THE EFFECTS OF CORPORATE GOVERNANCE ON CAPITAL STRUCTURE IN TAIWANESE CORPORATIONS AFTER CONTROLLINGFOR THE HETEROGENEITY OF INDUSTRIES AND FIRM SIZE

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Abstract

Since the MM theory, scholars have discussed capital structure issues from the perspectives of agency problems in corporate governance. Corporate governance has been seen as the means to reducing the agency costs produced by aligning the interests of management and shareholders, and the incentive for the management to engage in opportunistic behavior has been influenced by the firm's ownership and board of director structures. Previous studies, however, focus on traditional financial factors and neglect the debt and equity agency problems triggered by corporate governance and their possible influences on capital structure decisions. The sample used in this study consists of 317 firms listed on the Taiwan Stock Exchange from 1998 to 2007. By controlling for the heterogeneity of industries and firm size, our models incorporate the cash flow rights-voting rights-seat control divergence, the ownership structure, and the structure of the board of directors to examine the effects of corporate governance on the firm's capital structure. The results show that, when the divergence between cash flow rights and seat control is lower or when the divergence between voting rights and seat control is higher, the controlling shareholders can either control the board of directors to better monitor the firm or exhibit a preference for debt financing based on entrenchment motives. Further analysis indicates that blockholders prefer lower debt financing and do not expropriate minority shareholders. Financial institutional shareholders function through their provision of monitoring and the certification of debts for technological firms and can decrease the firms' debts. The management in the technological industry firms prefers debt financing in order to obtain agency-related benefits. While directors in traditional industries or large firms might use personal or firm debt to tunnel the firm's assets, the function of independent directors in technological firms or large firms of lowering debts in order to reduce the firm's bankruptcy risks is more evident.

Keywords: Corporate Governance, Capital Structure, Ownership Structure, The Structure of Board of Directors, Cash Flow Rights-Voting Rights-Seat Control Divergence

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Introduction

Since Modigliani and Miller (1958) proposed their MM theory, Jensen and Meckling (1976) and Myers and Majluf (1984) have further discussed the issue of capital structure from the perspective of agency theory. By extending the earlier research, a number of recent studies have provided compelling evidence to show that some association does exist between corporate governance and the capital structure decision.

Some scholars discuss the influence wielded by external investors on the firm's capital structure from the perspective of agency conflict. Agency theory regards debt as being a part of the internal control mechanism of a firm, which can reduce agency conflict (Grossman and Hart, 1980), as well as increase firm value through lowering the cost of conflicts between shareholders and management (Jensen, 1976). However, the incentive for management to engage in opportunistic behavior during financial decision making will be affected by the firm's ownership structure (Shleifer and Vishny, 1986); therefore, the conflict in terms of goals between shareholders and management is an important factor that needs to be taken into account in capital structure decisions (Morellec, 2004).

Much has been discussed regarding the influence of ownership structure on a firm's capital structure; for example, managerial ownership or insider ownership and debt exhibit negative correlation (Jensen et al., 1992), positive correlation (Mehran,

1992), or a non-linear inverted U-shaped relationship (Short and Keasey, 1999). There is a positive correlation between blockholders' ownership and capital structure (Fosberg, 2004), and there might be a positive correlation between the controlling shareholders' ownership and capital structure (Du and Dai, 2005), or else a negative correlation (Du and Dai, 2005). In addition, there might be a positive correlation between the ownership of institutional shareholders and capital structure (Chaganti and Damanpour, 1991), or else a negative correlation (Firth, 1995). Recently a number of studies have discussed it from the perspective of the divergence of cash flow rights and voting rights, with most supporting the view that there is a positive correlation between capital structure and the divergence of cash flow rights and voting rights (Du and Dai, 2005).

Since the board of directors plays the four roles of controlling and monitoring, providing service, making strategic plans and being dependent on resources, a fully functional board of directors can improve a firm's financial performance and increase its value (Zaha and Pearce, 1989; Borch and Huse, 1993; Johannisson and Huse, 2000) and prevent management from damaging the interests of shareholders (Daily et al., 2003). However, the performance of the board will be affected by the characteristics of board members.

While previous studies have emphasized the perspectives of traditional financial factors, the agency problems of debt and equity triggered by corporate governance may impact a firm's capital structure decision making. Thus, this study includes cash flow rights-voting rights-seat control divergence, ownership structure and the structure of the board of directors as corporate governance variables to analyze the effects of corporate governance on capital structure.

In Taiwan, the technological industries play an important role in the stock market. They have higher worldwide brand awareness and more flexible financing channels compared to traditional industries. Moreover, the technological industries place higher demands on the professional technical level of employees and thus utilize the bonus systems of profit sharing or executive share option plans to increase productivity and loyalty. It has therefore become more common for shareholders with professional expertise to participate in managerial decision making. On the other hand, traditional industries tend to be owned by families or corporate groups. Harris and Raviv (1988), for example, find that controlling shareholders, based on entrenchment motivation, tend to use debt rather than the optimal capital structure in order to increase the voting rights of the shareholder and to decrease the possibility of being taken over. Du and Dai (2005) also find that controlling shareholders prefer debt financing, thereby increasing debt in order to avoid the dilution of controlling rights. Moreover, the higher the debt level, the higher will be the pressure to pay off the debt, and the greater the proportion of the earnings that will be utilized to pay off the debt, thus preventing shareholders from tunneling company assets through self-dealing. However, the controlling shareholders may also lower the firm's financial leverage to hide their own tunneling, i.e., there will be a reduce-debt-for-tunneling effect. Since the agency problems associated with debt and equity in corporate governance may differ between the technological and traditional industries, in this study we consider the heterogeneity of industries.

In addition, small firms have limited financing channels, while it is common for blockholders to participate in a firm's decision making. Fosberg (2004) finds that the monitoring function of blockholders can effectively control the agency problem of choosing a sub-optimal capital structure. Claessens and Tzioumis (2006) find that there are different ownership structures between non-listed and listed companies, and therefore both of them face different corporate governance problems; most of the non-listed companies have blockholders and higher performance than listed companies. Since the management and governance of small firms differ from those of large firms, in this paper we also control the heterogeneity of firm size.

