

Empirical Analysis of Information Disclosure Transparency — Listed Electronics Companies in Taiwan as an Example

**Shoue-Yu Huang, Lecturer, Dept. of Business Administration,
Takming University of Science and Technology, Taipei, Taiwan
Dr. Yu-Cheng Hsiao, Professor, Dept. of Logistics Management,
Takming University of Science and Technology, Taipei, Taiwan**

ABSTRACT

The transparency of information disclosure in the context of corporate governance is the most important topical issue. This paper examines the influence of corporate performances, ownership structure and board composition on the transparency of information disclosure by using the 294 listed electronics in the Fifth Year Survey of Information Disclosure and Transparency Raking System of Listed Companies in Taiwan. The following conclusions are drawn based on the analysis of the data in 2008.

- 1. When the financial performance is better, the transparency of information disclosure is higher.*
- 2. When the ownership is more concentrated, the transparency of information disclosure is worse.*
- 3. There is no significant correlation between board size and information disclosure transparency.*
- 4. The results indicate that introducing independent directors and supervisors is a highly recommended mechanism to gain a better rating in the information disclosure assessment system and obtain trust from the public.*

Keywords: *Transparency of information disclosure, corporate governance, corporate performance, ownership concentration, board composition, regression analysis*

INTRODUCTION

There have been a series of major corporate frauds in the U.S., such as Enron, Worldcom and AHM. Lehman Brothers declared bankruptcy and CFC, the largest mortgage company in the US, also reported a financial crisis. In Taiwan, there also have been some major financial scandals and insider trading cases, such as Procomp Informatics Ltd., Rebar and Acer Communications & Multimedia Inc. These incidents highlight the importance of corporate governance in relation to the provision of untruthful public information that companies disclose to investors. Investors are paying more and more attention to the transparency of information disclosure.

Corporate governance can be divided into internal mechanisms and external mechanisms [Fremond and Capaul, 2002]. Internal mechanisms are the systems designed to manage and monitor businesses via internal self-governance. Examples are the operations of the board, the establishment and requirements of internal audits and control. External mechanisms are the systems designed to drive managers, via external pressures, to seek company benefits by setting aside their personal gains. Examples are the control over companies by government regulations and M&A activities in the market mechanism. There are two focuses in system designs (Chen, 2007). One is to ensure the legal compliance and reasonability of internal decision procedure, and this fall under the scope of the Company Act. The other is to assure full and accurate disclosure of company information. This falls under the governance of the Security Exchange Act and is achieved by the Information Disclosure and Transparency Raking System established by Securities & Futures Institute under the commission of Taiwan Stock Exchange and OTC.

This paper samples the listed electronics companies in the Fifth Year Survey of Information Disclosure and Transparency Raking System published by Securities & Futures Institute to example the correlation between financial performances, corporate governance, board composition and information transparency as part of internal mechanisms of corporate governance. The research purposes are as follows:

- 1) to explore the correlation between the relevant variables of financial performances and information disclosure transparency;
- 2) to explore the correlation between the relevant variables of ownership structure and information disclosure transparency;
- 3) to explore the correlation between the relevant variables of board composition and information disclosure transparency;
- 4) to illustrate the effects of information disclosure transparency on financial performances and corporate governance with empirical findings and to come up with relevant recommendations.

LITERATURE REVIEW

Literature Regarding Indicators of Corporate Performances

Kaufman (1988) suggested that performance indicators can validate and prove that the original targets and results have been achieved. Fortuin (1988) defined performance indicators as variables to measure the efficiency and effectiveness of a system as a whole or in part, in order to understand whether the operational processes can meet the determined goals. Good performance indicators should be clearly defined, easy to understand, quick to assess results, able to determine appropriate targets and set up challenging goals. They have to gain consistent agreement and consensus.

Chen & Dodd (1997) indicated that the frequently used accounting measures of corporate performances are returns on assets (ROA), returns on capital (ROC) and earnings per share (EPS). Niou (2001) referred to EPS, ROA, ROE and Tobin's Q as the variables for corporate performances.

