DOES GOOD CORPORATE GOVERNANCE IMPROVE EARNINGS QUALITY?

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By

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Abstract

In this paper, we examine the relationship between corporate governance and earnings quality. For earnings quality, we use two measures which are based on the modified Jones model (1995) and the Dechow-Dichev model (2002), respectively. Then we extract three factors from seven corporate governance variables by using principal components analysis. Using ordinary least squares (OLS) regressions and sensitivity tests, we find that firms with more independent boards and more efficient board structures have higher earnings quality. The results also indicate that larger firms and firms with higher return on assets have better earnings quality.

Chapter 1

Introduction

In recent years, it has become clear that corporate governance is becoming more and more important for the economic health of corporations. A series of financial scandals such as Enron, HealthSouth and WorldCom have directed more attention to corporate governance. Some big changes have been made following these scandals. The Sarbanes Oxley Act was signed into law in the United States in July 2002. This law imposes many corporate governance rules on all the public companies which have stock traded in the Unite States. At the end of 2003, Nasdaq, the New York Stock Exchange (NYSE) and the America Stock Exchange (AMEX) imposed some additional rules of corporate governance on most companies which have stock traded on their markets.

Meanwhile, as an important aspect of evaluating a company's financial health, earnings quality also attracts more notice even though investors and creditors often have overlooked it in the past. Nowadays, earnings quality has become the subject of Securities and Exchange Commission (SEC) investigations.

In our study, we examine the relationship between corporate governance and earnings quality and explore how corporate governance influences earnings quality. Based on prior research, we hypothesize that good corporate governance can improve earnings quality and then test that hypothesis on the data.

First of all, what is corporate governance? Different definitions are used in different fields. Here we take the definition of the Organization for Economic Co-operation and Development (OECD, 1999). "corporate governance is the system by which business corporations are directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among different participants in the corporation, such as the board, managers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions on corporate affairs. By doing this, it also provides the structure through which the company objectives are set, and the means of attaining those objectives and monitoring performance". From the definition, we can find that corporate governance is a mechanism to motivate the effective management in firms and ensure the interest of participants.

Secondly, what is earnings quality? Under the definition of Bellovary, Giacomino, and Akers (2005), earnings quality refers to the extent to which reported earnings reflect the company's true earnings, as well as the usefulness of reported earnings in predicting future earnings. Earnings quality also refers to the stability, persistence, and lack of variability in reported earnings.

In this study, we use board attributes as corporate governance characteristics. Many studies show that corporate governance has a relationship with earnings management and firm value. Klein (2002) finds that there is a negative association between audit committee independence and abnormal accruals, and between board independence and abnormal accruals, respectively. Her results also indicate that boards which are more independent of the CEO are more effective in monitoring the firm's management. Chtourou, Bedard and Courteau (2001) find that effective boards and committees constrain earnings management activities. Xie, Davidson and DeDalt (2003) show that board and the audit committees which meet frequently are related to lower levels of earnings management. They also imply that there is a link between the board structure and earnings management. Banner, Guenster and Otten (2003) find there is a strong relationship between both firm values and stock returns and corporate governance. These research findings suggest that better corporate governance leads to more efficient operations which can lower earnings management and improve earnings quality.

Based on the prior literature (e.g., Francis, LaFond, Olsson and Schipper, 2002), we use two measures to assess earnings quality. The first one is based on the Jones model (1991) which was modified by Dechow, Sloan and Sweeney (1995). This model separates total accruals into two parts: normal accruals and abnormal accruals. Normal accruals are associated with changes in revenue, accounts receivable and gross property, plant and equipment. Abnormal accruals are the difference between total accruals and normal accruals. This model is used in investigations of earnings management, through the behavior of abnormal accruals during a specific event or in a specific context. For example, Jones (1991) uses this model to test the changes of earnings management during import relief investigations issued by the United States International Trade Commission. Teoh, Welch and Wong (1998) use this model to analyze the changes of earnings management around seasoned equity offerings. Earnings management research usually focuses on signed abnormal accruals since the research often generates a directional prediction about earnings management. We will focus on unsigned abnormal accruals which we interpret as an inverse indicator of earnings quality.

The second earnings quality measure is based on the Dechow-Dichev (2002) model. It is a time series regression model. This model focuses on the relation between working capital accruals and operating cash flows in the past, present and future. Working capital accruals reflect managerial estimates of cash flows. The earnings quality can be estimated as the inverse of the variation in accruals which is not explained by variation in the prior, present and future cash flows.

These two models are distinct but related. In the modified Jones model, the earnings quality measures are based on opportunistic accruals while the earnings quality measures in the Dechow-Dichev model are based on opportunistic accruals as well as honest estimation errors.

Although previous research provides some information about corporate governance and earnings quality, the direct relation between them has not been examined. In this study, we mainly examine the relation between the above two earnings quality models, and investigate corporate governance's impact on earnings quality.

The results show that the above two earnings quality measures give different but related values. The standard deviation of earnings quality for the modified Jones model is lower than that of Dechow-Dichev model, but they are still very close for these two models.

We choose seven board variables to estimate corporate governance quality. After doing the Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) test, we find that factor analysis is possible for these seven variables. We take three extracted factors to represent corporate governance quality. They are board independence, board structure, and board activity and leadership.

We use ordinary least squares regression and two sensitivity tests to check the relationship between corporate governance and earnings quality. The results indicate that there is a significantly negative relationship between both board independence and board structure and earnings quality measures. This suggests that higher levels of corporate governance lead to better earnings quality, which is consistent with our hypothesis. We also find that earnings quality is associated with firm size and the firm's return on assets. That means larger companies and companies with higher returns have better earnings quality.

Chapter 2

Variables

2.1 Measures of Earnings Quality

Several models have been developed to measure earnings quality (EQ). In our study, we use two measures for earnings quality. The first one (EQ1) is based on the modified Jones model. The second one (EQ2) is based on the Dechow-Dichev model.

EQ1 can be achieved by taking the absolute value of abnormal accruals which are estimated from the modified Jones model. The larger the EQ1 is, the poorer the earnings quality is.

To estimate abnormal accruals, we need to calculate total accruals first. With reference to the Compustat items in the balance sheet,[1] we follow the definition of

[1]Here we use the data in the balance sheet instead of those in the statement of cash flows since the Compustat data in the statement of cash flows are less complete than those in the balance sheet. Using the data in the statement of cash flows would make the sample very small. In this case, using the indirect approach is preferred.

Kothari, Leone and Wasley (2001), and get total accruals as follows:

$TA_{i,t}$ = total accruals for firm i in year t,

$$= (\Delta CA_{i,t} - \Delta Cash_{i,t}) - (\Delta CL_{i,t} - \Delta Debt_{i,t}) - DA_{i,t}$$

where,

$\Delta CA_{i,t}$ = change in current assets (Compustat DATA4) for firm i between year t-1 and year t,

$\Delta Cash_{i,t}$ = change in cash and short-term investments (Compustat DATA1) for firm i between year t-1 and year t,

$\Delta CL_{i,t}$ = change in current liabilities (Compustat DATA5) for firm i between year t-1 and year t,

$\Delta Debt_{i,t}$ = change in debt in current liabilities (Compustat DATA34) for firm i between year t-1 and year t,

$DA_{i,t}$ = depreciation and amortization (Compustat DATA14) for firm i in year t.

Following the classification of Fama and French (1997), we partition firms into 48 groups by Industry Classification Code (DNUM).[2] Then we keep those groups which have at least 20 firms in year t. To trim the outliers, we winsorize the data at the 1st and 99th percentiles. We then apply the cross-sectional Jones model to get the industry- and year-specific parameter estimates $\hat{\alpha}_1, \hat{\alpha}_2$ and $\hat{\alpha}_3$:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta Rev_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

where,

$A_{i,t-1}$ = total assets (Compustat DATA6) for firm i in year t-1,

[2]The 48 Fama and French industry groups are listed in Appendix A.

