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Full Length Research Paper

Impact of compositions and characteristics of board of directors and earnings management on fraud

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This paper examines the effects of board of director characteristics and compositions, earnings management on fraud for Taiwan listed SES and OTC companies. The effects of Institutional director holding, the duality of board chair and CEO have not influence on fraud before the act of the independent directors and auditor, but Institutional director holding, the duality of board chair and CEO has negative influence on fraud afterward. The discretionary working capital accrual has not influence on fraud and the interaction of institutional director holding and the discretionary working capital accrual has negative influence on fraud before the act of the independent directors and auditor, but the discretionary working capital accrual has negative influence on fraud afterward. The interaction of independent director holdings and the discretionary accrual has positive influence on fraud after the act of the independent directors and auditor. It is ironical to promotion of the corporate government system in Taiwan that increasing independence director holdings would increase the influence of discretionary accrual on fraud.

Key words: Fraud, earnings management, board of director logit regression analysis, corporate governance.

INTRODUCTION

The corporate governance system in the United States is viewed as a model for the developing market in Taiwan. The accounting scandals at Enron, WorldCom and Nortel Networks mean that investors now lack confidence in the corporate governance system, and take a cautious approach to investment in the equity market. Furthermore, the exposure of fraudulent companies in Taiwan, such as Procomp Informatics, Summit Computer Technology and Infodisc Technology, reveals the lack of complaint procedures in many businesses. By separating ownership from operational management, corporate governance systems provide a set of mechanisms designed to supervise insider managers effectively, and to resolve problems with agencies (Shleifer and Vishny, 1997; Kumar and Sivaramakrishnan, 2008; Jackling and Johl, 2009). The main issue in corporate governanceis is the role of the board of directors in overseeing how management serves the long - term interests of shareowners and other stakeholders, as well as overseeing the duties of the inside and outside directors (Fama and Jensen, 1983).

Inside directors are not only managers, but also executors. They have rich insider information, and may collaborate with company administrators to work against the interests of shareowners (Fama, 1980; Williamson, 1983; Singh and Harianto, 1989). Outside directors include both those independent of the company (except for board service) and so-called “gray directors” with some non - board affiliation to the top management of the company (Beasley, 1998; Uzun et al., 2004). Companies can appoint comprehensive and specialized independent directors to improve management mechanisms for optimal supervision and fraud prevention (Beasley, 1996; Barnhart and Rosenstein, 1998; Seamer and Psaros, 2000; Sharma, 2004; Uzun et al., 2004; Doidge et al., 2007; Chhaochharia and Grinstein, 2009). However, gray

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directors are often found in family businesses, or are company clients, making fraud difficult to detect.

Earnings management, which refers to the manipulation of the profit and loss figures in financial statements, frequently occurs in the process of financial reporting (Schipper, 1989). Stakeholders monitor the managers and make decisions according to earnings performance, because they cannot directly observe how their company allocates resources (Sunder, 1997). To avoid bad company financial reports, managers may attribute poor performance to carelessness; adopt earnings management techniques to improve the appearance of the financial statement. Therefore, the manipulation of earnings has replaced objective financial reporting. Furthermore, fraudulent manipulation of earnings to provide the appearance that expected earnings have been achieved is increasing steadily (Defond and Jiambalvo, 1994; Sweeney, 1994; Dechow et al., 1996; Beneish, 1997; Martin et al., 2002; Doyle et al., 2007).

The study of corporate governance focuses not only on the influence of the composition and characteristics of boards of directors on earnings management, but also how they affect fraud events. Specifically, this investigation explores both the effect of the compositions and characteristics of boards of directors and of earnings management, on financial fraud in Taiwanese companies listed on the SEC and OTC. First, the influence of the compositions (inside director ratio, independent director ratio, gray director ratio, outside director ratio and institutional investor ratio) and characteristics (chairman as general manager, number of board meetings and board size) of boards of directors on fraud is examined. Second, the relationship between earnings management and fraud is investigated. Finally, the influence of the interactive relationship between compositions and characteristics of board of directors and earnings management on fraud events is examined. This paper is organized as follows. Section 2 presents the related literature. Next, section 3 describes the sample selection, the demographics of the sample and research design. Moreover, section 4 contains the empirical result of the study using a sample 178 firms that engaged in fraudulent financial reporting. Finally, section 5 discusses the results and presents conclusion.

LITERATURE REVIEW

Board of director characteristics and fraudulent financial reporting

Prior researches have analyzed the relationship between the Board of Directors and fraudulent financial reporting (Beasley, 1996; Beasley et al., 1999; Doyle et al., 2007; Bowen et al., 2008). Based on results from logit regression analysis, Beasley (1996) determined that non - fraudulent firms have boards with a significantly higher percentage of outside members than fraudulent firms; however, the presence of an auditing committee does not significantly affect the likelihood of financial statement fraud. Moreover, as outside director ownership in a firm and outside director tenure on a board increase, and as the number of outside directors in other firms held by outside director decreases, the likelihood of financial statement fraud decreases. In this study, Beasley (2000) demonstrated that the nature of corporate governance differs between fraudulent and non - fraudulent companies; non - fraudulent companies have a higher percentage of outside directors on their boards than fraudulent boards and generally have audit committees staffed by independent parties.

Agrawal et al., (1999) found little systemic evidence that firms suspected or charged with fraud have unusually high turnover rates among senior managers or directors in technology, health care and financial services industries. Univariate comparisons indicated that some evidence exists that firms committing fraud have higher managerial and director turnover rates. However multivariate tests for other firm attributes, such evidence dos not exist. These analytical findings suggest that the revelation of fraud does not generally increase net benefits for changing managers or a firm's leadership structure. Moreover, Cloninger and Waller (2000) investigated whether securities firms experience any significant beta shifts upon initial disclosure of alleged corporate fraud. Empirical tests identified evidence consistent with the theory that agents engage in illegal activity in an attempt to increase share price. Empirical results also provided additional insight into the question of why corporations engage in criminal activity. The goal of specify is to smooth earnings and make a company appear stable, which translates into a market beta, entice additional shareholders to purchase company stock. Seamer and Psaros (2000) obtained empirical evidence for the relationship between independent directors on a corporate board and the incidence of management-perpetrated fraud in Australian public companies during 1985 – 1998. Empirical results provided support non-fraudulent firms were had a significantly higher proportion of independent directors on their boards than fraudulent firms. The study by Seamer has two important implications. First, empirical evidence supports the appointment of mandatory levels of independent directors to the boards of Australian public companies. Second, evidence of a relationship between board composition and incidence of management fraud may prove useful to auditors when making risk assessment and planning the extent of audit tests for fraud. Moreover, Seamer (2004) also found that negative relationship existed between the proportion of independent directors and institutional investors and the likelihood of fraud, whereas a positive relationship existed between duality (chair of a board and the chief executive officer) and likelihood of fraud.