Literature Regarding Ownership Structure

Morck, Shleifer & Vishny (1988) conducted an empirical study on the U.S. companies in order to investigate the influence of management holdings on enterprise values. The results showed that when the holdings by management are below 5%, the correlation with enterprise values is positive. When the holdings by management are between 5% and 25%, the correlation with enterprise values is negative. However, when the holdings by management are above 25%, the correlation is back to positive again. Pond (1988) examined the correlation between corporate performances and institutional investors and proposed three hypotheses, which are efficient monitoring, conflicts of interest and strategic reasonability. Any correlations may be possible.

McConnell & Servaes (1990) probed into the correlation between Tobin's Q and equity structures, and divided equity structures into three types, which are internal holdings driven, major shareholdings driven and institutional investments driven. They performed regression analyses, and found that there exists a curved correlation between Tobin's Q and the percentage of internal holdings and a positive correlation between Tobin's Q and the percentage of institutional shareholdings. When the percentage of major shareholdings is incorporated into the regression model on a stand-alone basis, there shows no significant correlation. However, when both the percentage of major shareholdings and internal shareholdings are incorporated into the regression model, they generate interactive effects and report significant correlation.

Mallete & Fowler (1992) examined the correlation between board composition, equity structure and corporate control mechanism. The research finding showed that independent and external directors cannot effectively exercise their control mechanism. The agency theory suggests that organizations should adopt dual leaderships, in order to enhance the independence of the board. When the percentage of internal directors' holdings increases, the company's intention to fight against acquisitions becomes weaker. There are interactive effects between the percentage of independent and external directors' ownerships and the leadership pattern of the board.

Agrawal & Knoeber (1996) investigated the use of the seven mechanisms dealing with agency problems between managers and shareholders. These seven mechanisms are the percentage of holdings by internal parties, institutional investors, external major shareholders, external directors, debt policies, job markets for managers and corporate control. The research results showed that a simple regression analysis on individual mechanisms and corporate performances

reveals that the percentage of holdings by internal parties, external directors, debt policies and corporate control are correlated to corporate performances. However, a multiple regression analysis on all the seven mechanisms indicates that the effects of the percentage of holdings by internal parties disappear.

Barnhart & Rosenstein (1998) adopted a simultaneous equation system to study the correlation between board composition, management holdings and corporate performances. The research variables included the percentage of external directors, the percentage of management holdings, the percentage of institutional shareholdings, R&D expenses, debt ratio and Tobin's Q. The results showed that there is a curved correlation between the percentage of external directors and corporate performances and a non-linear relationship between the percentage of management holdings and corporate performance. Board composition, percentage of management holdings and corporate performances as the three variables are jointly determined in a simultaneous equations system.

Denis & Sarin (1999) used a cross-section analysis and a time-series analysis to examine the correlation between equity structures and board compositions of individual companies. The results indicated that when the percentage of holdings by internal parties exceeds 20%, the company in question would reduce the percentage of holdings by directors. When the percentage of holdings by independent, external directors is low, the company would gradually increase this percentage. If the board size gets too big (with more than 17 members), the company makes appropriate adjustments. The changes in equity structures and board compositions are simultaneous.

Literature Regarding Board Compositions

Westphal (1999) investigated the interactions between managers and boards of directors, and found that in the addition to control and supervisory means, boards of directors can also participate in corporate control by providing recommendations. When managers and boards of directors work together, it helps to improve corporate performances.

Hermalin & Weisbach (2001) examined the correlation between board characteristics and corporate performances, and found that the smaller the board size and the greater number of external and independent directors, the better corporate performances are. When the founder or CEO has higher percentage of holdings, the corporate performance is worse. Hans & Theo & Elmer (2003) studied the correlation between board characteristics and corporate performances, and found that the size of the board is not correlated with corporate performances. However, the number of supervisors and corporate performances are negatively correlated.