$\Delta Rev_{i,t}$ = change in revenues (Compustat DATA12) for firm i between year t-1 and year t,

$PPE_{i,t}$ = gross property, plant and equipment (Compustat DATA7) for firm i in year t.

Apply $\hat{\alpha}_1, \hat{\alpha}_2$ and $\hat{\alpha}_3$ to the modified Jones model, we can estimate the firm-specific normal accruals ($NA_{i,t}$):

$$NA_{i,t} = \hat{\alpha}_1 \frac{1}{A_{i,t-1}} + \hat{\alpha}_2 \frac{(\Delta Rev_{i,t} - \Delta Rec_{i,t})}{A_{i,t-1}} + \hat{\alpha}_3 \frac{PPE_{i,t}}{A_{i,t-1}} \quad (2)$$

where,

$\Delta Rec_{i,t}$ = change in receivables (Compustat DATA2) for firm i between year t-1 and year t.

The abnormal accruals can be calculated as $AA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - NA_{i,t}$; then EQ1=$|AA_{i,t}|$.

To calculate EQ2 using the Dechow-Dichev model, we also follow the classification of 48 Fama and French (1997) industry groups and keep those groups with at least 20 observations in each year. Consistent with EQ1, we also do winsorization at the 1st and 99th percentile on the data. Then we apply the Dechow-Dichev model as follows:

$$\frac{TCA_{i,t}}{Assets_{i,t}} = \beta_0 + \beta_1 \frac{CFO_{i,t-1}}{Assets_{i,t}} + \beta_2 \frac{CFO_{i,t}}{Assets_{i,t}} + \beta_3 \frac{CFO_{i,t+1}}{Assets_{i,t}} + \xi_{i,t} \quad (3)$$

where,

$TCA_{i,t}$ = total current accruals for firm i in year t,

$= (\Delta CA_{i,t} - \Delta Cash_{i,t}) - (\Delta CL_{i,t} - \Delta Debt_{i,t})$

$Assets_{i,t}$ = average of total assets for firm i in year t-1 and year t,

$= \frac{(A_{i,t-1}+A_{i,t})}{2}$

$CFO_{i,t}$ = cash flow from operations for firm i in year t,

$= IBEI_{i,t} - TA_{i,t}$

$IBEI_{i,t}$ = income before extraordinary items (Compustat DATA18) for firm i in year t.

$TA_{i,t}$ is defined as previously.

EQ2 is the absolute value of firm i's residual from the estimation of equation (3), that is, EQ2=$|\hat{\xi}_{i,t}|$. Same as EQ1, larger values of EQ2 indicate lower earnings quality.

2.2 Measures of Corporate Governance

The data we use to estimate corporate governance are from the Investor Responsibility Research Center (IRRC) database. We choose seven variables which are widely used in prior research on corporate governance (e.g. Kanagaretnam, Lobo and Whalen 2007; Gompers, Ishii and Metrick 2003): the percentage of independent directors (PCTBD), the relationship between the outside directors and the company (RELAT), board size (BSIZE), the existence of independent audit, compensation, nominating, and corporate governance committees (COMM), the classified boards (CBD), the board leadership (LEAD) and the number of board meetings held during a fiscal year (NMTG).

Usually a company's board of directors includes both inside directors and outside directors. Inside directors are current employees of the firm while outside directors have no ties to the firm except being a board member. Therefore outside directors are considered independent from the management of the firm and can give unbiased opinions for the firm's decisions. The percentage of companies with a majority of independent directors on the board continues to rise. Xie, Davidson and DeDalt (2003) find that outside directors' presence is associated with a lower level of earnings management. It is consistent with the past research that the large proportion of outside directors improves the monitoring of the firm and therefore improves earnings quality.

RELAT reflects the material relationships, such as personal, business, or financial relationships between an outside director and the company. These kinds of relationships would interfere the outside directors' judgement and lower earnings quality. RELAT is a dummy variable. If an outside director has any material relationship with the company, RELAT equals 1, otherwise it is 0.

BSIZE is the size of the board of directors. Too small boards may lessen the boards' independence and fresh perspectives. Too large boards could be inefficient and unwieldy. When the board size is in an appropriate range, usually 5 to 15 directors, larger boards could complete more tasks and make the boards more effective and cohesive. Therefore in an appropriate range, a large board of directors should improve earnings quality.

Among the 4 committees in COMM, the audit committee is responsible to communicate with the company's outside auditor and provide related information to that auditor. Independence and expertise are the main characters for audit committee members. It is the most important committee on the board. The compensation committee is mainly responsible for reviewing and approving pay, stock options, and other employee benefit plans. The nominating committee is in charge of nominating the board of directors. The corporate governance committee is responsible for reviewing, recommending the size, the composition and the performance of the board. The variable COMM equals 4 if the board of directors has separate nominating, audit, compensation and corporate governance committees. COMM equals 3 if the board has any three of the above committees. The rest may be deduced by analogy. COMM equals 0 if the board has none of the above committees. More independent board committees should enhance the firm's monitoring and make earnings quality better.

CBD reflects whether the firm has a classified board which means the board has directors with staggered terms. It is also a dummy variable. CBD equals 1 if the company has a classified board, otherwise 0. In a classified board, only some of the board members (usually 1/3) stand for election each year. Although a classified board can provide continuity and smoother board transitions, most companies still believe that a classified board increases the chances of poorly performing managers and unresponsive directors. Hence the existence of a classified board should lower the firm's earnings quality.

The variable LEAD reflects the existence of separate board chairs and lead/ presiding directors. LEAD equals 2 if the board has both a separate board chair and a lead/presiding director. LEAD equals 1 if the board has either one of them. LEAD equals 0 if the board has neither of them. Separating CEO and the board chair positions can enhance the board's oversight and lower the possibility of having a too powerful chairman. A lead/presiding director can take care of part of the

CEO's job and act as the CEO's coach. Appointing a lead/presiding director can facilitate communication among the directors. A lead/presiding director can also bring information to the CEO and oversee the committees. These may improve board leadership, in turn improving the firm's management and thus improving the firm's earnings quality.

NMTG reflects the frequency of the board members' meetings. Board meetings can provide better communications among directors. The number of the board meetings may be associated with the monitoring of management. The more the former, the better the latter. Hence the earnings quality should be improved as NMTG rises.

2.3 Control Variables

Following a previous study (Francis, LaFond and Olsson, 2002), we include a set of control variables which may affect earnings quality: financial leverage (Leverage), firm size (Size), return on assets (ROA), interest coverage (IntCov), and earnings volatility (Volatility). They can be obtained from Compustat and computed as follows:

$Leverage_{i,t}$ = ratio of long-term debt (Compustat DATA9) to total assets (Compustat DATA6) for firm i in year t,

$Size_{i,t}$ = log of total assets (Compustat DATA6) for firm i in year t,

$ROA_{i,t}$ = ratio of income before extraordinary items (Compustat DATA18) to total assets (Compustat DATA6) for firm i in year t,

$IntCov_{i,t}$ = ratio of interest expense (Compustat DATA15) to income before extraordinary items (Compustat DATA18) for firm i in year t,

$Volatility_{i,t}$ = standard deviation of $EPS_{i,t}$ over the rolling prior 5 years,

where,

$EPS_{i,t}$= earnings per share,

= ratio of income before extraordinary items (Compustat DATA18) to common shares used to calculate earnings per share (Compustat DATA54) for firm i in year t.