The remainder of this article is divided into four sections. Section 2 discusses the previous literature, highlighting those studies related to corporate governance and capital structure decisions. Section 3 explains of data sources, samples, and empirical models. Section 4 presents the analysis and discusses the empirical results. Section 5 provides the conclusions.

2. Literature Review

Many prior studies have examined the firm's capital structure, including Modigliani and Miller (1958), Jensen and Meckling (1976), Myers (1977), Ross (1977), and Myers and Majluf (1984), etc. Previous studies document empirical evidence of correlation between the financial determinants and capital structure, e.g., the agency theory (Jensen and Meckling, 1976; Haugen and Senbet, 1979), bankruptcy cost (Myers, 1977; Haugen and Senbet, 1978; Titman, 1984), debt tax shields (DeAngelo and Masulis, 1980; Dammon and Senbet, 1988), the pecking order theory (Myers and Majluf, 1984), profitability (Myers and Majluf, 1984), the signaling theory (Ross, 1985), growth opportunities (Myers, 1977; Titman and Wessels, 1988), and uniqueness (Titman and Wessels, 1988).

Several scholars have discussed the capital structure decision from the perspective of corporate governance. Agency theory regards debt as a part of the corporate internal control mechanism that can decrease agency conflicts (Grossman and Hart, 1980), thereby decreasing conflict costs between shareholders and management through debt financing, which in turn increases firm value (Jensen, 1976). Therefore, corporations may decrease the agency cost

of equity financing through debt financing and increase firm value by restricting or encouraging management to make the shareholders' interest the priority (Jensen and Meckling, 1976; Harris and Raviv, 1991). Furthermore, the liquidity risks or liquidation threats from high financial leverage may decrease agency costs (Jensen, 1986), as well as decrease the conflicts between shareholders and the management in investment decisions (Myers, 1977), risk-taking (Jensen and Meckling, 1976), liquidation (Harris and Raviv, 1990), and dividend policy (Stulz, 1990).

Jensen and Meckling (1976) propose that under a low financial leverage level, increasing debt provides the management with a positive incentive and lowers the total agency cost by decreasing external equity financing. Jensen (1986) suggests that the high debt ratio will limit the freedom of decision making in the non-profit maximizing behavior of the management. Friend and Lang (1998) point out that a firm's debt level is simultaneously affected by the firm's management and its stockholders; the management decreases debt out of a personal motivation to avoid damage to self-interest due to the firm's bankruptcy, while the stockholders can decrease personal risks through a well-diversified portfolio and tend to prefer a higher debt ratio for the firm.

What follows is a discussion of the relationship between corporate governance and capital structure from the perspectives of the firm's ownership structure (including the blockholders' ownership, the divergence of cash flow rights and voting rights, managerial ownership, and institutional stockholders' ownership) as well as the structure of the board of directors.

(1) Blockholders' ownership

Shleifer and Vishny (1986) suggest that external blockholders can limit the scope of managerial opportunism, and in turn lower the cost of conflict between the management and shareholders. Brailsford et al. (2002) indicate that if external blockholders can actively monitor the firm's management, it will be difficult for the management to manipulate the firm's debt ratio for self-interest, and therefore the external blockholders' ownership is positively correlated with the firm's financial leverage, thus supporting the active monitoring hypothesis. Fosberg (2004) finds that the blockholders' ownership is directly related to the firm's debt equity ratio, i.e., through the monitoring of blockholders the agency problem of the management choosing a sub-optimal capital structure can be effective controlled.

(2)The divergence of cash flow rights and voting rights

Harris and Raviv (1988) find that the separation of the cash flow rights from the voting rights of shareholders may give rise to a negative entrenchment effect for firm value. Du and Dai (2005) find that the divergence between cash flow rights and voting rights can increase the firm's financial leverage, i.e., large controlling shareholders will increase the firm's financial leverage to avoid the dilution of control rights. For this reason, weak corporate governance tends to give rise to a risky capital structure.

(3) Managerial ownership

Friend and Hasbrouck (1988) and Firth (1995) suggest that if the management owns a relatively high proportion of the firm's shares, it will tend to decrease the firm's debt level to avoid bankruptcy. Berger et al. (1997) also find that the percentage of a firm's shares owned by the CEO is directly related to the firm's debt. McConnell and Servaes (1990), McConnell and Servaes (1995) and Short and Keasey (1999) find that the relationship between the managerial ownership and the firm's debt ratio exhibit a non-linear inverted U-shape, i.e., the interests of the management and the shareholders are aligned in a firm with a high degree of managerial ownership, and the agency-related benefits enjoyed by the management due to the increased debt financing are fewer. On the other hand, the firm value of firms with a low degree of managerial ownership increase because of the convergence-of-interests effect.

(4) Institutional stockholders' ownership

Chaganti and Damanpour (1991) suggest that institutional stockholders prefer less debt financing, in which case the debt ratio and the institutional stockholders' ownership are negatively correlated. In addition, Firth (1995) states that institutional stockholders can protect their interests by restricting managerial behavior, in which case their ownership is positively correlated with the debt ratio.

Information asymmetry is an obstacle that a firm faces when seeking to finance itself from a financial market (Myers and Majluf, 1984). The mediation of banks as monitors can assist a firm in obtaining funds and reduce the dependency on internal funds (Diamonds, 1984). Leland and Pyle (1977) find that financial institutional ownership can improve the firm's monitoring and lower information asymmetry. It also plays the role of certification, thus signaling to the market that the firm's future cash flow is stable, and that the level of financial distress is low. In addition, the board members assigned by the financial institution can provide professional consulting services on financing and investments for the firm. Financial institutional ownership is therefore seen as a guarantee, which allows the monitoring cost to gain more economies of scale and decreases the obstacles to entering the financial market (Fama, 1985), thereby decreasing the firm's cost of capital (James, 1987). Hoshi et al. (1990) and Gilson et al. (1990) also find that the close relationship between banks and firms can decrease the firm's financial distress costs.