RESEARCH DESIGN

Research hypothesis

Chen & Park (2002) found that the better returns of shares of a certain company, the better information disclosure becomes. Such a company receives recognition from investors over time and will be highly valued. Naser (2002) also indicated that high marginal profits would tempt the management information to provide more information. The increased disclosure is to testify that managers have the capability to maximize the shareholders' value, so that they can increase their own compensations and secure their own positions. Therefore, this paper proposes H-1 that there is a positive correlation between financial performances and the level of information disclosure transparency.

H1: When the financial performance is better, the transparency of information disclosure is higher.

Wang (2005) mentioned that when directors and supervisors have higher percentage of holdings, the board is more likely to disclose the information beneficial to them, adopt the policies favorable to them, and hide the information disadvantageous to them. As a result, there is a negative impact on the quality of financial information disclosure. Many studies have found that when major shareholders have higher holding, it is more likely that they can manipulate the transparency of information disclosure at the expense of the right of retail shareholders. Weisbach (1988) and Hudson (1992) both argued that when equity is concentrated with holdings by the management, the interests of managers and shareholders would be aligned, and agency cost would be reduced. While the corporate performances are improving, they become more willing to disclose the information and make information disclosure even more transparent. Therefore, this paper proposes the hypotheses as follow.

H2-1: The percentage of holdings by directors and supervisors and information disclosure transparency are negatively correlated.

H2-2: The percentage of holdings by major shareholders and information disclosure transparency are negatively correlated.

H2-3: The percentage of holdings by managers and information disclosure transparency are negatively correlated.

Chen (2005) found that when the board size is larger and the board members have more diversified backgrounds, the demand for information disclosure is higher due to their varying needs for information. As a result, the transparency of information improves. According to the Securities Exchange Act, publicly issued companies can establish independent directors in accordance with their articles of incorporation. Independent directors should provide professional and objective opinions in different domains and assist the board to make the decisions most beneficial to companies. Huafang & Jianguo (2007) found that there is a significantly positive correlation between the percentage of independent directors on the board and the level of information disclosure. Independent directors help to enhance corporate information disclosure. Therefore, this paper proposes the hypotheses as follow:

H3-1: The board size as a variable of board compositions and information disclosure transparency are positively correlated.

H3-2: The percentage of independent directors and supervisors as a variable of board compositions and information disclosure transparency are positively correlated.

Research variables

This paper applies the method proposed by Niou (2001), Hans & Theo & Elmer (2003) in the definition of the variables to measure corporate performances, ownership concentrations and board compositions. The definitions and measurements are explained as follows. The research variables are benchmarked based on the data of 2007. The relevant variables are sampled from Taiwan Economic Journal.

(1) Transparency of information disclosure (TID): The results are classified as 0 for C and C-, 1 for B and 2 for A+ and A.

(2) Corporate performance measurements

- a. Earnings per share (EPS) =
$$\frac{\text{After-tax net profits of the period} - \text{preferred share dividends}}{\text{Weighted average of No. of ordinary shares outstanding}}$$
- b. Returns on assets (ROA) =
$$\frac{\text{After-tax net profits of the period} + \text{interest expenses} \times (1 - \text{tax rate})}{(\text{total assets of the period} + \text{total assets of the previous period}) / 2}$$
- c. Returns on equity (ROE) =

$$\frac{\text{After-tax net profits of the period}}{(\text{Shareholders' equity during the period} + \text{shareholders' equity of the previous period}) / 2}$$

(3) Equity ownership concentration

- a. Percentage of equity ownership by members of the board (PEB): The percentage of the holdings by members of the board when elected in terms of all the number of common shares outstanding.
- b. Percentage of equity ownership by major shareholders (PES): The percentage of the holdings by major shareholders at the end of the period in terms of all the number of common shares outstanding.
- c. Percentage of equity ownership by managers (PEM): The percentage of the holdings by managers at the end of the period in terms of all the number of common shares outstanding.