Dunn (2004) investigated the relationship between top

management team duality and the decision to release false financial information. Using a matched sample of 103 firms convicted of publishing fraudulent financial statements in 1992 - 1996, analytical results show that such illegal corporate behavior is most likely when power is concentrated in the hands of insiders. In such firms, insiders control top management and the board of directors by simultaneously occupying key managerial positions that have considerable power within the firm while sitting on a board (duality), and through their ownership interests in a firm. Uzun et al. (2004) analyzed how various characteristics of boards of directors and other governing groups impacted the occurrence of U.S. corporate fraud in 1978 - 2001. Analytical findings obtained by Uzun et al. verified a positive relationship between board structure and the likelihood of corporate fraud as the number of independent outside directors increased on a board; when the number increased on an auditing board and compensation committees, the likelihood of corporate fraud declined. On average, fraudulent companies had larger boards, a larger percentage of inside directors, and a higher percentage of grey directors, whereas non-fraudulent firms had a higher percentage of independent outside directors. Although the study controlled for CEO tenure, board member tenure was not analyzed as a model variable (Andres and Vallelado, 2008; Bhagat and Bolton, 2008).

Earnings management and fraudulent financial reporting

Previous studies investigated extreme instances of earnings management identified by the Securities and Exchange Commission (SEC) (Feroz et al. 1991; Beneish 1997; Bonner et al. 1998; Porta et al., 2006; Fich and Shivdasani, 2007), or listed potential earnings - management approaches based on personal experience and/or published accounts (Schilit 1993; Mulford and Comiskey 1996). These studies naturally focused on instances of earnings management that markedly biased audited financial statements and attracted the attention of the SEC or the public. Dechow et al. (1996) investigated companies subject to accounting enforcement actions by the U.S. SEC for alleged violations of Generally Accepted Accounting Principles (GAAPs). Dechow et al. demonstrated that firms manipulating earnings are more likely to have boards of directors dominated by management and more likely to have a CEO who simultaneously serves as board chairman than firms not manipulating earnings. Additionally, firms manipulating earnings are most likely to have a CEO who is also the firm founder, less likely to have an audit committee and less likely to have an outside blockholder than firms that do not manipulate earnings. Finally, Dechow et al. determined that firms manipulating earnings experience significant increases in capital costs when manipulations are made public.

Park and Shin (2004) found that only when outside directors have financial expertise are able to deter earnings manipulation in Canada. Increasing the proportion of outside directors per se does not deter earnings manipulation; what is needed is outside directors who have backgrounds in accounting or finance. Analytical findings obtained by Park and Shin agree with those of Agrawal and Chadha (2005). Aldhizer and Cashell (2006) demonstrated that 74% of all AAERs were involved in overstating revenue or, to a lesser extent, understating revenue.

METHODOLOGY

Sample data

This investigation adopted a sample of fraudulent listed companies on the SEC and OTC in Taiwan during the period January 1999 to December 2004. The fraudulent companies were identified by searching the Commercial Times and Taiwan-based Economic Daily News with key words to identify firms that had been convicted by the courts of fraudulent financial reporting. Relevant financial data were obtained from the prospectuses of Taiwanese listed companies on SEC and OTC, the TEJ database (Taiwan Economic Journal) and the "Market Observation Post System" of the Taiwan Stock Exchange Corporation (http://newmops.tse.com.tw/). The financial and insurance sectors were eliminated from this study in accordance with the stipulations of the special law of the Taiwanese security market. Therefore, 89 fraudulent companies were found. Furthermore, 89 non-fraudulent companies, as reported in the above specialized financial media and matched according to SIC codes in the same industry, were also selected. Thus, total of 178 samples were applied in this study. Table 1 lists the industrial distribution of the sample.

Demographic data

Dependent variable

This study employed the definitions of fraud provided by Karpoff and Lott (1993): (1) fraud against stakeholders in a company, such as suppliers, employees and clients, e.g., embezzlement and market manipulation; (2) fraud against the government, such as fictitious trade; (3) fraud in financing statement from misstating the company's financial condition, e.g., fraudulent financial reporting and prospectus, and (4) violating regulations relating to public companies and related compliance matters, e.g., bribery, insider trading, violating antitrust laws, environmental pollution, illegal payment, discrimination against employees, price fixing and fraudulent advertising.

Independent variable

(a) Board of director compositions

(i) Ratio of independent directors (Inddir): Inddir = the percentage of board members who are considered "independent" directors, that is, outside directors with no ties to the firm outside their role as director. Independent directors represent all outside directors except grey directors.

(ii) Ratio of outside directors (Outdir): Outdir = the percentage of board members who are non-employee directors.

Table 1. The distribution of fraudulent category.

Year / Category	1999	2000	2001	2002	2003	2004	Sample (%)
Insider trading	14	7	3	12	10	12	58(44.96)
Fraudulent financial reporting	1	1	1	1	4	0	8(6.20)
Fraudulent prospectus	1	0	0	0	0	1	2(1.55)
Manipulate markets	12	6	0	2	1	4	25(19.38)
Ficititious trades	2	0	0	0	1	1	4(3.10)
Embezzlement	11	7	3	6	2	3	32(24.81)
Total	41	21	7	21	18	21	129(100)

(iii) Ratio of inside directors (Indir): Indir = percentage of the board members who participate in the corporate operation.

(iv) *Ratio of gray directors (Graydir):* Graydir = percentage of the board members who are grey directors. Grey directors represent all outside directors who are related to management, consultants /supplier to the firm, outside attorneys who perform legal work for the firm, retired executives of the firm, or investment bankers because they are not viewed as being independent of management.

(v) *Ratio of Institutional investor (Instdir):* Instdir = percentage of the board members who represent Government agencies, domestic financial institutions, domestic trust funds, corporations, other juridical persons, foreign financial institutions, foreign juridical persons and foreign trust funds.

(b) Board of director characteristics

(i) *Chairman as CEO (Dceo):* Dceo = is dummy variable with a value of one if the chairman works as CEO concurrently and a value of zero otherwise.

(ii) Board size (B size): B size = the number of directors on the board.

(c) Earnings management

(i) *Discretionary Accruals (DA):* This paper uses a modified version of Jones' (1991) model, as developed by Dechow et al. (1995), to measure earnings management. To estimate discretionary accruals, we subtract the changes of accounts receivable and property, plant, and equipment from the changes of net sales. The estimation is based on the following:
Step 1. To estimate *non-discretionary accruals* (*NDA* $_t$)

$$TAC_t = \alpha_0 \frac{1}{TA_{t-1}} + \alpha_1 \frac{\Delta REV_t - \Delta AR_t}{TA_{t-1}} + \alpha_2 \frac{PPE_t}{TA_{t-1}} + \varepsilon_t$$

Where TAC_t denote the total accruals on period *t*; PPE_t denote the total plant, property and equipment on period *t*; TA_{t-1} denote the total accruals of the *i* th company on period *t-1*; ΔREV_t denote the changes of the operating revenue on period *t*; ΔAR_t denote the changes of the accounts receivable on period *t*.

$$N\hat{D}A_t = \hat{\alpha}_0 \frac{1}{TA_{t-1}} + \hat{\alpha}_1 \frac{\Delta REV_t - \Delta AR_t}{TA_{t-1}} + \hat{\alpha}_2 \frac{PPE_t}{TA_{t-1}}$$

$N\hat{D}A_t$ of each firm for each period can be calculated following we get the estimators of α_0, α_1 and α_2.
Step 2. To estimate discretionary accruals (*DA* $_t$)

$$DA_t = TAC_t - N\hat{D}A_t$$

Where TAC_t denotes the total accruals on period *t*; $N\hat{D}A_t$ denote the non-discretionary accruals of each firm.