(5) Board of directors' (BODs) structure

Zaha and Pearce (1989), Borch and Huse (1993) and Johannisson and Huse (2000) propose that a fully-functional BOD can improve the firm's financial performance and increase firm value. Yeh et al. (2001) suggest that board composition can be used as a proxy variable for the measurement of the wealth entrenchment of the firm by the shareholders; they

find that the firm's financial performance is negatively correlated with the percentage of board seats occupied by the controlling family.

In general, the BOD performs the roles of controlling and monitoring, of providing service, of making strategic plans and being dependent on resources. Therefore, the BOD is the core of the corporate internal governance mechanism and the first line of defense against the possible damage to the shareholders' rights by the management. In addition, the BOD can adjust the expectations gap between the stakeholders and the board of directors (Brennan, 2006). However, the performance of the board is affected by the characteristics of board members, e.g., the size of the BOD, the CEO duality, board diversity, and independent directors.

Daily et al. (1999), Zahra and Pearce (1989) and Young et al. (2001) suggest that the independent directors and the CEO duality are key factors if the BOD can effectively perform the roles of monitoring and providing service. Weisbach (1988), Byrd and Hickman (1992), Brickley et al. (1994), Shivadasani (1993) and Yermack (1996) find that the firm's performance is correlated with the fraction of independent directors on the board. Brennan and McDermott (2004), Matolcsy et al. (2004) and Peasnell et al. (2006) state that independent directors can more effectively monitor the management and reduce the agency costs based on the separation of control rights and ownership. Orr et al. (2005) find that in the high-growth option firms, the percentage of independent directors, non-executive directors, and gray directors is correlated with firm value. In addition, Fosberg (2004) finds that a dual leadership structure increases debt, while Fairchild and Li (2005) find that directors in managerial positions increase the firm's financial performance.

In summarizing the above-mentioned studies we find that, in addition to traditional factors, capital structure decisions are also affected by the debt and equity agency problems triggered by corporate governance. Therefore, we incorporate corporate governance variables into the empirical models, such as the cash flow rights-voting-rights-seat control divergence, the ownership structure and the BODs' structure to analyze the effects of corporate governance on capital structure.

3. Data, Variables and Models

3.1 Data

Our data are collected from the *Taiwan Economic Journal* (TEJ). Data regarding the ownership structure and the board of directors are obtained from the TEJ Corporate Database, and accounting information is gathered from the TEJ Financial Report Database. The sample consists of all firms listed on the Taiwan Stock Exchange from 1998 to 2007. Firms with missing data in relation to ownership structure, the board of directors or accounting information are excluded from the sample. As a result, a total of 317 listed firms (3,170 annual observations) are included in this study.

To consider the heterogeneity of industries we categorize sample firms into traditional and technological industries. The technological industries include 74 listed firms from the electronics industry and biotech and medical industries. The rest of the firms are categorized as traditional industries and include 243 listed firms.

In addition, we also divide the sample firms into two size categories, large firms and small firms, which are controlled for the heterogeneous effects of firm size. First, based on the annual data of the median of the total assets of the 317 listed firms, the firms are divided into large firms or small firms. Next, if the categorization of a firm is inconsistent during the 1998-2007 period, then the firm's average total assets during this period will be compared to the median of the total assets for all 3,170 observations. If the firm's average total assets is lower than the median of the total assets of all observations, then the firm will be categorized as a small firm. If not, it will be categorized as a large firm. As a result, there are 157 small firms and 160 large firms.

3.2 Variables

This study uses the total debt ratio as a proxy for a firm's capital structure. There are three independent variables in the models: the cash flow rights-voting rights-seat control divergence indicator, the ownership structure, and the BODs' structure. The cash flow rights-voting rights-seat control divergence indicator is measured by three divergence ratios, namely, the cash flow rights-voting rights divergence ratio, the cash flow rights-seat control divergence ratio, and the voting rights-seat control divergence ratio. The ownership structure is measured by three ratios, namely, the blockholders' shareholding ratio, the financial institutional stockholding ratio, and the managerial ownership ratio. In addition, previous financial scandals in Taiwanese listed firms show that the personal financial leverages of board members are connected to the firm's financial leverage decisions. Therefore, this study also includes the share-pledged ratios of board members as a measure of the financial leverage of the controlling shareholders (Lee and Yeh, 2004). The BODs' structure is measured by two variables, namely, the managerial director seats and independent director seats. In this study, we use two control variables. The return on total assets (Titman and Wessels, 1988; Moh'd et al., 1998; Kuo et al., 2000; Bhaduri, 2002) is included to control for the effects of the firm's profit performance. The natural logarithm of total assets (Warner, 1977; Smith and Watts, 1992; Moh'd et al., 1998; Kuo et al., 2000) is included to control for the effects of economies of scale and scope. The measurements of the variables are shown in Table 1.

(Insert Table 1 here)

3.3 Empirical Model

The sample consists of 317 firms listed in the Taiwan Stock Exchange from 1998 to 2007, and includes 3,170 observations, being a mixture of a cross-sectional and time-sequential panel data set. Based on the characteristics of the intercept item and the data type of the analyzed units (firms), there are two different intercept item models. The first model is the fixed-effects model. This model involves two methods. The method involving a fixed intercept item is the ordinary least squares method (abbreviated as OLS in this study). The method involving a variable intercept item based on the differences in the analyzed units (firms) is also referred to as the dummy variable model (abbreviated as the fixed-effects model, FE, in this study). The second model is the random-effects model, or the variance component model (abbreviated as the random-effects model, RE, in this study). In this model, the intercept item is a random variable. Therefore, in the analysis of panel data, if the analyzed units (firms) are heterogeneous, then the estimation using OLS will be biased, or even meaningless. Adopting a fixed-effects model (FE) or a random-effects model (RE) can solve the above-mentioned problem (Hsiao, 2003).

