Do Big 4 audit firms improve the value relevance of earnings and equity?

Hsien-Li Lee

*Department of Accounting, Chung Yuan Christian University,
Chung Li, Taiwan, and*

Hua Lee

*Department of Accounting, Hong Kong Shue Yan University,
North Point, Hong Kong*

Abstract

Purpose – The purpose of this paper is to examine the association between audit quality and value relevance of representative accounting measures, such as earnings and book value of equity.

Design/methodology/approach – The authors estimate the standard value relevance equations and the modified equations by ordinary least square regressions and use two ways to compare the difference in the value relevance of earnings and book value of equity audited by Big 4 auditors and non-Big 4 auditors, as characterized by the coefficient of determination, $R2$; and based on previous lines of published research.

Findings – Some evidence was found that, in the Taiwan capital market, in general, the earnings and book value of equity audited by Big 4 auditors explain more variations in stock return than those audited by non-Big 4 auditors. The results are robust to different empirical models and measurements of value relevance and control for risk and growth factors. Consequently, both earnings and book value audited by Big 4 audit firms are generally more relevant than those audited by non-Big 4 audit firms.

Originality/value – Assuming that the Big 4 audit firms provide a higher level of assurance and credibility, the overall results are generally consistent with the authors' prediction that audit quality, as captured by size of audit firms, improves the value relevance of earnings and book value of equity.

Keywords Auditing, Earnings, Equity capital, Capital markets, Audit quality, Taiwan

Paper type Research paper

1. Introduction

Value relevance, the combined effects of relevance and reliability, has been one of the primary issues in accounting-based capital market research for two decades[1]. The related studies document that summarized accounting measure is associated with firm value (Brown *et al.*, 1999; Barth *et al.*, 2001; Holthausen and Watts, 2001). Auditing serves as a bonding and monitoring mechanism, to reduce agency costs caused by information asymmetry among interested parties (Jensen and Meckling, 1976; Chow, 1982; Watts and Zimmerman, 1983)[2]. The effectiveness of auditing depends on auditors' ability to

constrain managers' opportunistic behavior in manipulating earnings, since auditors with higher quality are more likely to discover inappropriate accounting practices (Becker *et al.*, 1998; Reynolds and Francis, 2000). The purpose of this paper is to investigate the association between audit quality and value relevance of earnings and book value of equity. Higher audit quality may enhance the relevance and reliability of clients' financial statements, and hence improve the value relevance of financial statement information.

The issue of value relevance is crucial for information users because, based on all available information, users make an overall judgment on their decisions[3]. Useful accounting information must simultaneously possess relevance and faithfulness representation (reliability). Both these qualities are indispensable and inseparable, in order to influence users' decisions[4]. Value relevance reflects the combined effects of relevance and faithfulness representation (reliability), two fundamental qualities (primary qualities) of accounting information in the IASB's (FASB's) Conceptual Framework for Financial Reporting (Barth *et al.*, 2001). The financial statements audited by high quality auditors provide information more relevant (Behn *et al.*, 2008; Krishnan, 2005) or more faithfully representative or reliable (DeFond and Jiambalvo, 1994; Francis *et al.*, 1999; Kinney and Martin, 1994) to external users. However, no study explores the role of audit quality in the combined effects of relevance and faithfulness representation (reliability) of accounting information. The research question of interest is whether the summarized accounting figures audited by higher quality auditors can better explain variations in stock return and hence are more value relevant for equity valuation; that is, whether audit quality, as measured by Big 4 auditors, contribute to the value relevance of summarized accounting information.

Though prior studies document the positive role of audit quality in individual quality of accounting information, from the perspectives of users the overall effect of all qualities of accounting information can be more helpful for them. For example, the accounting information understandable to users demonstrates its usefulness for users' decision-making. For accounting information to be understandable, it should possess all qualities characterized by the Conceptual Framework for Financial Reporting provided by IASB and FASB. Thus, based on past literature regarding the positive role of audit quality on financial reporting quality, this study extends existing literature to examine the relation between audit quality and the combined effects of accounting information and audit quality. We investigate the relation between value relevance, the combined effects of relevance and reliability, of both earnings and book value of equity, whereby audit quality is measured by the audit firm's brand name reputation.

The major results indicate that, on average, the explanatory power of earnings and book value of equity, audited by Big 4 firms, on variations of stock return, is generally higher than that audited by non-Big 4 firms. Thus, earnings and book value of equity for clients of Big 4 auditors are generally more value relevant for stock valuation than those for clients of non-Big 4 auditors. The results are robust to different models and measures of value relevance and control for risk and growth factors. In sum, assuming that the Big 4 audit firms provide a higher level of assurance and audit quality, the overall results generally support our predictions that there is a positive relation between both earnings and book value and stock return, and that there is a positive relation between value relevance of earnings and book value of equity, and audit quality.

Prior studies explore the relation between audit quality and one of the following: relevance (Krishnan, 2005; Behn *et al.*, 2008); reliability (Kinney and Martin, 1994; Francis *et al.*, 1999); earnings quality (Balsam *et al.*, 2003); or information disclosure quality (Dunn and Mayhew, 2004). However, no study further examines whether high quality auditors improve the combined effects of relevance and reliability, i.e. value relevance, of accounting information. This study contributes to providing evidence on the relation of value relevance of accounting information and audit quality. We explore the effects of audit quality on the relation between earnings and book value of equity and stock price. This paper posits and finds evidence that, as big audit firms have better audit quality, the information in financial statements audited by a big audit firm is more relevant for firm value and hence has better ability in explaining the changes in stock return.

The remainder of this paper is organized as follows. The next section discusses related literature. Section 3 explains the research design. Section 4 analyzes empirical results and Section 5 concludes the paper.

2. Literature review
The literature review includes studies related to audit quality, value relevance of earnings and book value of equity, and the relation between audit quality and accounting information. We explain the predictions before the end of this section.

DeAngelo (1981) argues that audit quality is positively related to the size of the audit firm, because auditors with more clients lose more economic rents from audit failures. Since then, a large body of literature has used size as a measure of audit quality. Healy and Lys (1986) indicate that audit firms' reputation or brand name ensures that the client can obtain audit quality specified in the contract, and that users may obtain relevant information at a lower cost[5]. Auditors with different quality of audits, in performing different levels of effective audits, use different audit judgments, which lead to different degrees of quality on audited financial statements[6]. As auditors with more clients lose more economic rents from audit failures, they have stronger incentives to forestall the possibility of audit failure to maintain their reputation. Moreover, audit firms' brand name guarantees that the client can obtain audit quality specified in the contract, and that users may obtain relevant information at a lower cost. Thus, big firm auditors are presumed to provide high quality of audits.

Many studies have investigated value relevance of accounting information that examines the association between accounting and firm value since 1990. Holthausen and Watts (2001) provide a remarkable review[7]. The primary results indicate that summarized accounting information, such as earnings and book value, is significantly correlated with stock price or changes in stock price (Francis and Schipper, 1999). Some studies further find that the value relevance of earnings and/or book value has decreased over time (Ramesh and Thiagarajan, 1995; Lev, 1997; Chang, 1999), while others do not. Collins *et al.* (1997) indicate that the overall value relevance of earnings and book value has slightly increased over the past 40 years. Francis and Schipper (1999) find that the value relevance of earnings has declined, whereas that of book value of equity has increased.