(4) Board composition variables

- a. Board size (number of members of the board, NB): The average number of the members (directors and supervisors) sitting on the board each year.
- b. Percentage of independent directors and supervisors on the board (PIB): the average number of the independent directors and supervisors divided by the total number of the members on the board.

Regression analysis

The regression analysis examines the linear relationship of a single analytical response variable to multiple analytical explanatory variables. The result is a linear equation.

$$y_n = \beta_0 + \beta_1 X_{n1} + \beta_2 X_{n2} + \dots + \beta_k X_{nk} + e_n \quad e_n \sim N(0, \sigma^2)$$

y_n : the observation value on the response variable of the n-th case

β_k : regression coefficient of the k-th explanatory variable.

X_{nk} : the value of the k-th explanatory variable of the n-th case

e_n : corresponding errors, mutually independent and in compliance of a normal distribution with an expectation value of 0 and variance of σ^2

$$n = 1, 2, \dots, N \quad k = 1, 2, \dots, k$$

The basic assumption of a regression analysis assumes that the error items have to be normal, constant and independent. Therefore, there are two components in a regression model. One is a regression equation and the other is error assumptions. If the error assumptions are not supported, the regression model is not applicable. Meanwhile, the regression model has to pass an ANOVA test in order to claim its applicability. The practice is to ensure the equation is correct with an ANOVA test and confirm the error items are in compliance with $N(0, \sigma^2)$ with an error analysis (Jou, 2002).

The tests on a regression equation can be divided into three steps. Step 1 is an ANOVA test, which aims to examine whether all the slope coefficients in the regression model are all 0. The tests are conducted with F statistics or P values. Step 2 is a marginal test, which means to explore the explanatory power of individual explanatory variables. The tests are conducted with t statistics or P values. Step 3 is a model fit test, which serves to explore the levels of closeness between the predicted values and observed values. The tests are conducted with adjusted \bar{R}^2 . The cross-section data are mostly random samples. The relationship between variables is weak. Therefore, as long as adjusted \bar{R}^2 is larger than 0.18, the model is considered fit.

Residual analysis can be divided into three aspects as follows:

- 1) Normality test: to examine whether e_n is a normal distribution. The test is conducted with W stats or p value.
- 2) Consistency test: to examine whether the variance of e_n is a constant σ^2 . The test is conducted with the graphic method or variance regression method.
- 3) Independence test: to examine whether different e_n are independent of each other. In other words, cases before and after do not influence each other. When the data source is cross-section data, it means samples are acquired via random sampling. At this point, the independence of the samples is implied, and therefore, the independence hypothesis is supported.

Research subjects and data selection

This paper samples the 294 listed electronics companies in the Fifth Year Survey of Information Disclosure and Transparency Rating System published by Securities & Futures Institute in June 2008. The system was established by Securities & Futures Institute under the commission from Taiwan Stock Exchange and OTC. The rankings are as follows. The B grades account for the largest group (60.88%).

Table 1: Rankings of the assessed listed electronic companies

Ranking	No. of companies	Total	Percentage (%)
A+	2	294	0.68
A	68		23.13
B	179		60.88
C	40		13.61
C-	5		1.70

EMPIRICAL RESULTS AND ANALYSIS

This paper conducts the descriptive statistical analysis of individual variables before exploring the influence and correlation between individual variables and corresponding variables. It then establishes a multiple regression model and analyzes the explanatory power of independent variables as a whole before examining the influence of ownership concentrations and board compositions on corporate performances.