The general model of the debt ratio DR_{nt} of firm n in period t can be expressed as $DR_{nt} = \beta_{0n} + \beta_1 X_{1nt} + \cdots + \beta_k X_{Knt} + \varepsilon_{nt}$, $n=1,\ldots,N$, $t=1,\ldots,T$. In the equation, ε_{nt} is the random error item. The ordinary least squares method (OLS) assumes that all the intercept items are fixed and equal, i.e., $\beta_{0n} = \beta_0$, whereas the fixed-effects model (FE) assumes that each firm has its own fixed intercept item β_{0n}, and the random-effects model (RE) uses the random intercept item to represent the different structure in each cross section, assuming that the intercept item β_{0n} is the random variable ($\beta_{0n} \overset{iid}{\sim} (\beta_0, \sigma_\beta^2)$) with mean β_0 and variance σ_β^2, and that β_{0n} and ε_{nt} are independent random variables.

This paper uses the F-test, Lagrange multiplier and Hausman test to test the hypotheses of the ordinary least squares method and the fixed-effects model (H0: OLS, H1: FE), the ordinary least squares method and the random-effects model (H0: OLS, H1: RE), and the fixed-effects model and the random-effects model (H0: RE, H1: FE).

We construct four models to test the influence of corporate governance on the capital structure. Model 1 tests the relationship between cash flow rights-voting rights-seat control divergence and capital structure, taking into consideration the three divergence indicators, namely, the cash flow rights-voting rights divergence ratio, the cash flow rights-seat control divergence ratio and the voting rights-seat control divergence ratio. Model 2 examines the effects of ownership structure on the capital structure, taking into consideration not only the blockholders' shareholding ratio, the financial institutional stockholding ratio, and the managerial ownership ratio, but also including the share-pledge ratios of the directors. Model 3 investigates the effects of BODs' structure on capital structure; the model uses two variables, managerial director seats and independent director seats. Model 4 simultaneously incorporates the variables for cash flow rights-voting rights-seat control divergence, the ownership structure and the BODs' structure. All models include the two variables of the natural logarithm of total assets and the return on total assets to control for the potential effects of the firm's scale and profitability on capital structure.

4. Empirical Results and Analysis

4.1 Summary statistics and T-test results

Table 2 presents the descriptive statistics of the capital structure, corporate governance and control variables, and the results for the t-tests of the industry and firm size samples.

Overall, the mean debt ratio is 40.74%, and the mean cash flow rights-voting rights divergence ratio, the cash flow rights-seat control divergence ratio, and the voting rights-seat control divergence ratio are 84.82%, 31.95%, and 39.93%, respectively, indicating that the ranges of the cash flow rights-seat control and voting rights-seat control divergence ratios are higher. The mean blockholders' shareholding ratio, the financial institutional stockholding ratio, and the managerial ownership ratio are 15.36%, 1.775%, and 1.085%, respectively, while the mean directors' share-pledge ratio is 21.13% and the standard deviation is higher. The mean number of managerial director seats and independent director seats are 0.85 seats and 0.09 seats, respectively, while the maximum numbers are 9 seats and 4 seats.

The t-tests for the industry and firm size samples show that the debt ratio of the traditional industries or large firms is higher, while the return on the total assets of the technological industries or large firms is higher. The cash flow rights-voting rights-seat control divergence of the technological industries or large firms is higher (the lower the divergence ratio, the higher the divergence). The traditional industries or small firms have a higher blockholders' shareholding ratio, while the technological industries or large firms have a higher financial institutional stockholding ratio. In addition, the managerial ownership ratio of the traditional industries or large firms is lower, but the directors' share-pledge ratio is higher. The number of managerial director seats and independent director seats for the technological industries or large firms is higher.

(Insert Table 2 here)

4.2 Panel data regression results

Before proceeding with the panel data regression analysis, we use Pearson correlation test and the VIF value to test the correlation and the collinearity of the corporate governance variables and find that the three divergence indicators, i.e., the cash flow rights-voting rights divergence ratio, the cash flow rights-seat control divergence ratio and the voting rights-seat control divergence ratio, exhibit higher collinearity. In addition, in Section 4.1, from the descriptive statistics of the three divergence ratios we may find that the divergence for the cash flow rights-voting rights is lower, while the divergences for the cash flow rights-seat control and voting rights-seat control are relatively higher. Therefore, in the panel data regression model, we include only the cash flow rights-seat control divergence ratio and voting rights-seat control divergence ratio.

(1) Overall Sample

Table 3 reports the panel data analysis for the overall sample. A Hausman test suggests that a fixed-effects model is preferred to a random-effects model. As seen in Table 3, Model 1 shows that the cash flow rights-seat control divergence ratio is positively correlated with the debt ratio, indicating that the lower the divergence of the cash flow rights and the seat control (i.e., the higher the cash flow rights-seat control divergence ratio), the higher the firm's debt financing will be. That is to say, when the divergence between the controlling shareholder's cash flow rights and seat control is lower, the controlling shareholder can participate in the BOD and monitor the activities of management, thereby reducing the agency problem associated with the capital structure. This divergence is therefore positively correlated with the firm's financial leverage. This result is similar to the conclusions reached by Brailsford et al. (2002) and Fosberg (2004). The voting rights-seat control divergence ratio is negatively correlated with the firm's debt ratio, indicating that the higher the divergence between voting rights and seat control (i.e., the lower the voting rights-seat control divergence ratio), the higher the firm's debt financing will be, i.e., when the divergence between the controlling shareholder's voting rights and seat control is high (i.e., when voting rights are low and the number of directors' seats is high), the entrenchment behavior described by Harris and Raviv (1998) and Du and Dai (2005) may exist. The controlling shareholders will, based on entrenchment motives, control the number of directors' seats to influence the firm's preference for debt financing, in order to inflate the shareholder's personal voting rights so as to avoid the dilution of controlling rights.