Leverage reflects the proportion of debt to the firm's assets. This ratio indicates the firm's reliance on debt. The higher the Leverage is, the greater the risk that the firm may be unable to meet its obligations. The lower the Leverage is, the more equity "buffer" the creditors have if the firm becomes insolvent. Hence from the creditor's point of view, a higher proportion of debt means poorer earnings quality.

Larger firms may be more able to devote resources to estimating earnings and monitoring earnings management, and therefore improve earnings quality.

A higher return on assets may reduce the incentive for earnings management and hence improve earnings quality.

The higher the proportion of interest expense to a firm's income, the greater the incentive for earnings management directed to lenders and hence lower earnings quality the firm has.

Earnings volatility reflects the stability of earnings. Lower volatility may make earnings more predictable and hence lead to better earnings quality.

Chapter 3

Sample Selection and Data

3.1 Sample Selection

There is one restriction for the Dechow-Dichev model. This model requires at least 10 years of data for each firm. This restriction likely limits our sample size and biases our sample. It also indicates that the surviving firms in our sample should be larger and more successful than the population.

There are 23,414 firm-year observations with data on EQ measures from year 1996 to year 2002 in the Compustat North America database.[3] Meanwhile, there are 5,530 firm-year observations with data on corporate governance measures in the same period in the IRRC database . After merging these two data sets, there are 2,865 firm-year observations left with data for both earnings quality and corporate

[3] We calculate the earnings quality from year 1988 to year 2004, but the data for corporate governance are available from year 1996 to year 2002. After merging these two data sets, the data for both earnings quality and corporate governance are from year 1996 to year 2002.

governance.[4] The number of firms ranges from about 360 observations to around 580 observations per year during year 1996 to year 2002.

3.2 Data on Earnings Quality

For the two earnings measures EQ1 and EQ2, we have the summary information shown in Table 3.2.

Table 3.2 panel A reports summary statistics on the two EQ measures. The mean (median) of EQ1 is 0.0453 (0.0316). The mean (median) of EQ2 is 0.0296 (0.0193). They are close because they all capture the variation of accruals.

The Pearson correlation between EQ1 and EQ2 is shown in panel B. It is 0.6353 and significant at the 0.0001 level. We conclude that these two EQ measures partially overlap.

Panel C reports information on the over-time variation for these two EQ measures. The mean (median) standard deviation of rolling 5-year EQ1 is 0.0331 (0.0258). It is about 73% (82%) of the mean (median) of EQ1. EQ2 has similar over time variability. The mean (median) standard deviation of rolling 5-year EQ2 is 0.0222 (0.0169) which is about 75% (88%) of the mean (median) of EQ2.

[4]The IRRC only covers about 5,500 firms between year 1996 and year 2002. We lose 20,600 firm-year observations on earnings quality because of missing data. We believe that the main reason for the inclusion of data in the IRRC database is firm size and prominence and hence the probability of a firm being included is not necessarily correlated with earnings quality. In any case, we make no corrections for selection in this study.

Table 3.2

Descriptive Information on the Earnings Quality Measures

Panel A: Summary Statistics on Earnings Quality Measures

Variable	Mean	10%	25%	Median	75%	90%	Standard Deviation
EQ1	0.0453	0.0053	0.0144	0.0316	0.0630	0.0991	0.0459
EQ2	0.0296	0.0035	0.0086	0.0193	0.0380	0.0677	0.0326

Panel B: Correlation between EQ1 and EQ2

Variable	EQ1	EQ2
EQ1	1.000	0.6353
		(<0.0001)
EQ2		1.000

Panel C: Standard Deviation of Rolling 5-year Earnings Quality

Variable	Mean	10%	25%	Median	75%	90%	Standard Deviation
EQ1	0.0331	0.0093	0.0151	0.0258	0.0416	0.0641	0.0271
EQ2	0.0222	0.0057	0.0095	0.0169	0.0282	0.0464	0.0184

Notes:

1. EQ1 = unsigned abnormal accruals estimated from the modified Jones model; EQ2 = absolute residuals from the Dechow-Dichev model.
2. The sample contains 2,865 firm-year observations during year 1996-2002 with Compustat data to calculate EQ measures.
3. p-value denoting significance of correlation coefficient is in parentheses.
4. In the calculation of standard deviation of rolling 5-year EQ, we exclude firm-year observations with incomplete 5-year data.

3.3 Data on Corporate Governance

The corporate governance variables we take are PCTBD, RELAT, BSIZE, COMM, CBD, LEAD, NMTG. Table 3.3 reports summary information on these variables.

From Table 3.3, we find the average proportion of independent directors on the board is about 2/3 which means independent directors are typically the majority of the board. Around 15% of outside directors have a business or family relationship with their company. Most firms have about 10 directors on their boards. Boards have a median of 3 committees among the following 4 independent committees: audit, compensation, nominating and corporate governance committees. The mean number of classified boards is 0.6346 which means most boards don't have any directors with staggered terms. Less than 1/3 of the firms has either separate chairs or lead/presiding directors. None of the firms has both separate chairs and lead/presiding directors. The average number of board meetings is about 7 times per year.

3.4 Data on Control Variables

For the selected control variables: Leverage, Size, ROA, IntCov, and Volatility, we have the summary information shown in Table 3.4.

Table 3.4 shows that the mean ratio of long-term debt to assets is about 0.23 in the sample firms. About 90% sample firms have a debt ratio less than 0.42. The sample firms are very large with a mean and a median of around $30 million assets. These firms are also profitable. The mean (median) of ROA is 0.0452 (0.0473).

The interest expense ratio varies for these firms. IntCov is negative for 10% of the sample firms. The mean (median) of IntCov is 0.6925 (0.2351). Earnings volatility also varies, ranging from 0.2165 to 1.9760, with mean (median) of 0.9563 (0.6389).

Table 3.3

Descriptive Statistics on the Corporate Governance Variables

Variable	Mean	10%	25%	Median	75%	90%	Standard Deviation
PCTBD	65.9516	42.9	55.6	69.2	80	87.5	17.5248
RELAT	0.1476	0	0	0	0	1	0.3548
BSIZE	9.7407	7	8	10	11	13	2.5123
COMM	3.1654	2	3	3	4	4	0.8293
CBD	0.6346	0	0	1	1	1	0.4816
LEAD	0.3127	0	0	0	1	1	0.4778
NMTG	7.2045	4	5	7	9	11	2.8914

Variable definitions:

PCTBD = the percentage of independent directors on the board

RELAT = outside directors with material relationship with the firm. It equals 1 if outside directors have any business or personal relationship with the firm; 0 otherwise

BSIZE = the number of directors on the board

COMM = existence of independent audit, compensation, nominating, and corporate governance committees. COMM equals 4 if the board has all these four committees; equals 3 if the board has any three committees of them; equals 2 if the board has any two committees of them; equals 1 if the board has only one committee of them; equals 0 if the board doesn't have any committees.

CBD = existence of a classified board. CBD equals 1 if the board has directors with staggered terms; 0 otherwise

LEAD = existence of separate board chairs and lead/presiding directors. LEAD equals 2 if the firm has both the board chairs and lead/presiding directors; equals 1 if the firm just has one of them; equals 0 if the firm has none of them.

NMET = the number of board meetings held during the fiscal year

Notes:

1. The sample contains 2,865 firm-year observations during year 1996-2002 with IRRC data to calculate corporate governance measures.

