal of Financial Economics*, 87(1), pp. 157-176.

Chen, Y. and S. W. Chen (2018), "Does Board Structure Have Effect on Extreme Loss and Return? Evidence from Taiwan's Stock Investments", *East-Asia Review*, 479, pp.15-32.

Chou, H. I., P. A. Hamill. and Y. H. Yeh (2016), "Are All Regulatory Compliant Independent Director Appointments the Same? An Analysis of Taiwanese Board Appointments", *Journal of Corporate Finan*ce, 50, pp. 371-387.

Chung, K. H. and S. W. Pruitt (1994), "A Simple Approximation of Tobin's q", *Financial Management*, 23(3), pp. 70-74

Claessens, S., S. Djankov., J. Fan. and H. P. Lang (2002), "Disentangling the Incentive and Entrenchment Effects of Large Shareholdings", *Journal of Finance*, 57(6), pp. 2741-2772.

Conyon, M. J. and L. He (2017), "Firm Performance and Boardroom Gender Diversity: A Quantile Regression Approach", *Journal of Business Research*, 79, pp. 198-211.

Credit Suisse Group AG (2016), The Credit Suisse Gender 3000: Women in Senior Management.

Cullinan, C. P., L. Mahoney. and P. B. Roush (2017), "Are CSR Activities Associated with Shareholder Voting in Director Elections and Say-on-Pay Votes?", *Journal of Contemporary Accounting and Economics*, 13(3), pp. 225-243.

Duthler, G. and G. S. Dhanesh (2018), "The Role of Corporate Social Responsibility (CSR) and Internal CSR Communication in Predicting Employee Engagement: Perspectives from the United Arab Emirates (UAE)", *Public Relations Review*, 44(4), pp. 453-462.

Eberhardt-Toth, E. (2017), "Who Should Be on a Board Corporate Social Responsibility Committee?", *Journal of Cleaner Production*, 140(3), pp. 1926-1935.

F. Zona (2014), "Board Leadership Structure and Diversity over CEO Time in Office: A Test of the Evolutionary Perspective on Italian Firms", *European Management Journal*, 32(4), pp. 672-681.

Faleye, O. (2015), "The Costs of a (Nearly) Fully Independent Board", *Journal of Empirical Finance*, 32, pp. 49-62.

Farag, H. and C. Mallin (2017), "Monitoring Corporate Boards: Evidence from China",

European Journal of Finance, 25(6), pp. 524-549

Field, L., M. Lowry. and A. Mkrtchyan (2013), "Are Busy Boards Detrimental?", *Journal of Financial Economics*, 109(1), pp. 63-82.

Firth, M., J. Gao., J. Shen. and Y. Zhang (2016), "Institutional Stock Ownership and Firms' Cash Dividend Policies: Evidence from China", *Journal of Banking and Finance*, 65, pp. 91-107.

Frijns, B., O. Dodd. and H. Cimerova (2016), "The Impact of Cultural Diversity in Corporate Boards on Firm Performance", *Journal of Corporate Finance*, 41, pp. 521-541.

García-Jiménez, J.V., S. Ruiz-de-Maya. and I. López-Lópezb (2017), "The Impact of Congruence between the CSR Activity and the Company's Core Business on Consumer Response to CSR", *Spanish Journal of Marketing*, 21(1), pp. 26-38.

Goldman, E., J. Rocholl. and J. So (2009), "Do Politically Connected Boards Affect Firm Value?", *Review of Financial Studies*, 22(6), pp. 2331-2360.

Gompers, P. A., J. L. Ishii. and A. Metrick (2003), "Corporate Governance and Equity Prices", *Quarterly Journal of Economics*, 118(1), pp. 107-155.

Green, C. P. and S. Homroy (2018), "Female Directors, Board Committees and Firm Performance", *European Economic Review*, 102, pp. 19-38.

Heckman, J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica*, 47, pp. 153-162.

Hillman, A. J. and C. Shropshire. and A. A. Cannella (2007), "Organizational Predictors of Women on Corporate Boards", *Academy of Management Journal,* 50(4), pp. 941-952.

Hillman, A.J. and A. A. Cannella. and I. C. Harris (2002), "Women and Racial Minorities in Boardroom: How Do Directors Differ?", *Journal of Management*, 28, pp. 747-763.

Hung, C. D., Y. Jiang., F. Liu., H. Tu. and S. Wang (2017), "Bank Political Connections and Performance in China", *Journal of Financial Stability*, 32, pp. 57-69.

Jensen, M. C. and S. R. Rebuck (1983), "The Market for Corporate Control: The Scientific Evidence", *Journal of Financial Economics*, 11, pp.5-51.

Jensen, M. C. (1986), "Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers", *American Economic Review*, 76(2), pp. 323-329.

Kanter, R. (1977), "Some Effects of Proportions on Group Life: Skewed Sex Ratios and Responses to Token Women", *American Journal of Sociology*, 82(5), pp.965–990.

King, T., A. Srivastav. and J. Williams (2016), "What's in an education? Implications of CEO education for bank performance", *Journal of Corporate Finance*, 37, pp. 287-308.