Model 2 finds that the blockholders' shareholding ratios and financial institutional stockholding ratios are negatively correlated with the debt ratio. While this finding does not support the view of Brailsford et al. (2002) that blockholders actively perform a monitoring role, it does, however, support the views of Chaganti and Damanpour (1991) and Leland and Pyle (1977) that financial institutional shareholders prefer lower debt financing, while they perform the role of monitoring and certification, assisting the firm in obtaining financing from the financial market and lowering the debt financing of the firm. In addition, we also find that the directors' share-pledge ratio is positively correlated with the debt ratio, indicating that the personal financial leverage of the directors can induce the directors to tunnel corporate assets through debt financing.

Model 3 indicates that the number of independent director seats and the debt ratio are negatively correlated. This indicates that by hiring independent directors, the behavior of management can be monitored, thus decreasing the agency problems. Such directors prefer lowering the debt level of the firm to avoid bankruptcy risks from increased debts. This supports the findings of Brennan and McDermott (2004), Matolcsy et al. (2004) and Peasnell et al. (2006).

Model 4 shows that, as a whole, the determinants of a firm's debt ratios are the cash flow rights-seat control divergence ratio, the voting rights-seat control divergence ratio, the managerial ownership ratio, the directors' share-pledge ratio, and the number of independent director seats. Among these, the relationships between the debt ratios and the cash flow rights-seat control divergence ratio, the voting rights-seat control divergence ratio, the directors share pledge ratio and the number of independent director seats are consistent with the findings of Model 1, Model 2 and Model 3. The managerial ownership ratio and the debt ratio are significantly positively correlated. This result does not support the argument of Friend and Hasbrouck (1988) and Firth (1995) that managerial ownership is negatively correlated with the firm's debt level. Our results show that management can increase agency-related benefits through increasing debt financing, and therefore management prefers debt financing.

(Insert Table 3 here)

(2) Industry samples

Table 4 reports the panel data analysis for the industry samples. A Hausman test suggests that a random-effects model is preferred over a fixed-effects model for Model 2, and the rest of the models prefer the fixed-effects model. As seen from Panel A and B of Table 4, Model 1 shows that, the cash flow rights-seat control divergence ratios of both the traditional and technological industries are positively correlated with the firm's debt ratio, while the voting rights-seat control divergence ratio is negatively correlated with the firm's debt ratio. This result is consistent with the

empirical findings of overall sample, i.e., when the divergence between the cash flow rights and the seat control is low, the controlling shareholders can reduce the agency problem associated with the capital structure through the monitoring function of the board of directors, while when the divergence between voting rights and seat control is high, the controlling shareholders will influence the firm's preference for debt financing by controlling the number of seats of the directors, in order to secure their controlling rights.

Model 2 finds that the directors' share-pledge ratio and the debt ratio are positively correlated in the traditional industries, indicating that in the traditional industries the personal financial leverage of the directors may induce the directors to tunnel the firm's assets through debt financing. However, in the technological industries, we find that the financial institutional stockholding ratio is negatively correlated with the debt ratio, indicating that financial institution shareholders can perform the role of monitoring and debt certification, thus reinforcing the firm's ability to obtain financing from financial markets, and thereby lowering the firm's debts.

Model 3 shows that independent director seats in both the traditional industries and technological industries are negatively correlated with the debt ratio, indicating that independent directors can decrease the agency problems, thereby lowering debts to reduce the bankruptcy risks of the firms,

Model 4 shows that, as a whole, the determinants for the traditional industry firms are the cash flow rights-seat control divergence ratio, the managerial ownership ratio and the directors' share-pledge ratio. The determinants for the technological industry firms are the cash flow rights-seat control divergence ratio, the voting rights-seat control divergence ratio, the financial institutional stockholding ratio, the managerial ownership ratio, and the number of independent director seats. Among these, the managerial ownership ratio is positively correlated with the debt ratio, indicating that the management can gain agency-related benefits from increasing debt financing. For this reason, the management prefers debt financing.

(Insert Table 4 here)

(3) Firm size samples

Table 5 reports the panel data analysis of the firm size samples. A Hausman test suggests that a fixed-effects model is preferred over a random-effects model. As seen from Panel A and B of Table 5, Model 1 indicates that the cash flow rights-seat control divergence ratios for both large and small firms are positively correlated with the firms' debt ratios. In addition, the voting rights-seat control divergence ratio is negatively correlated with the firms' debt ratio. This is consistent with the findings of the industry samples.

Model 2 indicates that, for the large firms, the blockholders' shareholding ratio is negatively correlated with the firm's debt ratio, while the managerial ownership ratio and directors' share-pledge ratio are positively correlated with the debt ratio, indicating that blockholders in large firms prefer low debt financing and that they do not exhibit the behavior of expropriating minority shareholders, the management prefer high debt financing in order to gain agency benefits, and directors can use personal or company debt to tunnel the firm's assets. However, in small firms, we do not find any significant correlation between the debt ratio and the blockholders' shareholding ratio, the financial institutional stockholding ratio, or the directors' share-pledge ratio.

From Model 3 it is found that the debt ratio is negatively correlated with the number of independent director seats in large firms. In small firms we do not find any significant correlation between the debt ratio and managerial director seats or independent director seats. This result indicates that the function of independent directors of lowering debt in order to reduce bankruptcy risk is more evident in large firms.

Model 4 shows that, as a whole, the determinants for large firms are the managerial ownership ratio, the directors' share-pledge ratio, and the number of independent director seats. The determinants for small firms are the cash flow rights-seat control divergence ratio and the voting rights-seat control divergence ratio. Since in small firms the blockholders' shareholding ratio is higher, if the divergence of the cash flow rights-voting rights-seat control is high, the blockholders will tend to expropriate the minority shareholders.

(Insert Table 5 here)

Conclusions

Issues related to capital structure have for 50 years been widely discussed in financial studies. In addition to the main issue of the financial determinants in capital structures, due to the progress in the application of the capital structure, many scholars have discussed capital structure from the perspective of agency problems in corporate governance. Agency theory suggests that debt financing can decrease the cost of conflicts between shareholders and management. However, the incentive that management has to exhibit opportunistic behavior during the firm's financial decision-making process is influenced by the firm's ownership structure. Therefore, corporate governance factors influence capital structure decisions. Previous studies mostly focus on the discussion of traditional financial factors and neglect the influences of debt and agency problems in corporate governance on the capital structure decision.