Descriptive Statistics of Variables

This section first explains the presentation of the distributions of individual variables and basic statistics, such as the minimum values, maximum values, means and standard deviations of individual variables. The results are listed in Table 2. As seen, the range of transparency of information disclosure (TID) is between 0 and 2, with an average of 1.0850. It indicates that information disclosure is a shared acknowledgement. Due to the economic downturn, the standard deviations of corporate performance variables, such as earnings per share (EPS), returns on assets (ROA) and returns on equity (ROE), are rather large. Individual companies report varying results. Fortunately, the average numbers are not bad. The percentage of equity ownership by members of the board (PEB) ranges between 3.91% and 71.23%, with an average of 19.56% and large standard deviations. These figures indicate that not all of the members on the board are significant shareholders. The highest value of the percentage of equity ownership by major shareholders (PES) is 58.56% and the average is only 16.28%, indicating a rather diversified equity ownership in the electronics industry. The average of the percentage of equity ownership by managers (PEM) is as low as 1%, indicating a relative small portion of ownership by managers. The number of the members of the board (NB) ranges from 5 to 18. It is consistent with that of Denis & Sarin (1999), who suggested when the members of the board are over 17, the board size is too big. It shows that the average board size of the electronics industry is within a reasonable range. The percentage of independent directors and supervisors (PIC) ranges from 0% to 5%, indicating that some companies still have not established independent directors. The average percentage is very low for those companies that do have independent directors. There is room for improvement.

Table 2: Descriptive statistics of variables

	No. of observations	Minimum	Maximum	Mean	Standard Deviations
TID	294	.00	2.00	1.0850	.62067
EPS	294	-5.44	50.48	3.1168	4.73173
ROA	294	-.55	.44	.0773	.10581
ROE	294	-.68	.52	.1094	.16140
PEB	294	3.91	71.23	19.5615	12.21707
PES	294	.00	58.56	16.2838	10.32789
PEM	294	.00	18.97	1.0055	1.64551
NB	294	5.00	18.00	8.1973	1.88270
PIB	294	.00	5.00	1.5680	1.51684
Effective N	294				

Spearman Correlation Analysis

Based on past studies, this paper conducts Pearson tests to examine the correlation between transparency of information disclosure with the variables in corporate finances (EPS, ROA and ROE), ownership concentrations (percentages of holdings by directors/supervisors, major shareholders and managers) and board compositions (board size and percentage of independent directors and supervisors), in order to avoid collinearity and negative impacts on the reliability of empirical results. The list of variables for the regression models are established accordingly. Table 3 includes product-moment correlation coefficients and significance tests. As seen, there is a significant and positive correlation between corporate performances (EPS, ROA and ROE) and transparency in information disclosure. The correlation between variables is examined to ensure that there is no multi-collinearity.

Table 3: Correlation analysis of information disclosure transparency, corporate performances, ownership concentrations and board compositions

	TID	EPS	ROA	ROE	PEB	PES	PEM	NB	PIB
TID	1								
EPS	.218(**)	1							
ROA	.230(**)	.701(**)	1						
ROE	.247(**)	.684(**)	.954(**)	1					
PEB	.070	.014	.042	.051	1				
PES	.033	.032	.110	.109	-.181(**)	1			

PEM	.036	.036	.089	.112	-.058	-.064	1		
NB	.003	-.035	-.014	-.009	.125(*)	-.167(**)	-.067	1	
PIB	.083	.156(**)	.221(**)	.241(**)	.160(**)	.012	.029	.319(**)	1
* indicates the 0.05 significance level (two tails).									
** indicates the 0.01 significance level (two tails).									

Empirical study of financial performances and transparency in information disclosure

A simple regression analysis is conducted to investigate the correlation between financial performances and information disclosure transparency, and validate whether the hypotheses are supported.

H1: When the financial performance is better, the transparency in information disclosure is higher.

According to the results of simple regression analysis, as shown in Table 4, the regressions model for EPS, ROA and ROE show that F statistics are 14.504, 16.331, and 18.948, with a P value of 0.000 for all and smaller than $\alpha=0.05$. Therefore, the alternative hypothesis is accepted ($H_1: \beta_k \neq 0$) and the model is significant. Further study is recommended. The test statistics for the marginal test comes from t statistics, which are 3.808, 4.041 and 4.353, respectively, for EPS, ROA and ROE regression models. This shows that there is a positive correlation between financial performances and transparency of information disclosure (0.029, 1.35, 0.949), with a significance level of 0.01. The empirical study supports the research hypothesis that when the financial performance is better, the transparency in information disclosure is higher.