La porta, R., F. Lopez-De-Silanes., A. Shleifer. and R. Vishny (2002), "Investor Protection and Corporate Valuation", *Journal of Finance*, 57(3), pp. 1147-1170.

Larcker, D. F., S. A. Richardson. and İ. Tuna (2007), "Corporate Governance, Accounting Outcomes, and Organizational Performance", *Accounting Review*, 82(4), pp. 963-1008.

Low, D. C. M., H. Roberts. and R. H. Whiting (2015), "Board Gender Diversity and Firm Performance: Empirical Evidence from Hong Kong, South Korea, Malaysia and Singapore", *Pacific-Basin Finance Journal*, 35, pp. 381-401.

McGuinness, P. B., J. V. Paulo. and M. Wang (2017), "The Role of Board Gender and Foreign Ownership in the CSR Performance of Chinese Listed Firms", *Journal of Corporate Finance*, 42, pp. 75-99.

MSCI ESG Research (2017), Women on Boards. Progress Report.

Nam, J., X. Liu., E. Lioliou. and M. Jeong (2018), "Do Board Directors Affect the Export propensity and export performance of Korean firms? A Resource Dependence Perspective", *International Business Review*, 27(1), pp. 269-280.

Nazari, J. A., K. Hrazdil. and F. Mahmoudian (2017), "Assessing Social and Environmental Performance through Narrative Complexity in CSR Reports", *Journal of Contemporary Accounting and Economics*, 13(2), pp. 166-178

Osterloh, M. and B. S. Frey (2006), "Shareholders Should Welcome Knowledge Workers as Directors", *CREMA Working Paper Series*, Center for Research in Economics, Management and the Arts.

Pan, Y. and X. Li (2000), "Joint Venture Formation of Very Large Multinational Firms", *Journal of International Business Studies*, 31(1), pp. 179–189.

Reguera-Alvarado, N. and F. Bravo (2017), "The Effect of Independent Directors' Characteristics on Firm Performance: Tenure and Multiple Directorships", *International Business and Finance*, 41, pp. 590-599.

Reuer, J. J. and O. Shenkar. and R. Ragozzino (2004), "Mitigating Risk in International Mergers and Acquisitions: The Role of Contingent Payouts", *Journal of International Business Studies,* 35(1), pp. 19-32.

Rosenbaum, P. and D. Rubin (1983), "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika*, 70, pp. 41-55.

Rosenbaum, P. and D. Rubin (1985a), "Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity", *American Statistician*, 39, pp. 33-38.

Rosenbaum, P. and D. Rubin (1985b), "The Bias Due to Incomplete Matching", *Biometrics*, 41, pp. 103-116.

Saeed, A., Y. Belghitar. and A. Yousaf (2016), "Firm-Level Determinants of Gender Diversity in the Boardrooms: Evidence from Some Emerging Markets", *International Business Review*, 25(5), pp. 1076-1088.

Saeed, A. and M. Sameer (2017), "Impact of Board Gender Diversity on Dividend Payments: Evidence from Some Emerging Economies", *International Business Review*, 26(6), pp. 1100-1113.

Saeed, A., M. Sameer., M. Raziq., A. Salman. and S. Hammoudeh (2020), "Board Gender Diversity and Organizational Determinants: Empirical Evidence from a Major Developing Country", *Emerging Markets Finance and Trade*, 55(8), pp. 1803-1820.

Skaggs, B. C. and M. Youndt (2004), "Strategic Positioning, Human Capital, and Performance in Service Organizations: A Customer Interaction Approach", *Strategic Management Journal*, 25, pp. 85-99.

Terjesen, S., R. Sealy. and V. Singh (2009), "Women Directors on Corporate Boards : A Review and Research Agenda", *Corporate Governance: An International Review*, 17(3), pp. 320-337.

Tetlock, P. C. (2007), "Giving Content to Investor Sentiment: The Role of Media in the Stock Market", *Journal of Finance*, 62(3), pp. 1139-1168.

Tobin, J. (1969), "A General Equilibrium Approach to Monetary Theory", *Journal of Money, Credit and Banking*, 1(1), pp. 15-29.

Ward, A. M. and J. Forker (2017), "Financial Management Effectiveness and Board Gender Diversity in Member-Governed, Community Financial Institutions", *Journal of Business Ethics*, 141(2), pp. 351-366.

Zahra, S. A. and J. A. Pearce (1989), "Boards of Directors and Corporate Financial Performance: A Review and Integrative Model", *Journal of Management*, 15(2), pp. 291-334.

Zalata, A. M. and V. Tauringana. and I. Tingbani (2018), "Audit Committee Financial Expertise, Gender, and Earnings Management: Does Gender of the Financial Expert Matter?", *International Review of Financial Analysis*, 55, pp. 170-183.

Zlate, Ş. and C. Enache (2015), "The Interdependence between Human Capital and Organizational Performance in Higher Education", *Procedia-Social and Behavioral Sciences*, 180(5), pp. 136-143.

Zona, F. (2016), "Agency Models in Different Stages of CEO Tenure: The Effects of Stock Options and Board Independence on R&D Investment", *Research Policy*, 45(2), pp. 560-

575.