As many studies ignore the effects of firm size on the levels of market values and accounting numbers, Brown *et al.* (1999) analytically demonstrate that this scale effect leads to overstatement of the levels of value relevance measured by the coefficient of determination, R^2, of the regressions. They assert that all variables should be deflated

by the lagged market value and document that the value relevance of earnings and book value has declined over time, after controlling for scale effect. Lo and Lys (2001) distinguish among information content, valuation relevance and value relevance, and suggests the ways to reconcile among three approaches. Additionally, they argue that, according to Ohlson (1995), adding net dividends to the stock price as explanatory variable to yield a return equation can augment the standard value relevance equation. After the adjustment, Lo and Lys (2001) also find that the value relevance of earnings, book value, and dividends has declined over the last 28 years[8].

Banker *et al.* (2009) find that value relevance of earnings explains plentiful variations in the pay-sensitivity of earnings and document that earnings are value relevant for both valuation and performance evaluation purposes. Barton *et al.* (2010) find that "above the line" earnings are more value relevant than the bottom line numbers and that no single measure of earnings dominates around the world. Balachandran and Mohanram (2011) find no evidence that higher level of conservatism is related to greater declines in the value relevance of accounting information[9].

Prior studies explore the relation between audit quality and individual ingredients of relevance or reliability, earnings quality, or information disclosure quality. However, whether audit quality improves value relevance, the overall effects of relevance and reliability of accounting information remains unanswered. With respect to relevance of accounting information, the earnings audited by Big 5 auditors can have higher predictive value than those by non-Big 5 auditors. For example, Behn *et al.* (2008) document that Big 5 auditors contribute to higher accuracy and smaller dispersion of analysts' earnings forecast. Krishnan (2005) documents that the earnings audited by industry specialist Big 6 auditors can be more timely in reflecting the economic losses of clients than those audited by non-specialist Big 6 auditors. Krishnan *et al.* (2002) find that audit quality conditionally enhances the value of the R&D assets and thus convey information on the value relevance of R&D assets[10].

With respect to reliability of accounting information, the financial reports for clients of Big firm auditors can be more faithfully representative, in terms of completeness, neutrality, and free from error, than clients of non-Big-firm auditors. Higher quality auditors provide a higher level of assurance, which ensures that the financial reports are neutral among interested parties and reduces the bias in the financial reports caused by earnings management of client firms. For example, Kinney and Martin (1994) find that the errors and bias in net income and net assets are lower and the precision of measurements is greater for clients of Big 6 auditors, relative to non-Big 6 auditors. Francis *et al.* (1999) document that managers of firms with high accruals are more likely to hire high quality auditors to send a credible signal on the verifiability of reported earnings to outsiders. Nevertheless, they find that high quality auditors are more capable of verifying reported income and constrain the opportunistic reporting of accruals. Lastly, the earnings quality (Balsam *et al.*, 2003) and disclosure quality are better for clients of higher quality auditors (Dunn and Mayhew, 2004).

As explained above, a number of studies document the positive relation between audit quality and individual qualities of accounting information, such as relevance and reliability. However, from the perspectives of users, the overall effect of all qualities of accounting information can be more helpful for users. For example, the accounting information understandable to users demonstrates its usefulness for users' decision-making. For accounting information to be understandable, it should possess

all qualities characterized by the Conceptual Framework for Financial Reporting provided by IASB and FASB. Thus, based on past literature regarding the positive role of audit quality in the financial reporting quality, we posit that, the value relevance of earnings and book value of equity audited by Big 4 audit firms is higher than those audited by non-Big 4 audit firms. That is, the accounting numbers for clients of Big 4 audit firms can explain more variations in stock price than those for clients of non-Big 4 audit firms. Assuming that the Big 4 audit firms provide a higher level of assurance and audit quality, we predict that there is a positive relation between representative accounting figures, such as earnings and book value of equity and stock return, and that there is a positive relation between value relevance of representative accounting figures and audit quality.

3. Empirical design
3.1 Empirical model
The equity value of a firm can be expressed as a function of earnings and book value of equity (Ohlson, 1995). Considering Brown's *et al.* (1999) argument on the scale effect, all variables are deflated by stock price at the beginning of the period, P_{t-1}. We also consider the argument made by Lo and Lys (2001) by taking into account the effect of dividend on the dependent variable of stock price. We follow Collins *et al.* (1997), Francis and Schipper (1999), Brown *et al.* (1999) and Lo and Lys (2001) to use the standard value relevance equations, which include earnings and book value of equity as explanatory variables for stock price/return. Following Lo and Lys (2001) and Ohlson (1995), our models consider the influence of dividend on stock price. Assuming that stock price is the best available estimator of firm value, the following standard value relevance equation can be used to analyze the relation between earnings, book value, and value of the firm:

$$R_{i,t} = \alpha_0 + \alpha_1 \frac{E_{i,t}}{P_{i,t-1}} + \varepsilon_{1,i,t}, \tag{1}$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{BV_{i,t}}{P_{i,t-1}} + \varepsilon_{2,i,t}, \tag{2}$$

$$R_{i,t} = \gamma_0 + \gamma_1 \frac{E_{i,t}}{P_{i,t-1}} + \gamma_2 \frac{BV_{i,t}}{P_{i,t-1}} + \varepsilon_{3,i,t}, \tag{3}$$

$$R_{i,t} = \lambda_0 + \lambda_1 \frac{E_{i,t}}{P_{i,t-1}} + \lambda_2 \frac{BV_{i,t}}{P_{i,t-1}} + \lambda_3 \frac{D_{i,t}}{P_{i,t-1}} + \varepsilon_{4,i,t}, \tag{4}$$

where R_t is the stock return in period t, which is the sum of closing stock price and dividend deflated by beginning stock price. E_t is the earning per share in period t, BV_t is the book value of equity per share in period t, and D_t is the cash dividend in period t. In addition, in the robustness tests, we also use the models widely used in this line of research such as Collins *et al.* (1997), Barth *et al.* (1998), Francis and Schipper (1999) and Brown *et al.* (1999), which do not include dividend in both the dependent variable and independent variables.

A number of relative association studies of value relevance use the coefficient of determination, R^2 for regressing stock price/return on earnings and book value of equity to evaluate the value relevance of the two variables Examples include Harris *et al.* (1994), Collins *et al.* (1997), Barth *et al.* (1998), Brown *et al.* (1999), Francis and Schipper (1999),

Collins *et al.* (1999), Dhaliwal *et al.* (1999) and Lo and Lys (2001). Higher coefficient of determination means that those accounting numbers are more value relevant (Holthausen and Watts, 2001). Thus, we follow this line of research and divide all observations into two subsamples based on whether the financial statements are audited by Big 4 auditors or not, instead of adding an indicating variable and an interactive term into the above equations.