Table 4: Regression analysis of information disclosure transparency and corporate performances

Independent variables		Earnings per share (EPS)	Returns on assets (ROA)	Returns on equity (ROE)
Dependent variables				
(Constant)		0.996 (23.492**)	0.981 (22.425**)	0.981 (23.099**)
Transparency of information disclosure (TID)	coefficient (t)	0.029 (3.808**)	1.35 (4.041**)	0.949 (4.353**)
F-value		14.504** (0.000)	16.331** (0.000)	18.948** (0.000)
R ²		0.047	0.053	0.061
Adj-R ²		0.044	0.050	0.058
* indicates the 0.05 significance level.				
** indicates the 0.01 significance level.				

Empirical study of the ownership structure and transparency in information disclosure

A simple regression analysis is conducted to investigate the correlation between ownership structures and information disclosure transparency, and validate whether the hypotheses are supported.

H2-1: The percentage of holdings by directors and supervisors and information disclosure transparency are negatively correlated.

H2-2: The percentage of holdings by major shareholders and information disclosure transparency are negatively correlated.

H2-3: The percentage of holdings by managers and information disclosure transparency are negatively correlated.

According to the results of simple regression analysis, as shown in Table 5, the regression model for the percentage of the holdings by directors and supervisors, the percentage of holdings by major shareholders and the percentage of holdings by managers shows that F statistics are 163.231, 5.764 and 5.276, respectively, smaller than $\alpha=0.05$. Therefore, the alternative hypothesis is accepted ($H_1: \beta_k \neq 0$) and the model is significant. Further study is recommended. The test statistics for the marginal test comes from t statistics, which are -12.776, -2.401 and 2.297 for the percentage of holdings by directors and supervisors, the percentage of holdings by major shareholders and the percentage of holdings by managers. This shows that there is a negative correlation between the percentage of holdings by directors and supervisors and major shareholders and transparency of information disclosure (-0.0066), with a significance level of -0.0051. The result also shows that there is a positive correlation between the percentage of holdings by managers and transparency of information disclosure (0.0091), with a significance level of 0.05. The

empirical study supports the research hypothesis that the higher the percentage of holdings by directors, supervisors and major shareholders, the worst transparency in information disclosure becomes. Meanwhile, when the managers have higher percentage of holdings, the transparency in information disclosure is better.

Table 5: Regression analysis of information disclosure transparency and ownership concentration levels

Dependent variables		Independent variables		
		Percentage of equity ownership by members of the board (PEB)	Percentage of equity ownership by major shareholders (PES)	Percentage of equity ownership by managers (PEM)
(Constant)		0.799 (56.52**)	0.646 (69.482**)	0.555 (15.107**)
Transparency of information disclosure (TID)	Coefficient (t)	-0.0066 (-12.776**)	-0.0051 (-2.401**)	0.0091 (2.297*)
F-value		163.231** (0.000)	5.764* (0.017)	5.276* (0.023)
R ²		0.466	0.030	0.027
Adj-R ²		0.463	0.025	0.022
* indicates the 0.05 significance level. ** indicates the 0.01 significance level.				

Empirical study of the board compositions and transparency in information disclosure

A multiple regression analysis is conducted to investigate the correlation between board compositions and corporate performances, and validate whether the hypotheses are supported.

H3-1: The board size as a variable of board compositions and information disclosure transparency are positively correlated.

H3-2: The percentage of independent directors and supervisors as a variable of board compositions and information disclosure transparency are positively correlated.