The sample used in this study consists of 317 listed Taiwanese firms covering the period from 1998

to 2007. We examine the effects of corporate governance on capital structure after controlling for the heterogeneity of both industries and firm size. Our study incorporates cash flow rights-voting rights-seat control divergence, the ownership structure, and the board of directors' structure into various different models to investigate the relationship between corporate governance and capital structure.

We find that the debt ratios and the directors' share-pledge ratios of the traditional industries or large firms are higher, but that the managerial ownership ratios are lower. In the technological industries or large firms the return on total assets, the cash flow rights-voting rights-seat control divergence, the financial institutional stockholding ratio, the managerial director seats and the number of independent director seats are higher. As for the traditional industries or small firms, the blockholders' shareholding ratios are higher.

The panel data analysis indicates that, overall, the determinants for the debt ratio are the cash flow rights-seat control divergence ratio, the voting rights-seat control divergence ratio, the managerial ownership ratio, the director share pledge ratio and the number of independent director seats. When the divergence between the cash flow rights and seat control is lower or when the divergence between voting rights and seat control is higher, the controlling shareholders can either control the board of directors to better monitor the firm or may prefer to resort to debt financing based on entrenchment motives. We also find that blockholders prefer lower debt financing and that they do not expropriate minority shareholders. Financial institutional shareholders function through the monitoring and certification of the debts of technological firms and can decrease the firms' debts. The management in the technological firms prefer debt financing to obtain agency related benefits. The directors in the traditional industries or large firms might use personal or firm debt to tunnel the firm's assets. The function of the independent directors in the technological industry or large firms to decrease debts in order to reduce the firm's bankruptcy risks is more evident.

Future studies could construct a panel data simultaneous-equations model to further investigate the endogenous interaction between corporate governance and capital structure.

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Appendices

Table 1. Measurements of variables

Variables	Operational definition
Capital structure	Debt ratio (%) = (Total debt ÷Total assets) ×100%
Cash flow rights-voting rights-seat control divergence* indicator	Cash flow rights-voting rights divergence ratio(%) = (Cash flow rights% ÷ Share control rights%)×100%
	Cash flow rights-seat control divergence ratio(%) = (Cash flow rights% ÷ Seat control rights%)×100%
	Voting rights-seat control divergence ratio(%) = (Share control rights% ÷ Seat control rights%)×100%
Ownership structure	Blockholders' shareholding ratio (%) = (Total shares held by blockholders ÷ Total shares issued by the company) ×100%. The definition of blockholders is shareholders with over 10% of the shares.
	Financial institutional stockholding ratio (%) = [(Shares held by domestic financial institutions + Shares held by foreign financial institutions) ÷ Total shares issued by the company]×100%. Shares held by domestic financial institutions includes the shares held by the banks, insurance companies and trusts (including private funds and trust funds).
	Managerial ownership ratio (Shares held by managers in the firms or by managers from the groups) (%) = (Total amount of shares held by all managers at the end of the month ÷ Total amount of shares issued by the company by the end of the month)×100%. The definition of managers includes the CEO, vice president, departmental managers and assistant vice presidents.
	Directors' share-pledge ratio (%) = (The total of pledged shares held by all directors ÷The total of shares held by all directors)×100%。
Board of directors structure	Managerial director seats = The seats of executive directors from firms or corporate groups.
	Independent director seats = The seats of independent directors who do not have jobs in the firm and do not have family relationships with other directors in the firm, and directors with less than 1% of the shares.
Control variables	Return on total assets (%) = [(Recurring income + Dividend payout×(1- 25%)) ÷Total assets]×100%.
	Ln(Total assets)= Natural logarithm of the firm's total assets.

Earning distribution rights%, also called cash flow rights, is the controlling shareholder's direct gain distribution rights + Σ the product of shareholding ratios between each control links, not including shares held by organizations or foundations owned by the family. Share control rights%, also called voting rights, is the controlling shareholders' direct shares + controlling shareholders' indirect shares. This study adopts the method of La Porta et al. (1999), regarding the shares held at the end of the control link as indirect shares. Seat control rights%, Seats controlled by the controlling shareholder ÷The total number of director seats.

Table 2. Descriptive statistics and T-test results

A. Whole sample (3,170 observations)

Statistics	Debt ratio	Cash flow rights-voting rights divergence	Cash flow rights-seat control divergence	Voting rights-seat control divergence	Blockholders' shareholding ratio	Financial institutional stockholding ratio	Managerial ownership ratio	Directors' share-pledge ratio	Managerial director seats	Independent director seats	Total Assets (Millions)	Return on Total Assets
Average	40.74	84.82	31.95	38.93	15.36	1.77	1.08	21.13	0.85	0.09	20950	3.44
Std. Deviation	16.44	24.69	22.17	22.80	11.45	3.30	2.25	25.59	1.29	0.43	46316	1.90
Minimum	1.55	0	0	0.19	0	0	0	0	0	0	313	-60.40
Maximum	96.99	100	157.72	157.80	74.20	36.87	24.43	100	9	4	620941	43.22

B. Industry samples

B1 Technological industries (740 observations)

Statistics	Debt ratio	Cash flow rights-voting rights divergence	Cash flow rights-seat control divergence	Voting rights-seat control divergence	Blockholders' shareholding ratio	Financial institutional stockholding ratio	Managerial ownership ratio	Directors' share-pledge ratio	Managerial director seats	Independent director seats	Total Assets (Millions)	Return on Total Assets
Average	38.50	76.41	24.01	30.55	11.77	2.60	2.05	14.73	1.35	0.22	35402	5.31
Std. Deviation	14.39	26.89	18.44	18.07	8.06	3.72	2.90	19.49	1.39	0.68	70103	9.72
Minimum	5.39	1.29	0.51	0.86	0	0	0	0	0	0	642	-31.39
Maximum	86.70	100	113.65	113.84	43.69	36.87	24.43	95.69	8	4	620941	39.16