Table 3.4

Descriptive Statistics on the Control Variables

Variable	Mean	10%	25%	Median	75%	90%	Standard Deviation
Leverage	0.2303	0.0057	0.1203	0.2316	0.3248	0.4127	0.1547
Size	7.5201	5.7880	6.4449	7.4777	8.4954	9.5082	1.3820
ROA	0.0452	-0.0154	0.0213	0.0473	0.0817	0.1249	0.0896
IntCov	0.6925	-0.1590	0.0463	0.2351	0.6162	1.1943	14.7508
Volatility	0.9563	0.2165	0.3700	0.6389	1.2004	1.9760	1.0147

Variable definitions:

Leverage = financial leverage. It is long term debt to assets ratio

Size = natural logarithm of firm's total assets

ROA = return on assets

IntCov = interest coverage ratio

Volatility = standard deviation of rolling 5-year earnings per share

Notes:

1. The sample contains 2,865 firm-year observations during year 1996-2002.
2. In the calculation of standard deviation of rolling 5-year rolling EPS, we exclude firm-year observations with incomplete 5-year data.

Chapter 4

Empirical Test and Analysis

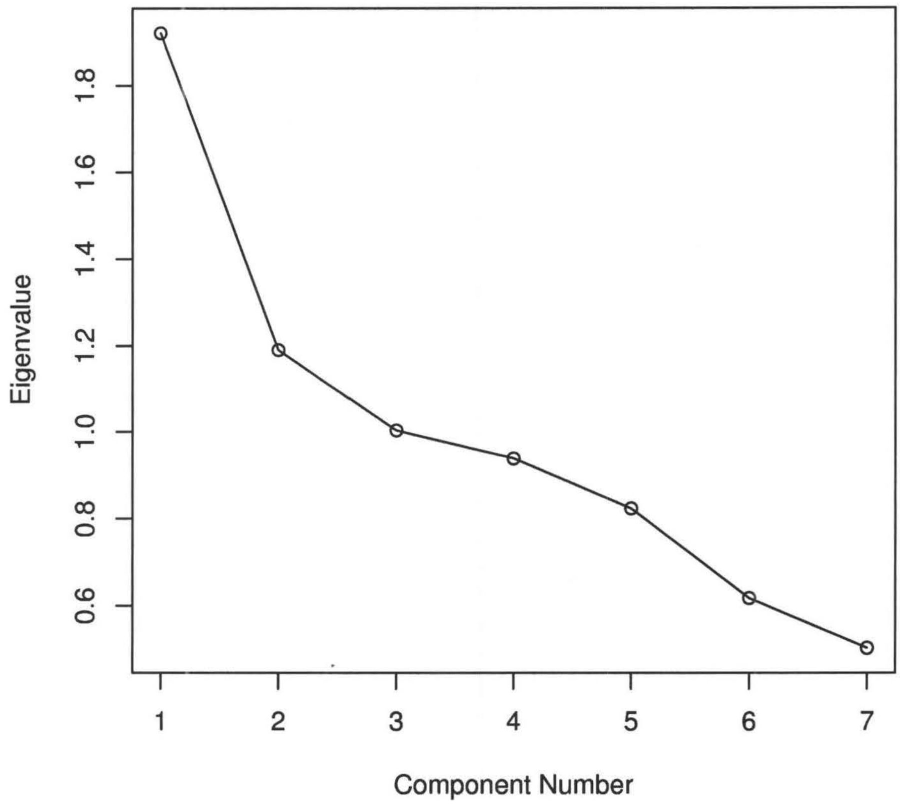
4.1 Principal Components Analysis

For the selected corporate governance variables: PCTBD, RELAT, BSIZE, COMM, CBD, LEAD and NMTG, we need to do the Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) test to check the feasibility of satisfactory principal component analysis. A large value for the Kaiser MSA indicates that a factor analysis of the variables may be feasible. For the above seven corporate governance variables, the overall MSA is 0.6251 which is greater than 0.5. It means a satisfactory factor analysis is reasonable.

Then we use principal components analysis to extract the corporate governance variables into composite factors which capture the information of corporate governance. Figure 4.1 and Table 4.1 show the results of doing the principal component analysis.

Figure 4.1 is a graph of the eigenvalues against all the factors. The graph is

Figure 4.1: Scree Plot



Note:

The curve appears as scree after the third component. It suggests that we should retain three factors.

Table 4.1

Description of Factor Analysis

Panel A: Initial Component Matrix

Variable	Factor 1	Factor 2	Factor 3
PCTBD	0.72696	-0.34293	0.01780
RELAT	-0.48697	0.62194	-0.25533
BSIZE	0.47306	0.57673	-0.32457
COMM	0.78010	0.13902	-0.01609
CBD	0.32095	0.26273	-0.32227
LEAD	-0.04716	0.46004	0.77380
NMTG	0.46907	0.23080	0.35972

Panel B: Rotated Component Matrix

Variable	Factor 1	Factor 2	Factor 3
PCTBD	0.77333	0.21893	-0.02043
RELAT	-0.80098	0.21800	-0.02043
BSIZE	-0.04362	0.80514	0.10770
COMM	0.51674	0.56505	0.20454
CBD	0.02888	0.51865	-0.07780
LEAD	-0.16881	-0.13629	0.87495
NMTG	0.29131	0.24370	0.50837

Panel C: Rotated Component Matrix with Small Coefficients Suppressed

Variable	Factor 1	Factor 2	Factor 3
PCTBD	0.77333		
RELAT	-0.80098		
BSIZE		0.80514	
COMM		0.56505	
CBD		0.51865	
LEAD			0.87495
NMTG			0.50837

Panel D: Summary statistics on Extracted Factors

Variable	Mean	10%	25%	Median	75%	90%	Standard Deviation
Factor 1	50.8841	32.3749	42.9972	53.3321	61.8664	67.6664	13.6537
Factor 2	9.9603	6.7661	8.4148	10.0251	11.6354	12.7270	2.2738
Factor 3	3.9362	2.0335	3.0502	3.5586	4.5753	5.9587	1.5521

Notes:

1. In panel A, B and C, the values are called factor loadings. They are the simple correlations of the variables with the factors.
2. In Panel B, ROTATE=VARIMAX.
3. For each factor, individual variables with absolute values of the factor loadings exceeding 0.50 are retained.

useful for determining how many factors to retain in the analysis. We only keep those factors before the curve begins to flatten. It can be seen from the plot that the curve starts to flatten between factors 3 and 4. Note Factor 4 has an eigenvalue less than 1, so three factors should be adequate.

Table 4.1 panel A shows the initial component matrix. Variables PCTBD, COMM and NMTG have high factor loadings on Factor 1. Variables RELAT and BSIZE have high factor loadings on Factor 2. Variables CBD and LEAD have high factor loadings for Factor 3.

In order to the minimize the number of variables that have high loadings on a factor, we take VARIMAX as the rotation method.[5] This method keeps the orthogonal nature of the factors and tries to get the original variables to load high on one of the factors and low on the rest. Panel B of Table 4.1 shows the factor loadings have been changed for each corporate governance variable after rotation.

In Table 4.1 panel C, after taking the absolute value of the factor loadings, we find that variables PCTBD and RELAT have high factor loadings on Factor 1, variables BDSIZE, COMM and CBD have high factor loadings on Factor 2, variables LEAD and NMTG have high factor loadings on Factor 3. For each factor, we only keep those variables with absolute values of the factor loadings more than 0.5.