In addition, we also use the following two ways to test the differences in the R^2s of two subsamples[11]. First, following Lev and Zarowin (1999), we regress R^2 from two subsamples, for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The significant regression coefficient demonstrates the ability of Big 4 auditors in explaining changes in R^2. Second, we conduct paired-samples t-test and examine whether the mean of R^2s for clients of Big 4 auditors are statistically greater than that for clients of non-Big 4 auditors, for the same model. The significant t-statistics suggests that earnings and/or book value of equity audited by Big 4 auditors are more value relevant than those audited by non-Big 4 auditors.

3.2 Data and sample description
The source of all variables is taken from the *Taiwan Economic News*. The sample includes public companies listed in the Taiwan Securities and Exchange market from 1996 to 2009, with complete information for both financial statements and stock price for each year and no switching of audit firms between Big 4 auditors and non-Big 4 auditors over the sample period. The sample selection is made according to the following rules: common stock listed in Taiwan Securities and Exchange market, calendar year, non-financial-related industries, non-negative book value of equity (Collins *et al.*, 1999), and non-negative earnings (Hayn, 1995; Collins *et al.*, 1997; Barth *et al.*, 1998; Collins *et al.*, 1999).

The definitions of all variables are as follows: stock price (P_t) is the closing price in period t. Earnings per share (EPS) (E_t) is defined as EPS, adjusted stock dividend and stock split, in period t. Book value of equity per share (BV_t) in period t is the ending common stockholder equity, divided by outstanding number of common stock shares. Common stockholder equity is equal to ending stockholder equity less preferred stock in period t. D_t is cash dividend in period t. ROE_t is return on common stock equity in period t. All accounting variables are deflated by lagged market values at the end of the previous fiscal year, by a price × share outstanding × share adjustment factor, unless otherwise noted.

4. Empirical results and analysis
The sample includes 5,589 observations from 17 industries during 1996-2009 and is shown in Table I, Panel A. The 17 industries sampled include cement, food, plastic, textile, electric machinery, electrical and cables, chemistry, glass and pulp, paper, iron and steel, rubber, automobile, electronics, building material and construction, shipping and transportation, tourism, trading and consumer goods, general, and others[12]. To compare the difference in the value relevance of accounting information audited by Big 4 and non-Big 4 audit firms, we divide the total sample into two sub-samples based on whether the financial statements are audited by Big 4 audit firms or not. Similar to the market share of Big 4 audit firms in the US audit market, Panel B of Table I shows

Panel A. Number of observations ranked by year and industry[a]

Year industry	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Cement	7	7	7	7	4	4	7	7	7	7	7	7	6	7	91
Food	14	16	12	14	16	14	17	19	15	16	14	18	16	19	220
Plastics	14	14	12	15	14	12	17	19	19	18	19	19	14	21	227
Textile fibers	24	31	23	20	23	21	26	26	23	18	23	32	17	33	340
Electrical machinery	10	9	14	16	19	23	23	25	26	27	29	27	24	24	296
Electrical cables	8	8	8	11	10	5	11	10	11	10	11	11	5	9	128
Chemistry	14	15	11	14	17	24	25	27	28	30	30	31	29	30	325
Glass and ceramics	3	5	3	4	2	2	1	4	3	4	5	4	3	3	46
Paper	4	5	2	5	6	3	5	5	5	4	6	7	5	3	65
Steel	12	16	12	16	13	12	22	24	24	16	21	22	13	20	243
Rubber	8	8	8	6	5	7	9	8	9	7	8	10	7	10	110
Automotive	2	3	4	4	4	3	3	4	4	5	5	5	4	5	55
Electronics	35	51	51	80	114	127	160	212	232	235	264	281	259	266	2,367
Construction materials	15	19	17	13	14	12	14	22	25	28	30	33	27	32	301
Transportation	12	12	11	11	13	8	13	16	15	16	14	13	13	11	178
Tourism	5	5	4	5	4	3	4	3	5	6	6	6	6	6	68
Department stores	6	8	9	7	7	10	6	3	5	8	9	10	10	10	118
Other	20	22	22	21	26	29	31	34	33	34	32	36	33	38	411
Total	213	254	230	269	311	319	394	474	493	489	533	572	491	547	5,589

Panel B. Number of observations audited by Big 4 and non-Big 4 auditors

Subsample year	Clients of Big 4 auditors	Clients of non-Big 4 auditors	Total
1996	167	46	213
1997	204	50	254
1998	187	43	230
1999	220	49	269
2000	263	48	311
2001	266	53	319
2002	332	62	394
2003	408	66	474
2004	423	70	493
2005	425	64	489
2006	460	73	533
2007	493	79	572
2008	434	57	491
2009	476	71	547
Total	4,775	814	5,589

Table I.

Notes: [a]The electronics industry covers nearly half observations of the sample, because it contained a broader scope of electronic-related firms and was reclassified as eight industries in 2007 by Taiwan Stock Exchange such as semiconductors, computer and peripheral equipment, optoelectronic, communications and internet, electronic components, electronic products and distribution, information service, and other electronic industry; for simplicity, we use the original classification

4.1 Descriptive statistics

Table II summarizes descriptive statistics of the total sample. For the total sample, stock price ranges from 0.76 to 2,773.86, with an average of 25.39 and standard deviation of 68.56. EPS is between 0.01 and 57.85, with an average of 2.23, standard deviation of 2.69. The average amount of book value per share is 17.74, with standard deviation of 8.78, and maximum and minimal values of 102.18 and 0.61, respectively. Of 5,589 observations, 4,775 (85 percent) are those audited by Big 4 firms. Table III presents Pearson correlation coefficient on any two variables of stock price (P), earnings per share (EPS), book value of equity per share (BV), and dividend per share (D). EPS and D have highest correlation, which is 0.836. The correlation between EPS and BV is also high, at 0.753.

4.2 Regression analysis

Following Francis and Schipper (1999), Brown *et al.* (1999) and Lo and Lys (2001), we use the standard value relevance equations (1)-(4), which include earnings and book value of equity as explanatory variables for stock price/return. As Holthausen and Watts (2001) point out, the relative association studies of value relevance use the coefficient of determination, R^2 of regressions to evaluate whether selected accounting variables are value relevant. As explained above, we compare the value relevance of earnings and book value of equity between clients of Big 4 auditors and non-Big 4 auditors in the following ways. First, following this line of research, we use R^2 of regressions to evaluate whether accounting numbers audited by Big 4 auditors are more value relevant than those audited by non-Big 4 auditors. Second, we follow Lev and Zarowin (1999) and regress R^2 from two subsamples, for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The significant regression coefficient demonstrates the better ability of Big 4 auditors in explaining changes in R^2. Third, we conduct paired-samples t-test and examine whether the mean R^2 for clients of Big 4 auditors is statistically greater

Variables	Average	SD	Median	Minimum	Maximum	
Price (P)	25.39	68.564	15.01	0.76	2,773.86	
Earnings per share (EPS)	2.23	2.688	1.52	0.01	57.85	
Book value per share (BV)	17.73	5.1774	15.70	0.61	102.18	**Table II.**
Dividend (D)	0.99	1.577	0.50	0.00	34.00	Descriptive statistics

Variables	P	EPS	BV	D	
Price (P)	1.000	0.295	0.294	0.279	
Earnings per share (EPS)	0.295	1.000	0.753	0.836	
Book value per share (BV)	0.294	0.753	1.000	0.674	**Table III.**
Dividend (D)	0.279	0.836	0.674	1.000	Pearson correlation

than that for clients of non-Big 4 auditors, for the same model. As such, this study divides all observations into two subgroups based on whether the financial statements are audited by Big 4 audit firms or not. If the R^2 of regressions with accounting numbers audited by Big 4 firms is higher than that audited by non-Big 4 firms, it means that those pieces of information audited by Big 4 audit firms are more value relevant. Thus, audit quality, as characterized by audit firm size, is positively related to value relevance of selected accounting variables.