According to the results of simple regression analysis, as shown in Table 6, there is a positive correlation between the board size and transparency of information disclosure; however, such correlation is not significant. The empirical result does not support the research hypothesis. In other words, when the board size increases, its influence on the transparency of information disclosure is not obvious. This may be because the average size of the boards in Taiwan is relatively small and there is little variance between companies. As a result, this variable does not exhibit significant influence in the empirical study. The regression model for the percentage of the independent directors and supervisors shows that F statistics are 3.244, smaller than $\alpha=0.05$. Therefore, the alternative hypothesis is accepted ($H_1: \beta_k \neq 0$) and the model is significant. Further study is recommended. The test statistics for the marginal test comes from t statistics, which are 2.440. This shows that there is a positive correlation between the percentage of independent directors and transparency of information disclosure (0.684), with a significance level of 0.01. The empirical study supports the research hypothesis that when the percentage of independent directors, the transparency in information disclosure is better.

Table 6: Regression analysis of information disclosure transparency and ownership concentration levels

Dependent variables		Independent variables	
		Size of the board (NB)	Percentage of independent directors and supervisors (PIB)
(Constant)		1.077 (6.635)	0.237 (0.044)
Transparency of information disclosure (TID)	Coefficient (t)	0.001 (0.053)	0.684 (2.440**)
F-value		0.003 (0.958)	3.244* (0.013)
R ²		0.000	0.066
Adj-R ²		0.000	0.046
* indicates the 0.05 significance level. ** indicates the 0.01 significance level.			

CONCLUSIONS AND SUGGESTIONS

Conclusions

The purpose of corporate governance is to establish an internal mechanism and an external mechanism to drive the management team to protect shareholders' rights and interests, as well as upholding the legal rights of other stakeholders as laws stipulate. Thus, corporate governance is a widely discussed issue, which has been promoted by the government and actively practiced by the private sector. However, there are only high-level policies and guidelines regarding corporate governance and the relevant laws and regulations are yet to be implemented. Therefore, there is still a large room for discussion. This paper samples the 294 listed electronics companies in the Fifth Year Survey of Information Disclosure and Transparency Ranking System published by Securities & Futures Institute, and analyzes the 2008 data to explore the influence of corporate performances, ownership structures and board compositions on information disclosure transparency. The findings are as follows:

1. When the financial performance is better, the transparency information disclosure is higher. This research finds that when financial performance is good, the management would prove their ability in further enhancing the performance by disclosing more information to gain trust from the public. This is a good way to improve ranking in the Information Disclosure Ranking System.
2. When the ownership is more concentrated, the transparency information disclosure is worse. This is because there are many family enterprises in Taiwan, and it is common that family members are the responsible persons and senior managers. Ownership and management are overlapped. This makes the management even more authoritative in the companies. Although this helps to implement instructions, dictatorship of leaders is also likely. In such an instance, they would not disclose in detail all the key information.
3. As for the correlation between board compositions and information disclosure transparency, the empirical study shows that there is no significant correlation between the board size and information disclosure transparency. This may be because the board sizes in Taiwan tend to be small and within a reasonable range. Therefore, this factor does not have any significant influence.
4. Independent directors are introduced to the corporate governance system to facilitate the best decisions for companies with the presence of a group of professionals with no vested interests. The empirical result also indicates that there is a positive correlation between the percentage of holdings of independent directors and supervisors and information disclosure transparency. However, the establishment of independent directors and supervisors is only a beginning of the reformation. The board of directors and supervisors has to continue its transition into a monitoring role, in order to enhance the transparency and correctness of the decision-making mechanism.

Research limitations and suggestions

1. This paper only conducts an empirical study on the listed electronics companies in Taiwan. Whether the empirical results are applicable to other industries requires verification by future studies.
2. The definitions of samples are not clear due to a lack of sufficient disclosure in Taiwan.
3. The identities of directors and supervisors are not easily defined, and it is difficult to differentiate who are internal or external directors. Therefore, there are considerable restrictions in the design of research variables.
4. The establishment and assessment of the database of independent directors and supervisors is critical and imperative.
5. The transparency of information disclosure is subject to the influence of many factors, which are difficult to quantify. Thus, it is not incorporated into the scope of this paper. As a result, the adjusted coefficient of the regression analysis is obviously low.

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