B2. Traditional industries (2,430 observations)

Statistics	Debt ratio	Cash flow rights-voting rights divergence	Cash flow rights-seat control divergence	Voting rights-seat control divergence	Blockholders' shareholding ratio	Financial institutional stockholding ratio	Managerial ownership ratio	Directors' share-pledge ratio	Managerial director seats	Independent director seats	Total Assets (Millions)	Return on Total Assets
Average	41.42	83.47	34.37	41.48	16.45	1.52	0.79	23.08	0.70	0.05	16549	2.87
Std. Deviation	16.97	23.74	22.65	23.48	12.09	3.12	1.92	26.88	1.21	0.30	34936	7.16
Minimum	1.55	0	0	0.19	0	0	0	0	0	0	417955	-60.40
Maximum	96.99	100	157.72	157.80	74.20	28.40	16.79	100	9	3	313	43.22

Table 2 continued

Technological & Traditional industries T-test	-4.64***	-6.41***	-12.65***	-13.38***	-12.17***	7.18***	11.16***	-9.27***	11.50***	6.78***	7.05***	6.31***
C. Firm size samples C1. Large firms (1,600 observations)												
Statistics	Debt ratio	Cash flow rights-voting rights divergence	Cash flow rights-seat control divergence	Voting rights-seat control divergence	Blockholders' shareholding ratio	Financial institutional stockholding ratio	Managerial ownership ratio	Directors' share-pledge ratio	Managerial director seats	Independent director seats	Total Assets (Millions)	Return on Total Assets
Average	40.85	76.99	26.77	35.16	14.37	2.23	0.94	22.08	0.99	0.11	37281	5.05
Std. Deviation	15.07	26.77	19.92	21.11	10.06	3.19	2.00	25.38	1.51	0.502	60893	7.58
Minimum	2.50	0	0	0.86	0	0	0	0	0	0	2018	-36.64
Maximum	92.68	100	127.62	127.65	66.52	28.40	17.41	100	9	4	620941	43.22
C2. Small firms (1,570 observations)												
Statistics	Debt ratio	Cash flow rights-voting rights divergence	Cash flow rights-seat control divergence	Voting rights-seat control divergence	Blockholders' shareholding ratio	Financial institutional stockholding ratio	Managerial ownership ratio	Directors' share-pledge ratio	Managerial director seats	Independent director seats	Total Assets (Millions)	Return on Total Assets
Average	40.63	86.73	37.24	42.77	16.37	1.31	1.22	20.16	0.71	0.07	4307	1.80
Std. Deviation	17.74	21.29	23.10	23.81	12.64	3.34	2.47	25.77	0.98	0.33	2171	7.89
Minimum	1.55	0.94	0.13	0.19	0	0	0	0	0	0	313	-60.40
Maximum	96.99	100	157.72	157.80	74.20	36.87	24.43	100	6	3	16999	28.57
Large & Small firm T-test	0.39	-11.34***	-13.66***	-9.52***	-4.90***	7.90***	-3.55***	2.11**	6.071***	2.90***	21.65***	11.82***

***: 1% significance level; **: 5% significance level.

Table 3. Results of full sample

Variables	Model 1	Model 2	Model 3	Model 4
Cash flow rights-seat control divergence ratio	0.1397*** (3.9587)			0.1592*** (4.2346)
Voting rights-seat control divergence ratio	-0.1267*** (-3.9805)			-0.1305*** (-3.8290)
Blockholders' shareholding ratio		-0.0307* (-1.6689)		-0.0301 (-1.5274)
Financial institutional stockholding ratio		-0.1168* (-1.7372)		-0.0997 (-1.4876)
Managerial ownership ratio		0.0485 (0.3378)		0.2730* (1.7067)
Directors' share-pledge ratio		0.0342*** (3.3426)		0.0340*** (3.3419)
Managerial director seats			0.0715 (0.2453)	-0.0663 (-0.2159)
Independent director seats			-2.03*** (-4.5807)	-1.8788*** (-4.2340)
ROA	-0.4006*** (-15.6454)	-0.3852*** (-15.0056)	-0.3934*** (-15.4141)	-0.3893*** (-15.2108)
Ln (Total assets)	2.2594*** (4.7160)	2.3315*** (4.7837)	2.7304*** (5.7065)	2.6052*** (5.2626)
F-test (p-value)	24.49 (0.0000)	29.33 (0.0000)	29.55 (0.0000)	29.42 (0.0000)
LM-test (p-value)	5985.75 (0.0000)	5613.04 (0.0000)	6137.26 (0.0000)	5496.46 (0.0000)
Hausman test (p-value)	74.32 (0.0000)	81.68 (0.0000)	63.06 (0.0000)	99.36 (0.0000)
Adj R^2	0.8420	0.7421	0.7424	0.7451

***: 1% significance level; **: 5% significance level; *: 10% significance level.

Table 4. Results for industry samples

Panel A. Traditional industries

Variables	Model 1	Model 2	Model 3	Model 4
Cash flow rights-seat control divergence	0.1271*** (3.1448)			0.1217** (2.3007)
Voting rights-seat control divergence	-0.1227*** (-3.3545)			-0.0492 (-1.0376)
Blockholders' shareholding ratio		-0.0247 (-1.3112)		0.0012 (0.0498)
Financial institutional stockholding ratio		-0.0532 (-0.6682)		-0.0014 (-0.0154)
Managerial ownership ratio		-0.2564 (-1.4319)		0.7698*** (3.1943)
Directors' share- pledge ratio		0.0334*** (3.0392)		-0.0479*** (-3.752)
Managerial director seats			0.1116 (0.3355)	-0.1103 (-0.2725)
Independent director seats			-1.2232* (-1.8144)	-0.4200 (-0.5308)
ROA	-0.4315*** (-13.5203)	-0.4064*** (-12.6571)	-0.4187*** (-13.1509)	1.6050*** (42.7277)
Ln (Total assets)	3.7834*** (5.7956)	3.2535*** (4.8665)	3.7714*** (5.7623)	1.2582*** (1.6109)
F-test (p-value)	35.15 (0.0000)	34.92 (0.0000)	35.00 (0.0000)	20.60 (0.0000)
LM-test (p-value)	4939.34 (0.0000)	4633.53 (0.0000)	4947.95 (0.0000)	218.35 (0.0000)
Hausman test (p-value)	69.38 (0.0000)	76.11 (0.0000)	67.43 (0.0000)	23.21 (0.0100)
Adj R^2	0.7757	0.7760	0.7749	0.6703