Table IV, Panel A lists the results of regressing either or both of earnings and book value of equity, and/or dividend on stock return for both clients of Big 4 auditors and non-Big 4 auditors (equations (1)-(4)). The F values and regression coefficients of regressing stock return on both earnings and book value of equity (or earnings) for clients of Big 4 auditors, as shown in equation (3) (equation (1)) in each year over the sample period 1996-2009, are all significant at 1 percent. This means that both earnings and book value of equity (or earnings) have significant explaining power for stock return. The coefficients of determination R^2s are between 0.188 (0.174) and 0.635 (0.525) from 1996 to 2009, meaning that earnings and book value of equity jointly (earnings) can explain 18.8 percent (17.4 percent) to 63.5 percent (52.5 percent) of variations in stock return between

Explanatory variable(s) Year	Earnings		Book value of equity		Earnings and book values		Earnings, book values, and dividend	
	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4
Panel A. The coefficients of determination R^2 *for equations (1)-(4)*								
1996	0.384	0.073	0.394	−0.016	0.401	0.136	0.406	0.123
1997	0.378	0.064	0.222	0.009	0.384	0.316	0.382	0.357
1998	0.364	0.355	0.115	0.120	0.367	0.340	0.368	0.323
1999	0.202	0.055	0.010	−0.010	0.231	0.051	0.230	0.047
2000	0.277	0.404	0.131	0.376	0.283	0.451	0.345	0.460
2001	0.408	0.178	0.037	−0.004	0.419	0.164	0.462	0.180
2002	0.525	0.652	0.443	0.563	0.634	0.688	0.634	0.696
2003	0.341	0.613	0.390	0.125	0.519	0.607	0.525	0.742
2004	0.334	0.349	0.327	0.306	0.460	0.367	0.552	0.461
2005	0.504	0.204	0.039	0.069	0.507	0.228	0.508	0.254
2006	0.266	0.415	0.239	0.138	0.373	0.458	0.374	0.453
2007	0.174	0.288	0.033	0.273	0.188	0.416	0.394	0.416
2008	0.235	0.113	0.161	0.019	0.327	0.116	0.390	0.108
2009	0.358	0.281	0.211	0.163	0.409	0.314	0.426	0.316
Total	0.217	0.278	0.163	0.184	0.248	0.299	0.301	0.304
Panel B. Significance test of difference in R^2 *of Big 4 and non-Big 4 subsamples*								
Paired *t*-test								
Mean	0.339	0.289	0.197	0.152	0.393	0.332	0.428	0.353
t-stat.	0.975		0.919		1.366		1.725	
p-value	0.174		0.187		0.098[*]		0.054[*]	
t-test for regression of R^2 on dummy variable								
t-stat.	4.942		3.844		5.189		5.344	
p-value	0.000[***]		0.000[***]		0.001[***]		0.000[***]	

Table IV.
Coefficients of determination for equations (1)-(4)

Notes: Significant at: [*]1, [**]5 and [***]10 percent, respectively; Big 4 denotes a subsample for clients of Big 4 auditors, whereas non-Big 4 denotes a subsample for clients of non-Big 4 auditors; the dummy variable is one for the Big 4 subsample and zero for the non-Big 4 subsample

1996 and 2009. Similarly, except in 1999, the F values of regressing stock return on both earnings and book value of equity (or earnings) for clients of non-Big 4 auditors are all significant at 10 percent, in each year over the sample period. This means that both earnings and book value of equity jointly (or earnings) have significant explaining power for stock return. Both earnings and book value of equity jointly (earnings) can explain 11.6 percent (5.5 percent) to 68.8 percent (65.2 percent) of variations in stock return between 1996 and 2009, except in 1999.

Comparing R^2 for the same model between two subsamples further finds that, except in 2000, 2002, 2003, 2006 and 2007 (2002-2004, 2006, and 2007), R^2s for clients of Big 4 auditors are greater than those for clients of non-Big 4 auditors. This means that both earnings and book value of equity (earnings) audited by Big 4 auditors jointly explain more variations in stock return than those audited by non-Big 4 auditors in nine (eight) out of 14 years during 1996-2009 and are more value relevant. This preliminary evidence moderately supports our prediction of a positive relation between audit quality and value relevance of earnings and book value of equity (earnings).

The results of regressing book value of equity on stock return (equation (2)), for clients of Big 4 auditors (clients of non-Big 4 auditors) show that, the F values in all other years are significant at a confidence level of 10 percent, except in 1996, 1999, 2001, and 2008 of the non-Big 4 subsample. Specifically, book value of equity, audited by Big 4 auditors (non-Big 4 auditors), can explain 1 percent (6.9 percent) to 44.3 percent (56.3 percent) of variations in stock return. Comparing R^2s for two subsamples suggests that book value of equity audited by Big 4 firms has better explanatory power on stock return than that of non-Big 4 audit firms in nine out of 14 years during 1996-2009. This evidence moderately supports our prediction of a positive relation between audit quality and value relevance of book value of equity.

Lastly, regressing stock return on earnings, book values, and dividend for two subsamples shows similar results. The F-statistics in all years are significant, except in 1999 for non-Big 4 subsample. Except in 2000, 2002, 2003, 2006 and 2007, the R^2s of regressing stock return on dividend for clients of Big 4 auditors are greater than those for clients of non-Big 4 auditors. Adding book value of equity and dividend as an explanatory variable only slightly increase the R^2s for both Big 4 and non-Big 4 subsamples. Thus, the results provide few pieces of evidence to support the argument that dividend is value relevant for stock return.

As noted above, we use two statistical tests to examine the difference in R^2 of two subsamples for a given model[13]. First, following Lev and Zarowin (1999), we run regressions of R^2 obtained from two subsamples for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The regression coefficients for all models as shown in equations (1)-(4) are significant, $p < 0.001$, suggesting a significant positive difference in the ability of Big 4 auditors to explain changes in R^2 over the sample period.

Second, we conduct paired-samples t-test and examine, given a model, whether the R^2s for clients of Big 4 auditors are statistically greater than those for clients of non-Big 4 auditors. As shown in Panel B of Table IV, the mean of R^2 of equation (3) (equation (4)) for Big 4 subsample is statistically greater those for non-Big 4 subsample, $p = 0.098$ ($p = 0.054$). This suggests that earnings and book value (and dividend) audited by Big 4 auditors jointly and significantly explain more variations than those audited by non-Big 4 auditors. Collectively, the above findings are consistent with our prediction

that earnings and book value audited by Big 4 auditors can explain more variations in stock return than book value, and hence is more value relevant for both subsamples.