(ii) Discretionary Working Capital Accruals (DWCA): Peasnell et al. (2000) employ the working capital accruals (WCA) version of the Jones model and the estimation is based on the following:
Step 1. To estimate working capital accruals (*WCA*$_t$)

$$\frac{WCA_t}{TA_{t-1}} = \alpha_0 \frac{1}{TA_{t-1}} + \alpha_1 \frac{\Delta REV_t}{TA_{t-1}} + \varepsilon_t$$

Where WCA_t denote the working capital accruals on period *t*; TA_{t-1} denote the total accruals on period *t-1*; ΔREV_t denote the changes of the operating revenue on period *t*.

Step 2. To estimate non - discretionary working capital accruals (*NDWCA*$_t$)
$NDWCA_t$ of each firm can be calculated following we get the estimators of $\hat{\alpha}_0$ and $\hat{\alpha}_1$ of each firm.

$$\frac{NDWCA_t}{TA_{t-1}} = \hat{\alpha}_0 \frac{1}{TA_{t-1}} + \hat{\alpha}_1 \frac{\Delta REV_t - \Delta AR_t}{TA_{t-1}}$$

Where ΔAR_t denote the changes of the accounts receivable on period *t*.

Step 3. To estimate *discretionary working capital accruals* ($DWCA_t$)

$$\frac{DWCA_t}{TA_{t-1}} = \frac{WCA_t}{TA_{t-1}} - \hat{\alpha}_0 \frac{1}{TA_{t-1}} - \hat{\alpha}_1 \frac{\Delta REV_t - \Delta AR_t}{TA_{t-1}}$$

Control variable

There are five control variables: firm size, industry category (*D*1~*D*18), financial performance, ratio of debt and group enterprise. This paper utilizes firm size as the proxy variable that

were calculated as the difference in the logarithms of book value of total asset (Sharma, 2004; Harris and Raviv, 2008). Furthermore, this study utilizes industry category of listed companies on the Taiwan Stock Exchange (Simpson, 1986) to examine whether specific industries exist illegal corporate behavior easily. The control variable, financial performance and ratio of debt (Peasnell et al., 2000) is used to investigate whether poor financial performance and high ratio of debt of corporate also exist illegal corporate behavior respectively.

Empirical model

This paper utilizes logit model to measure the effect of the board of director compositions, characteristics and earning management on the fraud. The variable, Y_i^* , is unobserved latent variable.

$$Y_t^* = X_i \beta + \varepsilon_i \tag{1}$$

Where X_i denote the vectors of explanatory variables. (1, X_{i2}, X_{i3},…, X_{ik}); $\beta=(\beta_1, \beta_2,\ldots, \beta_k)$; ε_i is random disturbance term of standard normal distribution, $E(\varepsilon_i, \varepsilon_i) = 0$, $\forall i \neq j$. Therefore, the relationship of Y_i and Y_i^* will be that if $Y_i^* > 0$, then $Y_i = 1$ and if $Y_i^* \leqq 0$, then $Y_i = 0$ and the average of Y_i will be

$$E(Y_i) = P_r(Y_i = 1) = P(Y_i^* > 0)$$
$$= P_r(\varepsilon_i > -X_i' \beta)$$
$$= \Phi(X_i' \beta)$$

When Φ is *S*-shaped like the logistic curve, we get the logistic model and have closed form function. Logistic model has the following form:

$$E(Y_i) = P_r(Y_i = 1) = \frac{1}{1+e^{-X_i' \beta}}$$
$$= \frac{e^{-X_i' \beta}}{1+e^{-X_i' \beta}} \tag{2}$$

$E(Y_i)=\pi_i$, marginal effect of a change in X_{ij}, on the probability of $Y_i = 1$ has the following form:

$$\frac{\partial \pi_i}{\partial X_{ij}} = \beta_j \pi_i (1-\pi_i)$$

Equation. (2) denote the cumulative distribution function.

$$F(X_i' \beta) = \frac{e^{-X_i' \beta}}{1+e^{-X_i' \beta}}$$

then probability distributions function of random variable.

$$f(X_i' \beta) = \frac{e^{X_i' \beta}}{\left(1+e^{-X_i' \beta}\right)^2} \tag{3}$$

Logistic regression applies maximum likelihood methods to estimate parameter β, and log likelihood function is as follows:

$$\ell = \ln = \sum [Y_i \ln \pi_i + (1-Y_i) \ln(1-\pi_i)] = \sum \left[Y_i (X_i' \beta) - \ln\left(1+e^{X_i \beta}\right)\right] \tag{4}$$

The partial derivatives of the Equation (4) with respect to β that is to get the first order necessary conditions and simultaneous equations on maximum likelihood estimator of β. Owing to β is nonlinear function it has to solve using numerical methods such as Newton-Raphson. Then we utilize the information matrix to solve the asymptotic covariance matrix, and the information matrix is as follows:

$$I(\beta) = E\left(-\frac{\partial^2 \ell}{\partial \beta \partial \beta'}\right) \tag{5}$$

The asymptotic distribution of log likelihood statistics is as follow and ℓ denotes the maximal log likelihood value of equation (4).

$$-2(\ell_0 - \ell) \sim \chi^2_{k-1} \tag{6}$$

EMPIRICAL RESULT

Basic statistics

Table 1 lists the distribution of fraudulent category, thus, in the study sample, most studies of the insider trading had the highest proportion of samples (44.96%), followed by embezzlement (24.81%), manipulate markets (19.38%), fraudulent financial reporting (6.20%), ficititious trades (3.10%) and fraudulent prospectus (1.55%). Furthermore, Table 1 lists the industrial distribution of fraudulent companies, and Electronics had the highest number of the study samples (33). Table 2 presents the results on the basic statistics of the study sample and its t-test (Mann - Whitney U test) statistics for assessing whether the difference in mean (median) between fraudulent company and no-fraudulent company is statistically significant. It reveals that there is insignificant difference on board of director compositions and characteristics between fraudulent and no-fraudulent company. However, regarding the earnings management, there is statistically significant difference between fraudulent and no - fraudulent company.