Table 4.1 panel D shows the summary statistics for the three extracted corporate governance factors. We label Factor 1 (F1) as board independence. It has a

[5]We use the orthogonal rotation method VARIMAX here, imposing the assumption that the three factors board independence (F1), board structure (F2) and board activity and leadership (F3) are not correlated. When the method PROMAX is used instead, not imposing orthogonality, the correlations between these factors are small, specifically 0.01, 0.13 and 0.24.

mean (median) of 50.8841 (53.3321). Factor 2 (F2) can be labeled as board structure. It has a mean (median) of 9.9603 (10.0251). Factor 3 (F3) can be labeled as board activity and leadership. It has a mean (median) of 3.9326 (3.5596). These factor groupings are consistent with those of Kanagaretnam, Lobo and Whalen (2007).

4.2 Ordinary Least Square Regression Analysis

Prior research indicates that earnings quality is associated with corporate governance quality. We note that good corporate governance can improve the firm's management and therefore improve earnings quality of the firm. Then we have the hypothesis as follows:

H: Earnings quality is positively related to corporate governance quality.

In our study, smaller values of EQ measures indicate better earnings quality while larger values of corporate governance measures indicate better governance quality. Then the above hypothesis can be interpreted as:

H: EQ measures are negatively related to corporate governance measures.

Panel A and panel B of Table 4.2 show the correlations between the two earnings quality variables and three corporate governance variables and the control variables. The results show that both EQ1 and EQ2 are significantly negatively related to board independence (F1) and board structure (F2) which is as expected. The results are consistent with the previous analysis that more independent, more effective and more active boards can improve earnings quality. EQ1 and EQ2 are also significantly negatively related to the variables Size and ROA as expected. Meanwhile, EQ1 and EQ2 are significantly negatively related to the control variable Leverage which is not as expected. We don't find EQ1 and EQ2 are significantly related to board activity and leadership (F3) and the control variables IntCov and Volatility. The sign of the Pearson correlation coefficient between EQ1 and IntCov is opposite to the correlation coefficient between EQ2 and IntCov.

We also do the scatter plot to check the relationship between the earnings quality and corporate governance. Figure 4.2, 4.3, 4.4 and 4.5 show the scatter plot between two EQ measures and corporate governance and control variables. Note of course that these figures have a symmetry as we have included the plots with EQ on both the horizontal and vertical axes so the reader may have both perspectives. From the graphs, in most cases there is no obvious evidence showing that the relationship between the earnings quality and corporate governance is not linear. There are a few cases where there appears to be some evidence of nonlinearity and subsequent investigation of that possibility might be profitable. However, for this study, we elected to maintain the linearity assumption throughout for simplicity.

We then formalize the hypothesis by testing the following regression using ordinary least squares (OLS):

$$\begin{aligned} EQ_{i,t} = {} & \gamma_0 + \gamma_1 F1_{i,t} + \gamma_2 F2_{i,t} + \gamma_3 F3_{i,t} + \gamma_4 Leverage_{i,t} + \gamma_5 Size_{i,t} + \gamma_6 ROA_{i,t} + \\ & \gamma_7 IntCov_{i,t} + \gamma_8 Volatility_{i,t} + \sum \gamma_k (\text{year dummy variables})_t + \zeta_{i,t} \qquad (4) \end{aligned}$$

Table 4.2

Description of OLS Regressions

Panel A: Correlations between Earnings Quality and Corporate Governance

Variable	EQ1	EQ2	F1	F2	F3
EQ1	1.0000	0.6353	-0.0724	-0.1335	0.0082
		(<0.0001)	(0.0001)	(<0.0001)	(0.6596)
EQ2		1.0000	-0.0790	-0.1730	0.0076
			(<0.0001)	(<0.0001)	(0.6836)
F1			1.0000	0.2059	0.1394
				(<0.0001)	(<0.0001)
F2				1.0000	0.1846
					(<0.0001)
F3					1.0000

Panel B: Correlations between Earnings Quality and Control Variables

Variable	Leverage	Size	ROA	IntCov	Volatility
EQ1	-0.0600	-0.1699	-0.1549	-0.0106	0.0084
	(0.0013)	(<0.0001)	(<0.0001)	(0.5696)	(0.6541)
EQ2	-0.0880	-0.2275	-0.2632	0.01726	0.0277
	(<0.0001)	(<0.0001)	(<0.0001)	(0.3558)	(0.1380)

Variable definition:

F1 = board independence factor

F2 = board structure factor

F3 = board activity and leadership factor

EQ1 and EQ2 are defined in Table 3.1. Other variables are defined in Table 3.3.

Notes:

1. The sample contains 2,865 firm-year observations during year 1996-2002.

2. p-values denoting significance of correlation coefficients are in parenthesis.