To preclude from the effect of extreme values, we follow Collins *et al.* (1997), and remove 1 percent of extreme values on either price, earnings, book value of equity or dividend and rerun all models. We find stronger results, as shown in the Table V [14]. Comparing R^2s for two subsamples suggests that the R^2s of equations (2)-(4) (1) for Big 4 subsample are greater than those for non-Big 4 subsample in 11 (ten) out of 14 years over the sample period. In addition, we run regressions of R^2 from two subsamples, for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The regression coefficients for all models as shown in equations (1)-(4) are all significant at $p < 0.001$, suggesting a significant difference in the ability of Big 4 auditors to explain changes in R^2. Moreover, the paired-samples t-test indicates that, except for equation (2), the means of R^2 of other equations for Big 4 subsample are statistically greater those for non-Big 4 subsample, $p = 0.027$, 0.006, 0.001, respectively. The t-statistics for equation (2), with book values as an explanatory variable, is marginally significant, $p = 0.125$. Overall, these stronger findings are supportive of our prediction that earnings and book value of equity audited by Big 4 auditors have better explanatory power on stock return than those audited by non-Big 4 auditors.

Explanatory variable(s) Year	Earnings		Book value of equity		Earnings and book values		Earnings, book values, and dividend	
	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4
Panel A. The coefficients of determination R^2 *for equations (1)-(4)*								
1996	0.361	0.107	0.200	−0.003	0.358	0.142	0.362	0.130
1997	0.389	0.079	0.131	0.006	0.454	0.322	0.460	0.364
1998	0.343	0.300	0.091	0.036	0.347	0.286	0.357	0.266
1999	0.193	0.073	0.006	0.001	0.223	0.061	0.223	0.057
2000	0.259	0.383	0.097	0.336	0.259	0.421	0.327	0.433
2001	0.305	0.176	0.039	−0.008	0.306	0.160	0.331	0.175
2002	0.400	0.463	0.414	0.323	0.594	0.514	0.595	0.530
2003	0.388	0.427	0.248	0.060	0.482	0.418	0.484	0.433
2004	0.342	0.212	0.280	0.122	0.465	0.258	0.491	0.247
2005	0.364	0.199	0.017	0.062	0.366	0.201	0.371	0.248
2006	0.244	0.331	0.239	0.095	0.357	0.381	0.356	0.375
2007	0.347	0.288	0.033	0.273	0.347	0.416	0.410	0.416
2008	0.209	0.113	0.138	0.019	0.295	0.116	0.352	0.108
2009	0.288	0.281	0.183	0.163	0.364	0.314	0.409	0.316
Total	0.231	0.198	0.143	0.112	0.265	0.218	0.298	0.220
Panel B. Significance test of difference in R^2 *of Big 4 and non-Big 4 subsamples*								
Paired *t*-test								
Mean	0.301	0.256	0.190	0.134	0.362	0.296	0.386	0.210
t-stat.	2.116		1.206		2.926		3.703	
p-value	0.027**		0.125		0.006***		0.001***	
t-test for regression of R^2 on dummy variable								
t-stat.	5.825		4.035		5.892		6.138	
p-value	0.000***		0.000***		0.000***		0.000***	

Notes: Significant at: *1, **5 and ***10 percent, respectively; Big 4 denotes a subsample for clients of Big 4 auditors, whereas non-Big 4 denotes a subsample for clients of non-Big 4 auditors; the dummy variable is one for the Big 4 subsample and zero for the non-Big 4 subsample

Following Brown *et al.* (1999) and Francis and Schipper (1999) neither of which included dividend for both the dependent variable and independent variables, we modify equations (1)-(3), in which stock price (P_t), deflated by lagged stock price, is the dependent variable, as follows:

$$\frac{P_{i,t}}{P_{i,t-1}} = \alpha'_0 + \alpha'_1 \frac{E_{i,t}}{P_{i,t-1}} + \varepsilon'_{1,i,t}, \tag{5}$$

$$\frac{P_{i,t}}{P_{i,t-1}} = \beta'_0 + \beta'_1 \frac{BV_{i,t}}{P_{i,t-1}} + \varepsilon'_{2,i,t}, \tag{6}$$

$$\frac{P_{i,t}}{P_{i,t-1}} = \gamma'_0 + \gamma'_1 \frac{E_{i,t}}{P_{i,t-1}} + \gamma'_2 \frac{BV_{i,t}}{P_{i,t-1}} + \varepsilon'_{3,i,t}, \tag{7}$$

In addition, we also modify equation (4), exclusive of dividend as a component of the dependent variable as follows:

$$\frac{P_{i,t}}{P_{i,t-1}} = \lambda'_0 + \lambda'_1 \frac{E_{i,t}}{P_{i,t-1}} + \lambda'_2 \frac{BV_{i,t}}{P_{i,t-1}} + \lambda'_3 \frac{D_{i,t}}{P_{i,t-1}} + \varepsilon'_{4,i,t}, \tag{8}$$

The results of estimating the modified equations (5)-(8) for both Big 4 and non-Big 4 subsamples are, respectively, shown in Table VI, which are similar to those in Table IV. The R^2s for Big 4 subsample are greater than those for non-Big 4 subsample in seven to nine out of 14 years over the sample period. Likewise, we run regressions of R^2 from two subsamples, for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The significant regression coefficients ($p < 0.001$) for all models as shown in equations (5)-(8) suggest a significant positive difference in the ability of Big 4 auditors to explain changes in R^2. In addition, the paired-samples t-test, as shown in Panel B, Table VI, indicates that the means of R^2 of equations (7)-(8) for Big 4 subsample are statistically greater those for non-Big 4 subsample, $p = 0.072, 0.068$, respectively. The t-statistics for equation (5), with book values as an explanatory variable, is marginally significant, $p = 0.128$. These findings suggest that either book value of equity or combining earnings and book value (and dividend) audited by Big 4 auditors jointly and significantly explain more variations than those audited by non-Big 4 auditors. Collectively, these findings are generally supportive of our prediction of a positive association between Big 4 auditors, a proxy for audit quality, and the value relevance of earnings and book value.

Finally, we remove 1 percent of extreme values on earnings or book value of equity and rerun, rerun all models, and find stronger results as shown in the Table VII. Comparing R^2s for two subsamples suggests that the R^2s of equations (2)-(4) (equation (1)) for Big 4 subsample are greater than those for non-Big 4 subsample in 11 (ten) out of 14 years over the sample period. Again, we run regressions of R^2 from two subsamples, for the same model, on a 0-1 dummy variable, where R^2 from the Big 4 subsample is one and zero for R^2 from the non-Big 4 subsample. The significant regression coefficients ($p < 0.069$) for equations (5)-(8) suggest a significant difference in the ability of Big 4 auditors to explain changes in R^2. Additionally, the paired-samples t-test indicates that, the means of R^2 of equations (5)-(8) for Big 4 subsample are statistically greater those for non-Big 4 subsample. Overall, these stronger findings are consistent with our prediction