Correlation analysis

Independent variables and dependent variables

The correlation of fraud and Chairman as CEO (Dceo) that used point - biserial correlation to analysis; others used Pearson correlation. Table 3 presents the results of the correlation analysis and reveals that discretionary accruals (discretionary working capital accruals) is

Table 2. Basic statistics of fraudulent sample.

Variable	Category	Mean	Median	Max	Min	S. D.
Inddir	Fraud	0.022	0.000	0.333	0.000	0.074
	Non-Fraud	0.016	0.000	0.400	0.000	0.071
	All	0.019	0.000	0.400	0.000	0.072
Outdir	Fraud	0.610	0.667	1.000	0.000	0.272
	Non-Fraud	0.595	0.667	1.000	0.000	0.275
	All	0.603	0.667	1.000	0.000	0.273
Indir	Fraud	0.214	0.167	0.800	0.000	0.182
	Non-Fraud	0.231	0.200	1.000	0.000	0.195
	All	0.223	0.200	1.000	0.000	0.188
Graydir	Fraud	0.223	0.000	1.000	0.000	0.290
	Non-Fraud	0.247	0.200	1.000	0.000	0.263
	All	0.235	0.174	1.000	0.000	0.276
Instdir	Fraud	0.517	0.500	1.000	0.000	0.346
	Non-Fraud	0.494	0.444	1.000	0.000	0.338
	All	0.505	0.500	1.000	0.000	0.342
Bsize	Fraud	7.157	7.000	26.000	3.000	3.605
	Non-Fraud	7.348	7.000	20.000	3.000	3.181
	All	7.253	7.000	26.000	3.000	3.391
Dceo	Fraud	0.281	0.000	1.000	0.000	0.452
	Non-Fraud	0.371	0.000	1.000	0.000	0.486
	All	0.326	0.000	1.000	0.000	0.470
DA	Fraud	-528962[b]	-197389[c]	5442121	-12238310	2391610
	Non-Fraud	271418[b]	78387[c]	19123076	-5049685	2325178
	All	-128772	-2197	19123076	-12238310	2385949
DWCA	Fraud	628[a]	-66984[c]	16482168	-12832441	3269547
	Non-Fraud	1517486 [a]	533181[c]	20105894	-1516232	3386446
	All	759057	190411	20105894	-12832441	3405121

Notes: 1. *a* (*b*) denotes statistical significance at 1% (5%) level and is checked by *t*-test statistics for assessing whether the difference in mean between fraudulent company.
2. *c* (*d*) denotes statistical significance at 1% (5%) level and is checked by Mann-Whitney U test statistics for assessing whether the difference in median between fraudulent company.

significantly negative related at 5% significant level on fraud. However, there is no statistically significant difference among others.

Independent variables and independent variables

Outside director ratio is significantly negatively related to inside director ratio (gray director ratio), -0.554 (-0.815), at 5% significant level. Moreover, institutional investor ratio is significantly negatively related to inside director ratio (gray director ratio), -0.270 (-0.285), and board size is also significantly negatively related to inside director ratio. Finally, there is significantly positive relationship (-0.158) between Chairman as CEO and board size. Additionally, there is significantly positive relationship, 0.351, between outside director ratio and institutional investor ratio, then, board size is significantly positively related to outside director ratio (institutional investor ratio) at 5% significant level. Chairman as CEO is significantly positively related at the 5% level to inside director ratio and discretionary accruals is also obviously positively

Table 3. Correlation analysis.

Variable	*Fraud*	*Inddir*	*Outdir*	*Indir*	*Graydir*	*Instdir*	*Bsize*	*Dceo*	*DA*	*DWCA*
Fraud	1.000									
Inddir	0.059 (0.583)	1.000								
Outdir	0.028 (0.713)	0.163 (0.129)	1.000							
Indir	-0.043 (0.570)	-0.041 (0.707)	-0.554** (0.000)	1.000						
Graydir	-0.044 (0.558)	-0.113 (0.293)	-0.815** (0.000)	0.075 (0.320)	1.000					
Instdir	0.034 (0.655)	-0.191 (0.074)	0.351** (0.000)	-0.270** (0.000)	-0.285** (0.000)	1.000				
Bsize	-0.028 (0.708)	-0.094 (0.385)	0.199** (0.008)	-0.241** (0.001)	-0.091 (0.228)	0.151* (0.045)	1.000			
Dceo	-0.096 (0.203)	0.103 (0.337)	-0.079 (0.297)	0.236** (0.002)	0.026 (0.728)	0.030 (0.692)	-0.158* (0.035)	1.000		
DA	-0.168* (0.025)	-0.031 (0.772)	-0.116 (0.122)	0.128 (0.087)	0.095 (0.208)	-0.072 (0.338)	-0.122 (0.104)	0.087 (0.248)	1.000	
DWCA	-0.223** (0.003)	-0.022 (0.838)	-0.027 (0.724)	0.123 (0.102)	-0.055 (0.468)	0.030 (0.692)	-0.077 (0.307)	0.022 (0.767)	0.281** (0.000)	1.000

related at the 5% level to discretionary working capital accruals.

An analysis of *board of director compositions* and *characteristics* and *earnings management* on fraud: An analysis of *board of director compositions* and *characteristics* and *Discretionary Accruals* on fraud

This paper used the result of section 4.2 to avoid the collinearity found in the regression analysis, hence, constructing the following logistic regression that the system of independent directors and supervisors do not establish before 2002. After 2002, following the construction of the system of independent directors and supervisors (Inddir denotes independent directors ratio), this paper constructed the following logistic regression.

Model 1:

$$Fraud = \beta_0 + \beta_{Outdir} Outdir + \beta_{Dceo} Dceo + \beta_{DA} DA + \beta_{Outdir \times DA} Outdir \times DA + \beta_{Dceo \times DA} Dceo \times DA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 2:

$$Fraud = \beta_0 + \beta_{Indir} Indir + \beta_{Graydir} Graydir + \beta_{DA} DA + \beta_{Indir \times DA} Indir \times DA + \beta_{Graydir \times DA} Graydir \times DA + \beta_{Fsiz} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 3:

$$Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Bsize} Bsize + \beta_{DA} DA + \beta_{Graydir \times DA} Graydir \times DA + \beta_{Bsize \times DA} Bsize \times DA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 4:

$$Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Dceo} Dceo + \beta_{DA} DA + \beta_{Graydir \times DA} Graydir \times DA + \beta_{Dceo \times DA} Dceo \times DA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 5:

$$Fraud = \beta_0 + \beta_{Instdir} Instdir + \beta_{Dceo} Dceo + \beta_{DA} DA + \beta_{Instdir \times DA} Instdir \times DA + \beta_{Dceo \times DA} Dceo \times DA + \beta_{Fsize} Fsize + \beta_{TSE} TSE$$

$+\beta_{ROA} ROA +\beta_{Debt} Debt +\beta_{Bgroup} Bgroup+\varepsilon$;

Where Outdir denotes outside director ratio, Indir denotes insider director ratio, Graydir denotes gray director ratio, *Instdir* denotes institutional investor ratio, Bsize denotes board size, Instdir denotes institutional investor ratio, Dceo denotes Chairman as CEO that equals 1 when it corresponds with Chairman as CEO, and otherwise equals 0. *DA* denotes discretionary accruals; Fsize denotes firm size that was calculated as the difference in the logarithms of total asset. TSE denotes industry category, ROA denotes financial performance, Debt denotes ratio of debt and Bgroup denotes group enterprise. Table 4 reveals result of board of director compositions and characteristics and discretionary accruals on fraud that the system of independent directors and supervisors is not to be established (before 2002). The Likelihood Ratio of all model are statistically significant at the 5% level. Discretionary accruals and board of director compositions and characteristics are insignificantly related to fraud at 5% significant level. Only ratio of debt exist the significantly positive relation.