Figure 4.2: Scatter Plot for EQ1 and Coporate Governance

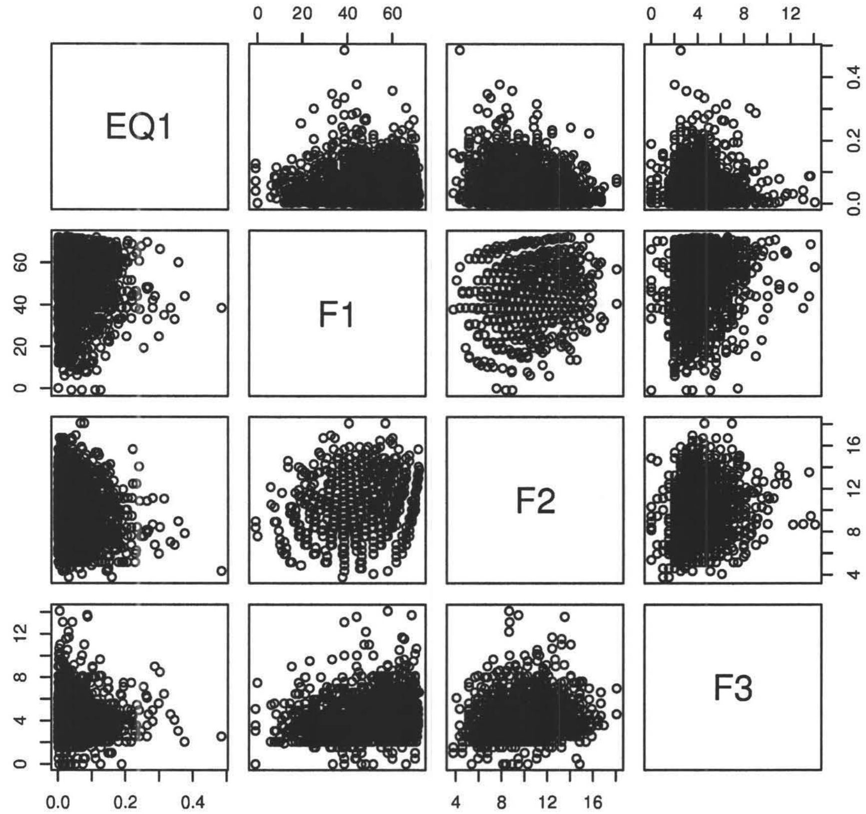


Figure 4.3: Scatter Plot for EQ1 and Control Variables

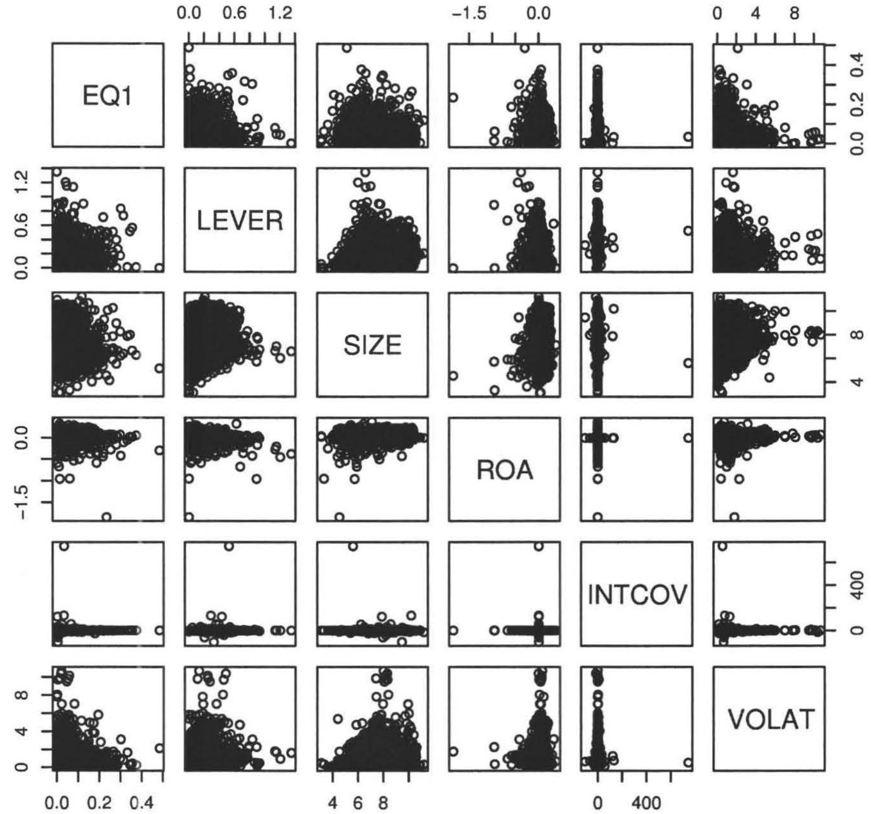


Figure 4.4: Scatter Plot for EQ2 and Corporate Governance

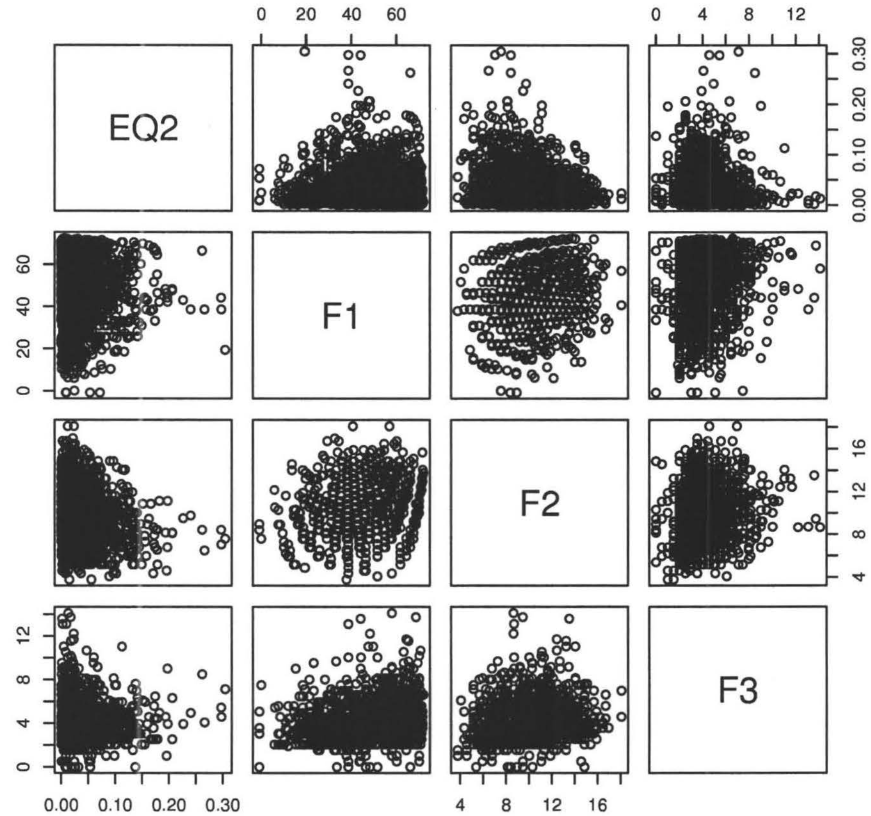
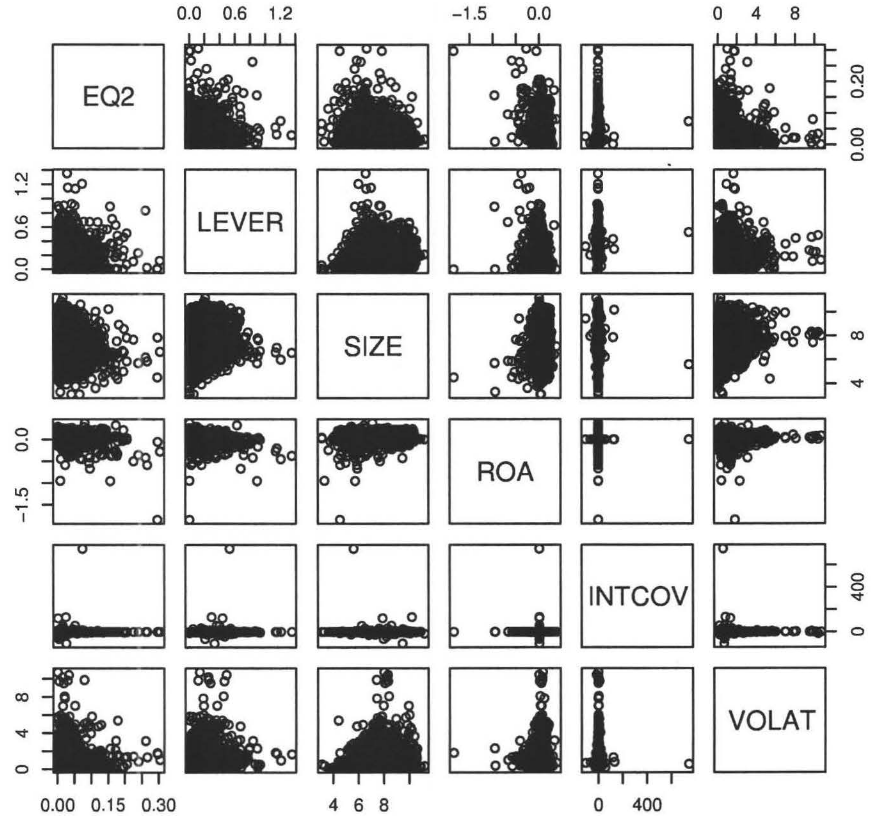


Figure 4.5: Scatter Plot for EQ2 and Control Variables



where,

F1 = board independence factor

F2 = board structure factor

F3 = board activity and leadership factor

Year dummy variables equal to one if the observation is in the given year, 0 otherwise. Since the sample data are from year 1996 to year 2002, we include 6 year dummy variables in equation (4), then k=9, 10...14.

All the other variables are defined as previously.

According to the hypothesis, we expect the earnings quality measures are negatively related to corporate governance measures. That is, coefficient γ_1, γ_2 and γ_3 are expected to be negative. From the analysis on page 13, the coefficients on Leverage (γ_4), IntCov (γ_7) and Volatility (γ_8) should be positive. The coefficients on Size (γ_5) and ROA (γ_6) should be negative.

Table 4.2 panel C and panel D report the results for OLS regressions. As we hypothesized, there are significantly negative relationships between earnings quality measures (both EQ1 and EQ2) and corporate governance measures (factors F1 and F2). It can be interpreted as firms with more independent boards and better board structure have better earnings quality. There is a slight difference in the significance level for EQ1 and EQ2. The coefficient of F1 for EQ1 is significant at the 0.05 level while that for EQ2 is significant at the 0.01 level. The earnings quality measures (both EQ1 and EQ2) are also significantly associated with Size and ROA. The coefficients of these two control variables both are negative as expected. Both EQ1 and EQ2 are significantly positive related to the control variable Volatility as we predicted. The coefficient of Volatility for EQ1 is significant at 0.1 level while that for EQ2 is significant at the 0.01 level.