Explanatory variable(s) Year	Earnings		Book value of equity		Earnings and book values		Earnings, book values, and dividend	
	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4
Panel A. The coefficients of determination R^2 for equations (1)-(4)								
1996	0.387	0.062	0.394	−0.019	0.402	0.128	0.398	0.107
1997	0.373	0.063	0.215	0.008	0.381	0.310	0.384	0.363
1998	0.324	0.345	0.088	0.097	0.331	0.330	0.332	0.326
1999	0.185	0.046	0.004	−0.016	0.221	0.051	0.229	0.034
2000	0.215	0.331	0.082	0.275	0.214	0.349	0.227	0.337
2001	0.360	0.109	0.025	−0.018	0.374	0.104	0.456	0.089
2002	0.470	0.626	0.424	0.542	0.585	0.661	0.598	0.656
2003	0.291	0.559	0.398	0.115	0.493	0.552	0.492	0.738
2004	0.280	0.323	0.332	0.283	0.427	0.338	0.464	0.354
2005	0.442	0.179	0.033	0.057	0.444	0.180	0.455	0.182
2006	0.210	0.360	0.237	0.129	0.330	0.399	0.330	0.422
2007	0.150	0.224	0.033	0.257	0.164	0.356	0.308	0.347
2008	0.194	0.095	0.173	0.015	0.302	0.095	0.324	0.097
2009	0.335	0.264	0.217	0.151	0.395	0.293	0.401	0.285
Total	0.198	0.246	0.157	0.159	0.231	0.263	0.258	0.262
Panel B. Significance test of difference in R^2 of Big 4 and non-Big 4 subsamples								
Paired *t*-test								
Mean	0.301	0.256	0.190	0.134	0.362	0.296	0.386	0.310
t-stat.		0.877		1.190		1.558		1.587
p-value		0.198		0.128		0.072*		0.068*
t-test for regression of R^2 on dummy variable								
t-stat.		4.813		3.933		5.251		5.258
p-value		0.000***		0.001***		0.000***		0.000***

Notes: Significant at: *1, **5 and ***10 percent, respectively; Big 4 denotes a subsample for clients of Big 4 auditors, whereas non-Big 4 denotes a subsample for clients of non-Big 4 auditors; the dummy variable is one for the Big 4 subsample and zero for the non-Big 4 subsample

Table VI.
Coefficients of determination for equations (6)-(9)

of a positive association between audit quality as characterized by Big 4 auditors and the value relevance of earnings and book value.

4.3 Additional analysis
In the robustness checks, we examine whether the results hold for different time period and control for risk and growth factors, for the following cases. First, in Taiwan the Big 5 audit firms consolidated into Big 4 audit firms in 2002, which are Deloitte & Touche, Price Waterhouse Coopers, KPMG Peat Marwick, and Ernst & Young. We examine the results for the sample period from 2003 to 2009 to preclude the influence of consolidation. The evidence shown in Tables IV-VII is similar to the major findings. EPS, book value of equity, and dividend audited by Big 4 auditors explain more variations in changes of stock return and are more value relevant than, as captured by R^2, those audited by non-Big 4 auditors.

Second, to control for risk and growth opportunities that could influence the results, we have run regressions of stock return on earnings and/or book value of equity. We use

Explanatory variable(s) Year	Earnings		Book value of equity		Earnings and book values		Earnings, book values, and dividend	
	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4	Big 4	Non-Big 4
Panel A. The coefficients of determination R^2 *for equations (1)-(4)*								
1996	0.345	0.096	0.184	−0.007	0.343	0.133	0.340	0.111
1997	0.376	0.078	0.122	0.005	0.444	0.315	0.460	0.371
1998	0.324	0.293	0.078	0.028	0.332	0.281	0.328	0.280
1999	0.176	0.064	0.001	−0.008	0.214	0.058	0.224	0.041
2000	0.195	0.307	0.051	0.231	0.192	0.316	0.204	0.301
2001	0.260	0.110	0.026	−0.002	0.263	0.102	0.321	0.085
2002	0.354	0.396	0.407	0.290	0.556	0.445	0.556	0.491
2003	0.312	0.332	0.246	0.049	0.419	0.321	0.441	0.377
2004	0.268	0.148	0.284	0.089	0.412	0.181	0.414	0.189
2005	0.302	0.175	0.014	0.052	0.303	0.174	0.326	0.176
2006	0.194	0.302	0.236	0.092	0.318	0.352	0.319	0.365
2007	0.296	0.224	0.032	0.257	0.296	0.356	0.330	0.347
2008	0.168	0.095	0.150	0.015	0.269	0.095	0.287	0.097
2009	0.253	0.264	0.192	0.151	0.343	0.293	0.368	0.285
Total	0.202	0.168	0.138	0.093	0.238	0.184	0.252	0.183
Panel B. Significance test of difference in R^2 *of Big 4 and non-Big 4 subsamples*								
Paired *t*-test								
Mean	0.273	0.206	0.145	0.089	0.336	0.244	0.351	0.251
t-stat.	2.068		1.584		3.289		3.515	
p-value	0.03**		0.069***		0.003***		0.002***	
t-test for regression of R^2 on dummy variable								
t-stat.	5.890		4.246		6.117		6.149	
p-value	0.000***		0.000***		0.000***		0.000***	

Notes: Significant at: *1, **5 and ***10 percent, respectively; Big 4 denotes a subsample for clients of Big 4 auditors, whereas non-Big 4 denotes a subsample for clients of non-Big 4 auditors; the dummy variable is one for the Big 4 subsample and zero for the non-Big 4 subsample

book-to-market, P/E ratio, and size, measured by log of market value of equity, as control variables, for two subsamples[15]. The untabulated results are qualitatively similar to those shown in the tables. The R^2s for all models of subsample of Big 4 auditors over the sample period are greater than the subsample of non-Big 4 auditors. For example, the earnings and book value of equity for clients of Big 4 auditors explain more variations in stock return than those for clients of non-Big 4 auditors (45.2 > 42.5 percent). Likewise, the earnings (book value of equity) for clients of Big 4 auditors explain more changes in stock return than those for clients of non-Big 4 auditors (earnings: 30.2 > 28.8 percent; equity: 44.3 > 41.2 percent)[16]. Collectively, our findings are robust to control for the risk and growth factors and suggest the positive association between audit quality, as characterized by Big 4 auditors, and value relevance of earnings and book value of equity[17].

In sum, earnings and book value of equity audited by Big 4 auditors, can generally explain more variations in stock return and hence are more value relevant than those audited by non-Big auditors. This suggests that Big 4 auditors improve the value relevance of earnings and book value of equity more than non-Big 4 auditors.

5. Concluding remarks

Past research indicates a positive relation between audit quality and financial statements quality, measured by earnings quality or information disclosure quality. This study further identifies the relation between audit quality and value relevance of represented accounting numbers such as earnings and book value of equity. This paper uses brand name as a proxy for audit quality and explores the effects of earnings and book value of equity audited by Big 4 and non-Big 4 audit firms on stock returns.

Major results show that, in general, earnings and book value of equity audited by Big 4 auditors can explain more variations in stock returns and hence are more value relevant than those audited by non-Big 4 auditors. The results are robust to different models and measurements of value relevance and control for risk and growth factors. Assuming that the Big 4 audit firms provide a higher level of assurance and audit quality, the overall results generally support our prediction that there is a positive relation between audit quality and value relevance of earnings and book value of equity.