Moreover, following the system of independent directors and supervisors is to be established (after 2002), Table 5 reveals result of board of director compositions and characteristics and discretionary accruals on fraud. In model 1, Chairman as CEO is significantly negative related to fraud at 5% significant level and institutional investor ratio is significantly negative related to fraud at 5% significant level in model 5. The interaction of independent director's ratio and discretionary accruals that exists shows significantly positive relation in model 4 and 5.

In this study, the variables of independent directors' ratio and insider director ratio are not significant to fraud at 5% significant level although their coefficient exist expected signs. Then, the variables of outside director ratio, gray director ratio and board size all have negative sign but are not significant to fraud at 5% significant level. However the coefficient of discretionary accruals and the interactive effect (Outdir × DA, Indir × DA, Graydir × DA, Instdir × DA, Bsize × DA, Dceo × DA) are also not significant. Moreover, the control variable of firm size is significantly positive to fraud at 5% significant level and the variable of financial performance has significantly negative sign in model 2 and 3. The variable of ratio of debt shows significantly positive sign in model 1 and 4. Pre-construction of the system of independent directors and supervisors, institutional investor ratio is not statistically significant in relation to fraud. However institutional investor ratio is a significantly negative sign following the establishment of the system of directors and supervisors that are the same as result of Sharma (2004) and Kumar and Sivaramakrishnan (2008). Similarly, Chairman as CEO is insignificant in pre- establishment of the system of independent directors and supervisors and is significantly negative sign in post – period that are inconsistent with Dunn (2004) and Sharma (2004). The result indicated that when chairman works as CEO concurrently, the administration will work hard to reduce the fraudulent possibility as a result of the self responsibility and achievement motivation (Bhagat and Bolton, 2008). Furthermore, there is no significant reverse relation between independent directors ratio and fraud. Unfortunately, the results are discordant with Beasley (1998), Uzun et al. (2004) and Sharma (2004). This phenomenon may be attributed to independent directors not making full use of their functions. However outside director ratio is insignificant in relation to fraud around construction of the system of independent directors and supervisors that are inconsistent with Beasley (1996), Uzun et al. (2004). The outside director can not decrease the ability of supervisors that may be attributed to ownership structure of domestic enterprises always focus on family enterprises and devoted to the acquisition of parent company by cross holding. Moreover, inside director ratio and gray director ratio are also insignificant sign to fraud that the former are discordant with Joyce (1989), Dechow et al. (1996) and latter are discordant with Beasley (1998), Uzun et al. (2004). The former ascribed insignificant sign to most of inside directors participated in corporate operation. Then, the latter found that high gray director ratio can not affect fraud as a result of which there are business activities between gray directors and the administrator.

In addition, board size and discretionary accruals are also insignificant positive sign to fraud. Bigger board size will enhance the quality of decisions even though that is hard to make efficiently decisions that are discordant with Lipton and Lorsch (1992) and Jensen (1993). Then, the latter are inconsistent with Sweeney (1994) and Beneish (1997). In fact, earning represents the whole of business enterprise. The administrator applied elastic accounting principles to regulate earning that do not constitute an act of fraud (Fich and Shivdasani, 2007; Bowen et al., 2008).

Finally, marginally significant sign did not exist in the interactive variable about discretionary accruals (Outdir × DA, Indir × DA, Graydir × DA, Instdir × DA, Bsize × DA, *Dceo* × *DA*) during pre - and post - construction of the system of independent directors and supervisors. Hence, the interactive variable of independent director ratio and discretionary accruals whose coefficient did not change. A set that is not consistent with Beasley (1998), Uzun et al. (2004) and Sharma (2004). The interpretation of insufficiently independent directors that the supervisal ability of broad of director was assured by high independent director ratio.

An analysis of *board of director compositions* and *characteristics* and *discretionary working capital accruals* on fraud

Similarly, this paper constructed the following logistic

Table 4. Board of director and discretionary accruals on fraud (1999~2001).

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Outdir	-0.536 (0.925)				
Indir		1.265 (1.416)			
Graydir		-0.222 (0.902)	-0.227 (0.903)	-0.166 (0.889)	
Instdir					-0.256 (0.755)
Bsize			-0.091 (0.079)		
Dceo	-0.041 (0596)			-0.013 (0.591)	-0.049 (0.601)
DA	5.63E-07 (5.50E-07)	-4.65E-07 (3.41E-07)	1.71E-07 (5.63E-07)	-1.64E-07 (2.39E-07)	8.51E-07 (6.26E-07)
Outdir × DA	-9.35E-07 (7.50E-07)				
Indir × DA		1.93E-06 (1.68E-06)			
Graydir × DA		5.80E-07 (8.06E-07)	4.04E-07 (7.83E-07)	5.77E-07 (7.03E-07)	
Instdir × DA					-1.15E-06 (7.45E-07)
Bsize × DA			-4.00E-08 (5.07E-08)		
Dceo × DA	-3.65E-07 (6.80E-07)			-4.63E-07 (6.73E-07)	-5.80E-07 (7.37E-07)
Firm size	0.071 (0.307)	0.135 (0.313)	0.134 (0.313)	0.067 (0.306)	0.170 (0.315)
Industry category	0.030 (0.057)	0.019 (0.056)	0.016 (0.058)	0.030 0.056	0.016 (0.057)
Financial performance	-0.050 (0.043)	-0.067 (0.045)	-0.066 (0.044)	-0.052 (0.042)	-0.057 (0.043)
Ratio of debt	0.056** (0.018)	0.055** (0.019)	0.055** (0.019)	0.055** 0.018	0.057** (0.019)

Table 4. Contd.