However, both EQ1 and EQ2 have a significantly positive relationship with board activity and leadership (F3) which is not as expected. Both EQ1 and EQ2 have a significant relationship with Leverage, but the coefficients of Leverage don't have the expected signs. The coefficients of the control variable IntCov are not significant for both EQ1 and EQ2.

Panel C: OLS Regression for EQ1

Independent Variable	Predicted Sign	Coefficient	Standard	t value Error
Intercept	?	0.09192	0.00566	16.25***
F1	-	-0.00015	0.00006	-2.26**
F2	-	-0.00104	0.00044	-2.35***
F3	-	0.00119	0.00057	2.10**
Leverage	+	-0.02166	0.00591	-3.66***
Size	-	-0.00399	0.00078	-5.14***
ROA	-	-0.08266	0.01004	-8.23***
IntCov	+	-0.00004	0.00006	-0.74
Volatility	+	0.00134	0.00084	1.60*
F-Value	14.17			
Adjusted R^2	6.05%			

Panel D: OLS Regression for EQ2

Independent Variable	Predicted Sign	Coefficient	Standard	t value Error
Intercept	?	0.07581	0.00386	19.63***
F1	-	-0.00011	0.00004	-2.42***
F2	-	-0.00086	0.00030	-2.83***
F3	-	0.00078	0.00039	2.01**
Leverage	+	-0.02694	0.00403	-6.68***
Size	-	-0.00367	0.00053	-6.92***
ROA	-	-0.10126	0.00685	-14.78***
IntCov	+	0.00004	0.00004	0.99
Volatility	+	0.00167	0.00058	2.91***
F-value	33.05			
Adjusted R^2	13.54%			

Notes:

1. All variables are defined in Table 3.3, Table 4.2 panel B.
2. The sample contains 2,865 firm-year observations during year 1996-2002.
3. *** denotes significant at 0.01 level, ** denotes significant at 0.05 level, * denotes significant at 0.10 level. Significance levels are based on one-tailed (two-tailed) tests when the coefficient sign is (is not) predicted.

Chapter 5

Sensitivity Analysis

We use OLS estimates for a linear model in section 4.2. Since correlations across observations from the same firm likely exist, we need to do the corrections on the pooled data. In this chapter, we conduct two different methods to do the sensitivity tests. One is the clustered robust standard errors method and another one is the multilevel modeling method.

The clustered robust standard errors method is based on correcting the clustered Huber-White standard errors for the presence of repeated observations on a single firm. It is weaker than using a multilevel model. The latter not only accounts for the intraclass correlation, but also corrects the denominator degrees of freedom for the number of clusters. Using the clustered robust method, the denominator degrees of freedom is based on the number of observations, not the number of clusters.

Table 5.1 panel A shows the results of the clustered robust standard errors method for EQ1. We find that the coefficient estimates for the independent variables in this panel are almost the same as those in OLS regression. Although the coefficient estimates are close, the standard errors are slightly different. The OLS method tends to have smaller standard errors. The significance levels are still similar except the coefficient of the variable IntCov is not significant in OLS regression while the coefficient on the variable Volatility is not significant in the clustered robust standard error method.

Panel B of Table 5.1 reports the results of the clustered robust standard error method for EQ2. Comparing to the OLS regression, the coefficient estimates for the independent variables and the significance levels of these two methods are the same.[6] The standard errors are slightly different. In the OLS regression, coefficient on variable IntCov is not significant, but it is significant in the clustered robust standard error method.

Table 5.1 panel C reports the results of the multilevel modeling method for EQ1. Similarly, the coefficient estimates for the independent variables of the multilevel modeling method are very close to those in the OLS regression. So are the standard errors. The significance levels are also similar for these two methods except that the coefficient of variable Volatility is significant in OLS regression but not significant in multilevel modeling method.

Table 5.1 panel D reports the results of the multilevel modeling method for EQ2. Both the coefficient estimates for the independent variables and the standard errors in multilevel modeling method are similar to those in OLS regression. So are

[6]We use different procedures in SAS for OLS regressions with and without the clustered robust standard error method. Due to rounding errors, these methods yield coefficient estimates which are very slightly different. With perfect numerical accuracy, the coefficient estimates would be exactly the same.

the significance levels except that the coefficient on variable IntCov is not significant in the OLS regression but significant in multilevel modeling method.

The above results show that the correlations across observations are relatively small. The coefficient estimates are the same for the the OLS regression, the clustered robust standard errors method and the multilevel modeling method. The standard errors are just slightly different among these three methods.

Table 5.1

Description of Sensitivity Tests

Panel A: Clustered Robust Standard Errors Method for EQ1

Independent Variable	Sign	Coefficient	Standard Error	z value
Intercept	?	0.0919	0.0074	12.36***
F1	-	-0.0001	0.0001	-1.90**
F2	-	-0.0010	0.0006	-1.81**
F3	-	0.0012	0.0007	1.70**
Leverage	+	-0.0217	0.0091	-2.39***
Size	-	-0.0040	0.0010	-4.03***
ROA	-	-0.0827	0.0162	-5.09***
IntCov	+	-0.0000	0.0000	-1.84**
Volatility	+	0.0013	0.0011	1.28

Panel B: Clustered Robust Standard Errors Method for EQ2

Independent Variable	Sign	Coefficient	Standard Error	z value
Intercept	?	0.0758	0.0055	13.75***
F1	-	-0.0001	0.0001	-1.75**
F2	-	-0.0009	0.0004	-2.12**
F3	-	0.0008	0.0005	1.42*
Leverage	+	-0.0269	0.0068	-3.94***
Size	-	-0.0037	0.0007	-5.40***
ROA	-	-0.1013	0.0144	-7.03***
IntCov	+	0.0000	0.0000	2.02**
Volatility	+	0.0017	0.0008	2.17**

Panel C: Multilevel Modeling Method for EQ1

Independent Variable	Sign	Coefficient	Standard Error	t value
Intercept	?	0.08835	0.00736	12.00***
F1	-	-0.00017	0.00008	-2.09**
F2	-	-0.00098	0.00055	-1.78**
F3	-	0.00126	0.00062	2.04**
Leverage	+	-0.02014	0.00711	-2.83***
Size	-	-0.00341	0.00103	-3.33***
ROA	-	-0.08476	0.01034	-8.20***
IntCov	+	-0.00002	0.00005	-0.34
Volatility	+	0.00057	0.00101	0.56

Panel D: Multilevel Modeling Method for EQ2

Independent Variable	Sign	Coefficient	Standard Error	t value
Intercept	?	0.07526	0.00508	14.82***
F1	-	-0.00010	0.00005	-1.91**
F2	-	-0.00117	0.00038	-3.10***
F3	-	0.00094	0.00042	2.25**
Leverage	+	-0.02029	0.00486	-4.17***
Size	-	-0.00347	0.00071	-4.91***
ROA	-	-0.1079	0.00699	-15.44 ***
IntCov	+	-0.00006	0.00004	1.56*
Volatility	+	0.00131	0.00069	1.91**

Notes:

1. All variables are defined in Table 3.3, Table 4.2 panel B.
2. The sample contains 661 firms during year 1996-2002.
3. *** denotes significant at 0.01 level, ** denotes significant at 0.05 level, * denotes significant at 0.10 level. Significance levels are based on one-tailed (two-tailed) tests when the coefficient sign is (is not) predicted.