The results suggest the effectiveness of quality audits provided by Big 4 audit firms, as the audited financial statements provide information more relevant for firm value and can better explain the changes in stock return, and so is more useful in predicting future value of the firm. Future research may consider using industry specialization as a measure of audit quality. The industry specialized auditors may increase the usefulness of representative accounting information. Future research may further consider the relation between audit quality and stock price predictability.

Notes

1. In the Conceptual Framework for Financial Reporting of both Financial Accounting Standards Board (Statement of Financial Accounting Concept No. 8, announced in September 2010), and International Accounting Standards Board, the fundamental qualities that replace primary qualities are, relevance and faithful. The enhancing qualities complementary to the fundamental qualities are comparability, verifiability, timeliness, and understandability. Although there are some changes in SFAC No. 8, all the ingredients of primary qualities are contained in the fundamental and enhancing qualities of financial information. For simplicity and consistency, we use reliability instead of faithful representation.

2. Chow (1982) examines firms' incentives to hire external auditing from the perspective of agency costs. He shows that leverage, firm size, and number of accounting-based debt covenants increases the likelihood that a firm will voluntarily hire external auditing, whereas the firm manager's ownership share has opposite effect. Francis and Wilson (1988) documents that demand for higher-quality increases with agency costs measured by managerial stock ownership, presence of accounting-based bonus plans, largest individual percentage of stock, and ratio of long-term debt to total assets.

3. For example, investors make an overall judgment on whether to buy, sell, or hold stocks, whereas creditors make an overall judgment on whether to lend funds or extend credit to borrowers.

4. As Statement of Financial Accounting Concept No. 8 (Chapter 3, QC 12) specifies: "To be useful, financial information not only must represent relevant phenomena, but it also must faithfully represent the phenomena that it purports to represent." Therefore, faithfully representative but irrelevant accounting information or relevant but unfaithfully representative accounting information is not useful for users' decision-making.

5. Palmrose (1988) argues that auditors with a higher level of assurance have stronger incentives to reduce the likelihood of audit failure to maintain their reputation. Therefore, auditors with fewer lawsuits provide a higher level of assurance and have higher audit quality.

6. Auditors perform many audit tasks that frequently requires making judgment. Audit judgment performance is affected by knowledge, ability, environment, and motivation (Libby, 1995).

7. Holthausen and Watts (2001) classify value relevant literature into three categories as follows: (a) relative association studies: these studies compare the relation between stock market value or changes in market value and summarized accounting measures, for example, Dhaliwal *et al.* (1999) and Harris *et al.* (1994); (b) incremental association studies: these studies analyze whether specific accounting figures aid to explain stock return or stock value. The accounting measure is value relevant if the regression coefficient is significantly different from zero; and (c) marginal information content studies: these studies investigate whether specific accounting figures is incorporated into investors' available information set. The event study is usually used to determine whether the release of accounting information is related to changes in stock price. The significant response of stock price is regarded as evidence of value relevance.

8. Though Holthausen and Watts (2001) point out that value relevance research has limited influences on standard setting, Barth *et al.* (2001) has opposite comment on the implications of value relevance in standard setting.

9. Using Taiwan's data, Lee and Wang (2003) adopt accounting based residual income valuation model to estimate firm's intrinsic value and finds that both book value of equity and intrinsic value significantly explain cross sectional variations in security returns. However, consistent with Lo and Lys (2001), the value relevance, in terms of the coefficient of determination, of both earnings and book value has decreased over time.

10. This result holds in the absence of monitoring mechanisms in terms of the discretionary accounting for R&D expenditures. Specifically, they find that market valuation of the capitalized R&D costs of clients of big firm auditors is greater than that of clients of non-Big firm auditors.

11. We have also followed Francis and Schipper (1999) and statistically test the difference of R^2 between two subsamples: clients of Big 4 auditors and clients of non-Big 4 auditors. The F-statistics show significant difference in the ability of earnings and book value of equity to explain stock returns of clients of Big 4 auditors and clients of non-Big 4 auditors.

12. The electronics industry covers nearly half observations of the sample, because it contained a broader scope of electronic-related firms and was reclassified as eight industries in 2007 by Taiwan Stock Exchange such as semiconductors, computer and peripheral equipment, optoelectronic, communications and internet, electronic components, electronic products and distribution, information service, and other electronic industry. For simplicity, we use the original classification. Nevertheless, we have rerun regressions of the main models for a subsample of electronic-related firms. The regression analysis indicates that our results hold for firms in these electronic-related industries. Both earnings and book value of equity of firms in these electronic-related industries audited by Big 4 auditors explain more variations in stock return (earnings, $18 > 15$ percent, book value of equity, $23 > 20$ percent; both earnings and book values, $24 > 22$ percent), and hence are more value relevant than those of non-Big 4 auditors. These results qualitatively hold for firms in non-electronic-related industries.

13. Following Francis and Schipper (1999), we use F-statistics to test the differences in R^2, of regressions of stock return on earnings and/or book values, between two subsamples of clients of Big4 auditors and clients of non-Big 4 auditors. The F-statistics indicates that

earnings for clients of Big 4 auditor significantly explains more of variations in stock return ($p < 0.016$). Likewise, combining earnings and book value of equity (earnings, equity, and dividend) for clients of Big 4 auditor significantly explains more of variations in stock return, $p < 0.057$ ($p < 0.008$). We fail to find book value of equity audited by Big 4 auditors significantly explain more changes in stock return. These results are supportive of our findings as shown in our analysis. However, the R^2s for all models of subsample of Big 4 auditors over the sample period are greater than the subsample of non-Big 4 auditors.

14. The sample size reduces to 5,398, where the number of observations is 4,600 and 798 for the Big 4 subsample and non-Big 4 subsample, respectively.

15. The authors are thankful for one of the referees' suggestion on this robustness check.

16. In addition, we have also included P/B ratio as a control variable and run regressions of the models. Again, the results are similar to those as shown above, without changing our conclusion.

17. In response to one referee's comment, we have also run regressions excluding observations of 2008 and 2009 and found similar results as those shown in the tables of the manuscript. Both earnings and book value of equity for clients of Big 4 auditors over the period of 1996-2007 explain more variations in stock return (earnings, 28.5 > 23.1 percent, book value of equity, 11.7 > 9.8 percent; both earnings and book values, 29.8 > 24.1 percent), and hence are more value relevant than those for clients of non-Big 4 auditors. Nevertheless, we believe that the observations from 2008 and 2009 should be included in our analysis for two reasons. First, in 2008, the well-known global financial crisis resulted in huge economic loss for many listed companies. However, our sample has already precluded observations of firms with loss as the negative earnings have information contents different from positive earnings (Hayn, 1995; Collins *et al.*, 1997; Barth *et al.*, 1998). Second, since it is all firms that suffered the same economic shock by the financial crisis, all observations in the sample period, from 1996 to 2009, should be included in our sample for analysis.

References

Balachandran, S. and Mohanram, P. (2011), "Is the decline in the value relevance of accounting driven by increased conservatism?", *Review of Accounting Studies*, Vol. 16, pp. 272-301.