Ratio of group Enterprise	0.648 (0.818)	0.658 (0.820)	0.566 (0.808)	0.547 (0.801)	0.410 (0.790)
Constant	-4.471 (4.525)	-5.917 (4.663)	-4.828 (4.545)	-4.532 (4.534)	-5.911 (4.699)
Likelihood ratio	90.872**	90.186**	91.717**	92.611**	90.270**

Model 1: $Fraud = \beta_0 + \beta_{Outdir}\, Outdi\, r + \beta_{Dceo}\, Dceo + \beta_{DA}\, DA + \beta_{Outdir \times DA}\, Outdir \times DA + \beta_{Dceo \times DA}\, Dceo \times DA + \beta_{Fsize}\, Fsize + \beta_{TSE}\, TSE + \beta_{ROA}\, ROA + \beta_{Debt}\, Debt + \beta_{Bgroup}\, Bgroup + \varepsilon$;

Model 2: $Fraud = \beta_0 + \beta_{Indir}\, Indir + \beta_{Graydir}\, Graydir + \beta_{DA}\, DA + \beta_{Indir \times DA}\, Indir \times DA + \beta_{Graydir \times DA}\, Graydir \times DA + \beta_{Fsize}\, Fsize + \beta_{TSE}\, TSE + \beta_{ROA}\, ROA + \beta_{Debt}\, Debt + \beta_{Bgroup}\, Bgroup + \varepsilon$;
Model 3: $Fraud = \beta_0 + \beta_{Graydir}\, Graydir + \beta_{Bsize}\, Bsize + \beta_{DA}\, DA + \beta_{Graydir \times DA}\, Graydi\, r \times DA + \beta_{Bsize \times DA}\, Bsize \times DA + \beta_{Fsize}\, Fsize + \beta_{TSE}\, TSE + \beta_{ROA}\, ROA + \beta_{Debt}\, Debt + \beta_{Bgroup}\, Bgroup + \varepsilon$;
Model 4: $Fraud = \beta_0 + \beta_{Graydir}\, Graydir + \beta_{Dceo}\, Dceo + \beta_{DA}\, DA + \beta_{Graydir \times DA}\, Graydir \times DA + \beta_{Dceo \times DA}\, Dceo \times DA + \beta_{Fsize}\, Fsize + \beta_{TSE}\, TSE + \beta_{ROA}\, ROA + \beta_{Debt}\, Debt + \beta_{Bgroup}\, Bgroup + \varepsilon$;
Model 5: $Fraud = \beta_0 + \beta_{Instdir}\, Instdir + \beta_{Dceo}\, Dceo + \beta_{DA}\, DA + \beta_{Instdir \times DA}\, Instdir \times DA + \beta_{Dceo \times DA} Dceo \times DA + \beta_{Fsize}\, Fsize + \beta_{TSE}\, TSE + \beta_{ROA}\, ROA + \beta_{Debt}\, Debt + \beta_{Bgroup}\, Bgroup + \varepsilon$.

Notes: 1. ** (*) denotes statistical significance at 1% (5%) level.
2. S. D. denotes standard deviation.

Table 5. Board of director and discretionary accruals on fraud (2002~2004).

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Inddir	6.383 (3.549)	5.581 (3.308)	5.076 (3.156)	6.138 (3.361)	6.572 (3.790)
Outdir	-0.663 (1.192)				
Indir		0.245 (1.547)			
Graydir		-0.006 (1.063)	-0.071 (1.071)	-0.002 (1.103)	
Instdir					-2.226* (1.072)
Bsize			-0.115 (0.106)		
Dceo	-1.196* (0.591)			-1.074 (0.551)	-1.061 (0.585)
DA	-2.20E-06 (1.14E-06)	2.23E-07 (3.95E-07)	5.14E-07 (7.41E-07)	-8.9E-07 (5.67E-07)	-1.60E-06 (8.45E-07)
Inddir× DA	6.36E-06 (3.57E-06)	4.16E-06 (2.81E-06)	4.11E-06 (2.77E-06)	6.97E-06* (3.51E-06)	9.93E-06* (4.57E-06)
Outdir × DA	2.17E-06 (1.62E-06)				

Table 5. Contd.

Indir × DA					
		-7.00E-07			
		(8.53E-07)			
Graydir × DA					
		4.81E-07	-4.00E-07	-1.50E-07	
		(1.04E-06)	(6.96E-07)	(6.97E-07)	
Instdir × DA					
					1.46E-06
					(1.08E-06)
Bsize × DA					
			-8.50E-08		
			(1.10E-07)		
Dceo × DA					
	1.09E-06			8.69E-07	8.76E-07
	(5.92E-07)			(5.53E-07)	(5.44E-07)
Firm size					
	0.649*	0.826**	0.829**	0.688*	0.926*
	(0.310)	(0.293)	(0.294)	(0.300)	(0.366)
Industry category					
	-0.008	-0.023	-0.008	-0.021	-0.029
	(0.066)	(0.063)	(0.066)	(0.067)	(0.066)
Financial performance					
	-0.050	-0.059*	-0.054*	-0.042	-0.044
	(0.027)	(0.025)	(0.023)	(0.024)	(0.026)
Ratio of debt					
	0.041*	0.024	0.027	0.039*	0.040*
	(0.020)	(0.017)	(0.018)	(0.019)	(0.020)
Ratio of group enterprise					
	0.418	0.021	0.086	0.201	0.386
	(0.787)	(0.727)	(0.729)	(0.743)	(0.776)
Constant					
	-11.522*	-13.964**	-13.463**	-12.180**	-14.942**
	(4.516)	(4.378)	(4.302)	(4.402)	(5.066)
Likelihood ratio					
	85.214**	94.321**	92.922**	88.524**	81.096**

Model 1: $Fraud = \beta_0+\beta_{Inddir}\,Inddir + \beta_{Outdir}\,Outdir+\beta_{Dceo}\,Dceo + \beta_{DA}D + \beta_{Inddir\ \times\ DA}Inddir \times DA+ \beta_{Outdir\ \times\ DA}Outdir \times DA + \beta_{Dceo\ \times DA}\,Dceo\times DA + \beta_{Fsize}\,Fsize + \beta_{TSE}\,TSE + \beta_{ROA}\,ROA + \beta_{Debt}\,Debt + \beta_{Bgroup}\,Bgroup +\varepsilon$;
Model 2: $Fraud = \beta_0 + \beta_{Inddir}Inddir +\beta_{Indir}Indir + \beta_{Graydir}Graydir + \beta_{DA}DA + \beta_{Inddir\ \times\ DA}Inddir \times DA + \beta_{Indir\ \times\ DA}Indir \times DA + \beta_{Graydir\ \times\ DA}\,Graydir\times DA+ \beta_{Fsize}\,Fsize + \beta_{TSE}\,TSE + \beta_{ROA}\,ROA +\beta_{Debt}\,Debt + \beta_{Bgroup}\,Bgroup +\varepsilon$;
Model 3: $Fraud = \beta_0 + \beta_{Inddir}\,Inddir + \beta_{Graydir}\,Graydir + \beta_{Bsize}\,Bsize + \beta_{DA}\,DA + \beta_{Inddir\ \times\ DA}\,Inddir \times DA+ \beta_{Graydir\ \times\ DA}\,Graydir \times DA +\beta_{Bsize\ \times\ DA}\,Bsize \times DA+\beta_{Fsize}\,Fsize + \beta_{TSE}\,TSE + \beta_{ROA}\,ROA + \beta_{Debt}\,Debt + \beta_{Bgroup}\,Bgroup + \varepsilon$;
Model 4: $Fraud = \beta_0 +\beta_{Inddir}\,Inddir+ \beta_{Graydir}\,Graydir + \beta_{Dceo}\,Dceo + \beta_{DA}\,DA+ \beta_{Inddir\times DA}\,Inddir \times DA + \beta_{Graydir\ \times\ DA}\,Graydir \times DA +\beta_{Dceo\ \times\ DA}\,Dceo \times DA +\beta_{Fsize}\,Fsize + \beta_{TSE}\,TSE + \beta_{ROA}\,ROA + \beta_{Debt}\,Debt + \beta_{Bgroup}\,Bgroup +\varepsilon$;
Model 4: $Fraud = \beta_0 + \beta_{Inddir}\ Inddir + \beta_{Instdir}\,Instdir +\beta_{Dceo}\,Dceo +\beta_{DA}\,DA + \beta_{Inddir\ \times\ DA}\,Inddir \times DA +\beta_{Instdir\ \times\ DA}\,Instdir \times DA + \beta_{Dceo\ \times\ DA}Dceo \times DA+ \beta_{Fsize}\,Fsize + \beta_{TSE}\,TSE + \beta_{ROA}\,ROA + \beta_{Debt}\,Debt +\beta_{Bgroup}\,Bgroup + \varepsilon$;