***: 1% significance level; **: 5% significance level; *: 10% significance level.

Panel B. Technological industries

Variables	Model 1	Model 2	Model 3	Model 4
Cash flow rights-seat control divergence	0.2090*** (2.8289)			0.2376*** (3.0685)
Voting rights-seat control divergence	-0.189*** (-2.7687)			-0.2032*** (-2.8035)
Blockholders' shareholding ratio		-0.0682 (-1.1907)		-0.0188 (-0.3139)
Financial institutional stockholding ratio		-0.2404* (-1.9489)		-0.2581** (-1.9786)
Managerial ownership ratio		0.3604 (1.6394)		0.6875** (2.4977)
Director s' share-pledge ratio		0.00357 (1.4296)		0.0148 (0.5648)
Managerial director seats			0.1497 (0.24448)	-0.8395 (-1.2375)
Independent director seats			-2.4021*** (-3.7454)	-2.1607*** (-3.3551)
ROA	-0.374*** (-8.1641)	-0.4105*** (-9.2124)	-0.3741*** (-8.2164)	-0.3733*** (-8.2264)
Ln (Total assets)	0.7061*** (0.8365)	1.1395* (1.8896)	1.8563** (2.4136)	1.9965*** (2.2383)
F-test (p-value)	14.48 (0.0000)	14.08 (0.0000)	14.68 (0.0000)	14.06 (0.0000)
LM-test (p-value)	761.38 (0.0000)	770.20 (0.0000)	787.82 (0.0000)	702.16 (0.0000)
Hausman test (p-value)	13.38 (0.0095)	9.11 (0.1678)	8.60 (0.0720)	16.88 (0.0771)
Adj R^2	0.5841	0.5831	0.5877	0.5946

***: 1% significance level; **: 5% significance level; *: 10% significance level.

Table 5. Results for firm size samples

Panel A. Large firms

Variables	Model 1	Model 2	Model 3	Model 4
Cash flow rights-seat control divergence	0.1013* (1.9283)			0.0757 (1.4392)
Voting rights-seat control divergence	-0.1024** (-2.2052)			-0.07608 (-1.6099)
Blockholders' shareholding ratio		-0.0567** (-2.0760)		-0.0425 (-1.4840)
Financial institutional stockholding ratio		-0.1261 (-1.3570)		-0.1082 (-1.1538)
Managerial ownership ratio		1.0904*** (3.8895)		1.0758*** (3.6909)
Directors' share- pledge ratio		0.0805*** (5.9415)		0.0795*** (5.8471)
Managerial director seats			0.0533 (0.1434)	-0.1157 (-0.3005)
Independent director seats			-2.2320**** (-4.4905)	-2.0003*** (-4.0642)
ROA	-0.5542*** (-16.4985)	-0.5506*** (-16.5495)	-0.5508*** (-16.4774)	-0.5434*** (-16.4015)
Ln (Total assets)	1.2343*** (2.0433)	2.2161*** (3.7169)	1.9681*** (3.3190)	2.4110*** (3.8510)
F-test (p-value)	27.70 (0.0000)	28.75 (0.0000)	28.09 (0.0000)	28.50 (0.0000)
LM-test (p-value)	2914.84 (0.0000)	2770.87 (0.0000)	2961 (0.0000)	2684.22 (0.0000)
Hausman test (p-value)	25.46 (0.0000)	27.90 (0.0000)	20.26 (0.0000)	34.02 (0.0001)
Adj R^2	0.7313	0.7412	0.7342	0.7440

***: 1% significance level; **: 5% significance level; *: 10% significance level.

Panel B. Small firms

Variables	Model 1	Model 2	Model 3	Model 4
Cash flow rights-seat control divergence	0.1410*** (2.9309)			0.1486*** (2.6885)
Voting rights-seat control divergence	-0.1305*** (-2.9810)			-0.1275** (-2.5557)
Blockholders' shareholding ratio		-0.0210 (-0.8461)		-0.0222 (-0.8116)
Financial institutional stockholding ratio		-0.0800 (-0.8357)		-0.0829 (-0.8625)
Managerial ownership ratio		-0.7130 (-1.0028)		0.0331 (0.1574)
Directors' share- pledge ratio		-0.0137 (-0.8962)		-0.0124 (-0.8089)
Managerial director seats			0.2267 (0.5040)	0.3949 (0.8078)
Independent director seats			-1.1775 (-1.3920)	-0.9715 (-1.1396)
ROA	-0.2494*** (-6.4565)	-0.2398*** (-6.1833)	-0.2361*** (-6.1545)	-0.2506*** (-6.4354)
Ln (Total assets)	3.2877*** (4.2903)	3.2982*** (4.0412)	3.4132*** (4.4429)	3.4694*** (4.2350)
F-test (p-value)	31.39 (0.0000)	30.79 (0.0000)	31.19 (0.0000)	30.24 (0.0000)
LM-test (p-value)	2996.95 (0.0000)	2800.57 (0.0000)	3024.82 (0.0000)	2612.59 (0.0000)
Hausman test (p-value)	50.92 (0.0000)	59.66 (0.0000)	48.64 (0.0000)	76.60 (0.0557)
Adj R^2	0.7560	0.7546	0.7548	0.7557

***: 1% significance level; **: 5% significance level; *: 10% significance level。