Balsam, S., Krishnan, J. and Yang, J.S. (2003), "Auditor industry specialization and earnings quality", *Auditing: A Journal of Practice & Theory*, Vol. 22, pp. 71-97.

Banker, R., Huang, R. and Natarajan, R. (2009), "Incentive contracting and value relevance of earnings and cash flows", *Journal of Accounting Research*, Vol. 47 No. 3, pp. 647-678.

Barth, M.E., Beaver, W.H. and Landsman, W.R. (1998), "Relative valuation roles of equity book value and net income as a function of financial health", *Journal of Accounting and Economics*, Vol. 25 No. 1, pp. 1-34.

Barth, M.E., Beaver, W.H. and Landsman, W.R. (2001), "The relevance of the value relevance literature for financial accounting standard setting: another view", *Journal of Accounting and Economics*, Vol. 31, pp. 77-104.

Barton, J., Hansen, T. and Pownall, G. (2010), "Which performance measures do investors around the world value the most – and why?", *The Accounting Review*, Vol. 85 No. 3, pp. 753-789.

Becker, C.L., DeFond, M.L., Jiambalvo, J. and Subramanyam, K.R. (1998), "The effect of audit quality on earnings management", *Contemporary Accounting Research*, Vol. 15, pp. 1-24.

Behn, K.B., Choi, J.-H. and Kang, T. (2008), "Audit quality and properties of analyst earnings forecasts", *The Accounting Review*, Vol. 83, pp. 327-349.

Brown, S., Lo, K. and Lys, T. (1999), "Use of R^2 in accounting research: measuring changes in value relevance over the last four decades", *Journal of Accounting and Economics*, Vol. 28, pp. 83-135.

Chang, J. (1999), "The decline in value relevance of earnings and book values", working paper, Harvard University, Boston, MA.

Chow, C. (1982), "The demand for external auditing: size, debt and ownership influences", *The Accounting Review*, Vol. 57 No. 2, pp. 272-291.

Collins, D.W., Maydew, E.L. and Weiss, I.S. (1997), "Changes in the value-relevance of earnings and book values over the past forty years", *Journal of Accounting and Economics*, Vol. 24, pp. 39-67.

Collins, D.W., Pincus, M. and Xie, H. (1999), "Equity valuation and negative earnings: the role of book value of equity", *The Accounting Review*, Vol. 74 No. 1, pp. 29-61.

DeAngelo, L.E. (1981), "Auditor size and audit quality", *Journal of Accounting and Economics*, Vol. 3, pp. 183-199.

DeFond, M.L. and Jiambalvo, J. (1994), "Debt covenant violation and manipulation of accruals", *Journal of Accounting and Economics*, Vol. 17, pp. 145-176.

Dhaliwal, D., Subramanyam, K.R. and Trezevant, R. (1999), "Is comprehensive income superior to net income as a measure of firm performance?", *Journal of Accounting and Economics*, Vol. 26 No. 1, pp. 43-67.

Dunn, K.A. and Mayhew, B.W. (2004), "Auditor industry specialization and client disclosure quality", *Review of Accounting Studies*, Vol. 9, pp. 35-58.

Francis, J. and Schipper, K. (1999), "Have financial statements lost their relevance?", *Journal of Account Research*, Vol. 37, pp. 319-352.

Francis, J. and Wilson, E. (1988), "Auditor changes: a joint test of theories relating to agency costs and auditor differentiation", *The Accounting Review*, Vol. 63 No. 4, pp. 663-682.

Francis, J.R., Maydew, E.L. and Sparks, H.C. (1999), "The role of Big 6 auditors in the credible reporting of accruals", *Auditing: A Journal of Practice & Theory*, Vol. 18, pp. 17-34.

Harris, T.S., Lang, M. and Moller, H.P. (1994), "The value relevance of German accounting measures: an empirical analysis", *Journal of Accounting Research*, Vol. 32 No. 2, pp. 187-209.

Hayn, C. (1995), "The information content of losses", *Journal of Accounting and Economics*, Vol. 20, pp. 125-153.

Healy, P. and Lys, T. (1986), "Auditor changes following Big eight takeovers of non-Big eight audit firms", *Journal of Accounting and Public Policy*, Vol. 5 No. 4, pp. 251-265.

Holthausen, R.W. and Watts, R.L. (2001), "The relevance of the value-relevance literature for financial accounting standard setting", *Journal of Accounting and Economics*, Vol. 31, pp. 3-75.

Jensen, M. and Meckling, W. (1976), "Theory of the firm: managerial behavior, agency costs, and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Kinney, W. and Martin, R. (1994), "Does auditing reduce bias in financial reporting? A review of audit-related adjustment studies", *Auditing: A Journal of Practice & Theory*, Vol. 13, pp. 149-156.

Krishnan, G., Percy, M. and Tutticci, I. (2002), "The role of audit quality in firm valuation: the case of R&D capitalization in Australia", working paper, City University of Hong Kong, Queensland University of Technology, and University of Queensland, Brisbane.

Krishnan, V.K. (2005), "The association between Big 6 auditor industry expertise and the asymmetric timeliness of earnings", *Journal of Accounting, Auditing and Finance*, Vol. 20, pp. 209-228.

Lee, H. and Wang, T. (2003), "Value relevance: book value of equity and intrinsic value", *Review of Securities and Futures Markets*, Vol. 15 No. 3, pp. 63-103.

Lev, B. (1997), "The boundaries of financial reporting and how to extend them", working paper, New York University, New York, NY.

Lev, B. and Zarowin, P. (1999), "The boundaries of financial reporting and how to extend them", *Journal of Accounting Research*, Vol. 37, pp. 353-385.

Libby, R. (1995), "The role of knowledge and memory in audit judgment", in Ashton, R.H. and Ashton, A.H. (Eds), *Judgment and Decision Making Research in Accounting and Auditing*, Cambridge University Press, New York, NY.

Lo, K. and Lys, T. (2001), "Bridging the gap between value relevance and information content", working paper, University of British Columbia, Vancouver, BC.

Ohlson, J.A. (1995), "Earnings, book values, and dividends in equity valuation", *Contemporary Accounting Research*, Vol. 11, pp. 661-687.

Palmrose, Z.-V. (1988), "An analysis of auditor litigation and audit service quality", *The Accounting Review*, Vol. 63, pp. 55-73.

Ramesh, K. and Thiagarajan, R. (1995), "Inter-temporal decline in earnings response coefficients", working paper, Northwestern University, Evanston, IL.

Reynolds, J.K. and Francis, J.R. (2000), "Does size matter? The influence of large clients on office – level auditor reporting decisions", *Journal of Accounting and Economics*, Vol. 30 No. 3, pp. 375-400.

Watts, R.L. and Zimmerman, J.L. (1983), "Agency problems, auditing, and the theory of the firm: some evidence", *Journal of Law and Economics*, Vol. 26, pp. 613-634.

Further reading

Palmrose, Z.-V. (1986), "Audit fees and auditor size: further evidence", *Journal of Accounting Research*, Vol. 24, pp. 97-110.

Corresponding author
Hua Lee can be contacted at: ahlee@hksyu.edu