Notes: 1. ** (*) denotes statistical significance at 1% (5%) level.
2. S. D. denotes standard deviation.

regression to explore the influence of board of director compositions and characteristics and discretionary working capital accruals on fraud that the system of independent directors and supervisors do not establish before 2002. After 2002, following the construction of the system of independent directors and supervisors, this

paper constructed the following logistic regression.

Model 1:

$$Fraud = \beta_0 + \beta_{Outdir} Outdir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Outdir \times DWCA} Outdir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 2:

$$Fraud = \beta_0 + \beta_{Indir} Indir + \beta_{Graydir} Graydir + \beta_{DWCA} DWCA + \beta_{Indir \times DWCA} Indir \times DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Fsiz} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 3:

$$Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Bsize} Bsize + \beta_{DWCA} DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Bsize \times DWCA} Bsize \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

Model 4:

$$Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$$

Model 5:

$$Fraud = \beta_0 + \beta_{Instdir} Instdir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Instdir \times DWCA} Instdir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon;$$

The results of effect of board of director compositions and characteristics and discretionary working capital accruals on fraud are shown in Table 6 in pre- construction of the system of independent directors and supervisors. Then, the likelihood ratio statistic is also presented statistical significant that indicated these model possess explanatory ability. Unfortunately, the results could not serve as evidence that board of director compositions and characteristics and discretionary working capital accruals did not affect fraud even though the interactive effect of institutional investor ratio and discretionary working capital accruals exist significant negative sign in Model 5. Table 7 present effect of board of director compositions and characteristics and discretionary working capital accruals on fraud, following financial supervisory commission of executive, yuan formally implemented the system of independent directors and supervisors. First, Chairman as CEO shows statistically significant negative sign in all model and the results are inconsistent with Dunn (2004) and Sharma (2004) that could serve as evidence that the administration will work hard to reduce the fraudulent possibility as a result of the self responsibility and achievement motivation. Discretionary working capital accruals also shows significant negative sign in model 4 and 5 that are inconsistent with Healy (1985) and Teoh et al. (1998). In fact, the exceeding variation of profit and loss will result in negative evaluation of market participator; hence, the administrator usually utilized elastic accounting principles to regulate earning.

The variables of independent director ratio, outside director ratio and inside director ratio have positive sign but are not statistically significant sign. Similarly, the variables of gray director ratio, institutional investor ratio and board size have negative sign but are not statistically significant. Moreover, during pre - and post - construction of the system of independent directors and supervisors, there are not expected significant sign in the interactive tern about discretionary accruals (Inddir × DWCA, Outdir × DWCA, Indir × DWCA, Graydir × DWCA, Instdir × DWCA, Bsize × DWCA and Dceo × DWCA) although all control variables have their expected signs in all models and Sharma. Furthermore, pre-construction of the system of independent directors and supervisors, the interactive tern of discretionary accruals and institutional investor ratio exist negative sign on the fraud but this sign did not significant in post - construction of the system of independent directors and supervisors. The results indicate that the institutional director support the manager tend to communion of self -interests following conflict of interest between institutional investor and corporate although institutional director whose background with professional knowledge and skills. Hence, the professional institutional director can not reduce the possibility of fraud. The interactive variable of discretionary accruals and independent investor ratio also did not show expected negative sign that is inconsistent with Beasley (1998), Uzun et al. (2004).

Conclusion

The study explores whether board of director compositions and characteristics and earnings management have an effect on corporate financial fraud. The results from our analysis show that there is no significant difference on corporate financial fraud between pre - and post the system of independent directors and supervisors. The focus of the administration in Taiwanese companies is family enterprises that did not necessarily separate ownership from managerial authority although Government gradually perceived the importance of corporate governance. Government had to consider whether western supervisor system is suitable for Taiwan before thoroughly adopted western supervisor system. At present, the current system of supervisor system did not reflect Taiwanese economic system, market structure and culture characteristic that result in confusion of power,

Table 6. Board of director and discretionary working capital accruals on fraud (1999~2001).

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Outdir	-0.129 (0.965)				
Indir		0.759 (1.542)			
Graydir		-0.627 (0.965)	-0.358 (0.941)	-0.250 (0.906)	
Instdir					0.535 (0.814)
Bsize			-0.144 (0.099)		
Dceo	0.257 (0.698)			0.302 (0.697)	0.134 (0.760)
DWCA	9.39E-08 (1.80E-07)	-5.51E-07 (3.00E-07)	5.33E-07 (5.09E-07)	-2.34E-07 (2.03E-07)	3.67E-07 (2.42E-07)
Outdir ×DWCA	-6.22E-07 (4.44E-07)				
Indir ×DWCA		9.25E-07 (6.54E-07)			
Graydir ×DWCA		2.84E-07 (4.90E-07)	1.28E-07 (5.33E-07)	3.39E-07 (5.14E-07)	
Instdir ×DWCA					-1.01E-06* (5.12E-07)
Bsize ×DWCA			-1.28E-07 (7.71E-08)		
Dceo ×DWCA	-2.32E-07 (4.57E-07)			-3.49E-07 (4.54E-07)	-3.13E-07 (5.13E-07)
Firm size	0.295 (0.325)	0.290 (0.321)	0.319 (0.351)	0.272 (0.322)	0.378 (0.326)
Industry category	0.038 (0.057)	0.028 (0.058)	0.018 (0.059)	0.041 (0.057)	0.047 (0.059)
Financial performance	-0.051 (0.040)	-0.065 (0.042)	-0.055 (0.042)	-0.054 (0.039)	-0.061 (0.042)
Ratio of debt	0.046* (0.019)	0.049* (0.020)	0.044* (0.019)	0.045* (0.018)	0.039* (0.019)

Table 6. Contd.