Chapter 6

Conclusion

In this study, we identify the association between two distinct earnings quality measures which are based on different models. We also examine the relationship between earnings quality and corporate governance.

The correlation between EQ1 (earnings quality based on the modified Jones model) and EQ2 (earnings quality based on the Dechow-Dichev model) shows that these two measures are related but different. They partially overlap since they are all generated from accruals but EQ2 is also related to cash flow.

In a principal component analysis, we find that seven individual corporate governance variables can be reduced to three independent factors. The three factors are labeled as board independence, board structure, and board activity and leadership.

Both an OLS regression analysis and a sensitivity analysis show that corporate governance plays an important role in influencing firms' earnings quality. The results suggest that earnings quality measures are significantly negatively related to both board independence and board structure. This finding is consistent with our hypothesis and indicates good corporate governance may improve earnings quality. Earnings quality measures also have a significantly negative relationship with firm size and the firm's return on assets. Larger and more successful firms appear to have better earnings quality.

The results also show that earnings quality is not associated with interest coverage and earnings per share volatility. These two earnings quality measures are significantly negatively related to financial leverage which is opposite to our expectation. These two earnings quality measures also have a significantly positive relationship with board activity and leadership which is not expected. These questions can be left for future research.

Appendix A

Famma and French's 48 Industry Groups

Short Name	Long Name	DNUM
Agric	Agriculture	0100-0299 0700-0799
		0900-0919 2048
Food	Food Produts	2000-2046 2050-2063
		2070-2079 2090-2092
		2095 2098-2099
Soda	Candy and Soda	2064-2068 2086-2087
		2096-2097
Beer	Alcoholic Beverage	2080 2082-2085
Smoke	Tobacco Products	2100-2199
Toys	Recreational Products	0920-0999 3650-3652
Fun	Entertainment	7800-7833 7840-7841
		7900 7910-7911
		7920-7933 7940-7949
		7980 7990-7999
Books	Printing and Publishing	2700-2749 2770-2771
		2780-2799
Hshld	Consumer Goods	2047 2391-2392
		2510-2519 2840-2844
		3160-3161 3170-3172

Short Name	Long Name	DNUM
		3190-3199 3229 3260
		3262-3263 3269
		3230-3231 3630-3639
		3750-3751 3800
		3860-3861 3870-3873
		3910-3911 3914-3915
		3960-3962 3991 3995
Clths	Apparel	2300-2390 3020-3021
		3100-3111 3130-3131
		3140-3151 3963-3965
Hlth	Health care	8000-8099
MedEq	Medical Equipment	3693 3840-3851
Drugs	Pharmaceutical Products	2830-2831 2833-2836
Chems	Chemicals	2800-2829 2850-2879
		2890-2899
Rubbr	Rubber and Plastic	3031 3041 3050-3053
	Products	3060-3099
Textls	Textiles	2200-2284 2290-2295
		2290-2295 2297-2299
		2393-2395 2397-2399
BldMt	Construction Materials	0800-0899 2400-2439
		2450-2459 2490-2499

Short Name	Long Name	DNUM
		2660-2661 2950-2952
		3200 3210-3211
		3240-3241 3250-3259
		3261 3264 3270-3275
		3280-3281 3290-3293
		3295-3299 3420-3433
		3440-3442 3446
		3448-3452 3490-3499
		3996
Constr	Construction	1500-1311 1520-1549
		1600-1799
Steel	Steel Works, Etc	3300 3310-3317
		3320-3325 3330-3341
		3350-3357 3360-3369
		3370-3379 3390-3399
FabPr	Fabricated Products	3400 3443-3444
		3460-3479
Mach	Machinery	3510-3536 3538
		3540-3569 3580-3582
		3585-3586 3589-3599
ElcEq	Electrical Equipment	3600 3610-3613
		3620-3621 3623-3629

Short Name	Long Name	DNUM
		3640-3646 3648-3649
		3660 3690-3692 3699
Autos	Automobiles and Trucks	2296 2396 3010-3011
		3537 3647 3694 3700
		3710-3711 3713-3716
		3790-3792 3799
Aero	Aircraft	3720-3721 3723-3725
		3728-3729
Ships	Shipbuilding, Railroad Eq	3730-3731 3740-3743
Guns	Defense	3760-3769 3795
		3480-3489
Gold	Precious Metals	1040-1049
Mines	Nonmetallic Mining	1000-1039 1050-1119
		1400-1499
Coal	Coal	1200-1299
Enrgy	Petroleum and Natural gas	4900 4910-4911
		4920-4925 4930-4932
		4939-4942
Util	Utilities	4800 4810-4813
		4820-4822 4830-4841
		4880-4892 4899
Telcm	Telecommunications	7020-7021 7030-7033

Short Name	Long Name	DNUM
		7200 7210-7212
		7214-7217 7219-7221
		7230-7231 7240-7241
		7250-7251 7260-7299
		7395 7500 7520-7549
		7600 7620-7623
		7629-7631 7640-7641
		7690-7699 8100-8499
		8600-8699 8800-8899
PerSv	Personal Service	2750-2759 3993 7218
		7300 7310-7342
		7349-7353 7359-7372
		7374-7385 7389-7394
		7396-7397 7399
		7510-7519 8700
		8710-8713 8720-8721
		8730-8734 8740-8748
		8900-8911 8920-8999
Coms	Computers	3570-3579 3661-3666
		3669-3679 3810 3812
Chips	Electronic Equipment	3622 3661-3666
		3669-3679 3810 3812

Short Name	Long Name	DNUM
LabEq	Measuring and Control	3811 3820-3827
		3829-3839
Paper	Business Supplies	2520-2549 2600-2639
		2670-2699 2760-2761
		3950-3955
Boxes	Shipping Containers	2440-2449 2640-2659
		3220-3221 3410-3412
Trans	Transportation	4000-4013 4040-4049
		4100 4110-4121
		4130-4131 4140-4142
		4150-4151 4170-4173
		4190-4200 4210-4231
		4240-4249 4400-4700
		4710-4712 4720-4749
		4780 4782-4785 4789
Whlsl	Wholesale	5000 5010-5015
		5020-5023 5030-5060
		5063-5065 5070-5078
		5080-5088 5090-5094
		5099-5100 5110-5113
		5120-5122 5130-5172
		5180-5182 5190-5199

Short Name	Long Name	DNUM
Rtail	Retail	5200 5210-5231
		5250-5251 5260-5261
		5270-5271 5300
		5310-5311 5320
		5330-5331 5334
		5340-5349 5390-5400
		5410-5412 5420-5469
		5490-5500 5510-5579
		5590-5599 5600-5700
		5710-5722 5730-5736
		5750-5799 5900
		5910-5912 5920-5929
		5930-5932 5940-5990
		5992-5995 5999
Meals	Restaurants, Hotel,	5800-5829 5890-5899
	Motel	7000 7010-7019
		7040-7049 7213
Banks	Banking	6000 6010-6036
		6040-6062 6080-6082
		6090-6100 6110-6113
		6120-6179 6190-6199
Insur	Insurance	6300 6310-6331

Short Name	Long Name	DNUM
		6350-6351 6360-6361
		6370-6379 6390-6411
Rlest	Real estate	6500 6510 6512-6515
		6517-6532 6540-6541
		6550-6553 6590-6599
		6610-6611
Fin	Trading	6200-6299 6700
		6710-6726 6730-6733
		6740-6779 6790-6795
		6798-6799
Misc	Miscellaneous	3990 3992-3994
		3997-3999 4950-4961
		4970-4971 4990-4991
		9900-9999

Note: DNUM is Industry Classification Code.

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