Ratio of group enterprise					
	0.712	0.672	0.608	0.628	0.779
	(0.791)	(0.802)	(0.789)	(0.793)	(0.814)
Constant					
	-7.687	-7.703	-6.777	-7.308	-9.151
	(4.845)	(4.842)	(5.072)	(4.820)	(4.935)
Likelihood ratio					
	87.332**	87.553**	83.429**	89.744**	84.557**

Model 1: $Fraud = \beta_0 + \beta_{Outdir} Outdir + \beta_{Dceo} Dceo + \beta_{DA} DA + \beta_{Outdir \times WCDA} Outdir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + BFsize\, Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 2: $Fraud = \beta_0 + \beta_{Indir} Indir + \beta_{Graydir} Graydir + \beta_{DWCA} DWCA + \beta_{Indir \times DWCA} Indir \times DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + BFsize\, Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 3: $Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Bsize} Bsize + \beta_{DWCA} DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Bsize \times DWCA} Bsize \times DWCA + BFsize\, Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 4: $Fraud = \beta_0 + \beta_{Graydir} Graydir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 5: $Fraud = \beta_0 + \beta_{Instdir} Instdir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Instdir \times DWCA} Instdir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + BFsize\, Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;

Notes: 1. ** (*) denotes statistical significance at 1% (5%) level.
2. S. D. denotes standard deviation.

Table 7. Board of director and discretionary working capital accruals on fraud (2002~2004).

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Inddir	2.804	2.754	2.797	2.590	2.251
	(3.233)	(3.157)	(3.170)	(3.279)	(3.355)
Outdir	0.165				
	1.279				
Indir		0.637			
		(1.751)			
Graydir		-1.432	-1.487	-0.988	
		(1.220)	(1.259)	(1.285)	
Instdir					-2.006
					(1.170)
Bsize			-0.195		
			(0.111)		
Dceo	-1.774*			-1.691*	-1.760*
	(0.715)			(0.718)	(0.714)
DWCA	-5.30E-07	-3.60E-07	-6.20E-07	-6.80E-07**	-7.10E-07*
	(3.12E-07)	(1.86E-07)	(3.71E-07)	(2.42E-07)	(3.26E-07)
Inddir× DWCA	2.37E-06	3.28E-07	-2.70E-07	2.24E-06	1.99E-06
	(3.30E-06)	(3.10E-06)	(3.12E-06)	(3.30E-06)	(3.43E-06)

Table 7. Contd.

Outdir × DWCA					
	-1.40E-07				
	(3.24E-07)				
Indir × DWCA					
		-1.90E-07			
		(3.10E-07)			
Graydir × DWCA					
		1.05E-06	8.87E-07	5.30E-07	
		(5.96E-07)	(4.89E-07)	(4.77E-07)	
Instdir × DWCA					
					1.51E-07
					(3.28E-07)
Bsize × DWCA					
			2.00E-08		
			(4.19E-08)		
Dceo × DWCA					
	4.29E-07			4.19E-07	4.79E-07
	(2.77E-07)			(2.50E-07)	(2.74E-07)
Firm Size					
	1.172**	1.035**	1.242**	1.159**	1.416**
	(0.366)	(0.320)	(0.363)	(0.366)	(0.409)
Industry Category					
	0.006	-0.014	0.012	-0.002	-0.008
	(0.068)	(0.067)	(0.071)	(0.070)	(0.068)
Financial Performance					
	-0.071*	-0.057*	-0.063**	-0.070*	-0.076**
	(0.028)	(0.023)	(0.024)	(0.029)	(0.029)
Ratio of Debt					
	0.022	0.010	0.004	0.023	0.018
	(0.021)	(0.018)	(0.018)	(0.021)	(0.021)
Ratio of Group Enterprise					
	0.028	-0.371	-0.322	-0.060	0.194
	(0.775)	(0.737)	(0.741)	(0.770)	(0.762)
Constant					
	-18.463**	-15.892**	-17.545**	-17.813**	-21.003**
	(5.322)	(4.600)	(4.940)	(5.245)	(5.592)
Likelihood Ratio					
	83.989**	89.181**	86.290**	82.764**	80.957**

Model 1:
$Fraud = \beta_0 + \beta_{Inddir} Inddir + \beta_{Outdir} Outdir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Inddir \times DWCA} Inddir \times DWCA + \beta_{Outdir \times DWCA} Outdir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 2:
$Fraud = \beta_0 + \beta_{Inddir} Inddir + \beta_{Indir} Indir + \beta_{Graydir} Graydir + \beta_{DWCA} DWCA + \beta_{Inddir \times DWCA} Inddi\ r \times DWCA + \beta_{Indir \times DWCA} Indir \times DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model3:
$Fraud = \beta_0 + \beta_{Inddir} Inddir + \beta_{Graydir} Graydir + \beta_{Bsize} Bsize + \beta_{DWCA} DWCA + \beta_{Inddir \times DWCA} Inddir \times DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Bsize \times DWCA} Bsize \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 4:
$Fraud = \beta_0 + \beta_{Inddir} Inddir + \beta_{Graydir} Graydir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Inddir \times DWCA} Inddir \times DWCA + \beta_{Graydir \times DWCA} Graydir \times DWCA + \beta_{Dceo \times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;
Model 5:
$Fraud = \beta_0 + \beta_{Inddir} Inddir + \beta_{Instdir} Instdir + \beta_{Dceo} Dceo + \beta_{DWCA} DWCA + \beta_{Inddir \times DWCA} Inddir \times DWCA + \beta_{Instdir \times DWCA} Instdir \times DWCA + BDceo_{\times DWCA} Dceo \times DWCA + \beta_{Fsize} Fsize + \beta_{TSE} TSE + \beta_{ROA} ROA + \beta_{Debt} Debt + \beta_{Bgroup} Bgroup + \varepsilon$;

Notes: 1. ** (*) denotes statistical significance at 1% (5%) level.
2. S. D. denotes standard deviation.

hence, affect the effectiveness of corporate governance. The phenomena of cross holdings and fraud of top manager must be averted and the protection of the interests for small shareholders when adaptive corporate governance is to be act immediately. Moreover, level of information disclosure is the important parameter to diagnose the quality of corporate governance (Chemmanur et al., 2009). The opaque information of companies was always potential high risk group of financial fraud, hence, the level of information disclosure which served as an important foundation of investment evaluation for investors. Therefore, the investors can acquire the public information of practical operation from annual reports and "Market Observation Post System" that was established by Government. The mechanism of corporate governance in Taiwanese companies devotes to improvement of frame and operation in broad of directors such as increase of independent directors although it was difficult to get rid of vivid family characteristics and the influence of insider and gray directors in seconds. Hence, with Western trend, the performance of directors was evaluated by broad of directors to enhance the performance that can serve as example to Taiwanese companies.

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