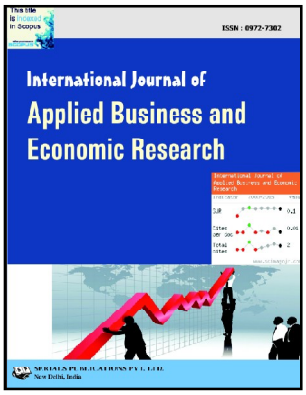

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The Effect of Audit Hours and Firm Characteristics on Earnings Quality

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Abstract: The main purpose of this study is to examine the effect of audit hours and firm characteristics on earnings quality over the period 2014–2015 in Korea, where audit firms are required to disclose audit hours by personnel level in their audit reports. The audit hours are measured as both total hours and hours by accounting professional position level. In public accounting firms, professional positions can be categorized as engagement quality reviewers, partners, registered certified public accountants (CPAs), apprentice CPAs and information technology (IT) experts. The proxy of earnings quality is discretionary accruals (DA) estimated using the modified Jones model. To test our hypothesis, we specify a stochastic frontier function in which output is DA and inputs are audit hours and firm characteristics. The results are summarised as follows. First, we verify that lower DA (i.e., higher earnings quality) is positively related to high total audit hours and audit hours incurred by each of engagement quality reviewers, partners, CPAs and IT experts. Second, the magnitude of scale economies in the stochastic frontier is less than one, signifying that there are decreasing returns to scale in audit activity. Our analysis reveals that total hours as well as audit hours by engagement quality reviewers, partners, CPAs and IT experts have positive relations with earnings quality. The empirical results are consistent with firms reporting high quality earnings when audit efforts are high.

Keywords: Audit Hours, Earnings Quality, Discretionary Accruals, Stochastic Frontier Analysis (SFA)

INTRODUCTION

Prior research has explored whether earnings quality is related to factors that could impair auditor independence. Such factors include audit fees, fees from non-audit services, client importance and audit tenure (Frankel *et al.*, 2002; Myers *et al.*, 2003). However, there is little evidence regarding the effect of the total audit hours and audit hours by each accounting professional position on earnings quality. The rarity of evidence on audit hours is mainly attributable to the unavailability of the data on audit hours.

In Korea, however, the Financial Supervisory Service (FSS) has required audit firms to disclose both total audit hours and audit hours of each professional position in their audit reports since 2014. The professional positions of an audit firm can be classified into the following five groups: (1) engagement quality reviewers who evaluate the significant judgments made by audit teams and related conclusions on the audit engagement to promote continuous improvements in audit quality, (2) partners who are registered certified public accountants (CPAs), act as the highest executive of the accounting firm, and determine final decisions on their projects and activities, (3) CPAs who are registered CPAs but not partners and generally handle audit processes for individual clients, (4) apprentice CPAs who are not registered CPAs but have passed CPA exams and are working under the apprenticeship programme at accounting firms, and (5) information technology experts (IT) who perform computer-based auditing to ensure a firm's information-related controls and processes are working properly.

Korea provides a good research setting, not only because of the availability of data on audit hours, but also because earnings management is more widespread than in other nations (Leuz *et al.*, 2003). Leuz *et al.* (2003) rank Korea as having the third earnings management score in an international study of 31 countries (with Austria and Greece having the first and second, respectively). Recently, as litigation risks have increased, more and more audit firms in Korea have been incentivised to exert effort and certify no misstatements.

Auditors are at risk of lawsuits or imperilled reputations if clients are found to have overstated earnings, but there is generally no penalty when clients understate earnings. Auditors and clients tend to disagree about accounting choices that overstate earnings rather than understate it and auditors generally require their clients to adjust earnings downwards (DeFond and Jiambalvo, 1993; Kinney and Martin, 1994; Nelson *et al.*, 2002). Caramanis and Lennox (2008) document that companies are apt to manage earnings upwards in order to meet or beat the zero earnings benchmark when audit hours are low.

We measure earnings quality by estimating discretionary accruals (DA) using the modified Jones model (Dechow *et al.*, 1995). Higher levels of positive DA indicate income-increasing earnings management and lower quality earnings. We focus on the overstated earnings and expect higher audit hours to reduce the extent to which managers aggressively overstate earnings. We make no prediction about the association between audit hours and the magnitude of negative DA.

Based on the above, our research hypothesis is as follows: *Audit hours are negatively (positively) related to discretionary accruals (earnings quality)*. This study tries to explore the relationship between audit hours and earnings quality using stochastic frontier analysis (SFA).

RESEARCH METHODOLOGY

We investigate the correspondence between audit hours and earnings quality. This relation is moderated by firm characteristics such as size, receivables, inventories and profitability that may affect a firm's earnings quality. According to prior research, we use DA as a proxy for earnings quality. Previous research on earnings management suggests that the modified Jones model performs the best among the various DA models. The modified Jones model is:

$$TACC_{i,t} / TA_{i,t-1} = a_0 / TA_{i,t-1} + a_1 * (\Delta REV_{i,t} - \Delta REC_{i,t}) / TA_{i,t-1} + a_2 * PPE_{i,t} / TA_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where, for each firm i and period t, TACC are the total accruals measured as the net income minus the cash flows from operating activities; TA are the total assets; ΔREV is the change in revenue; ΔREC is the change in accounts receivables; and PPE is the level of property, plant, and equipment. The TA as the deflator is intended to mitigate heteroskedasticity in residuals (White, 1980). We estimate (1) cross-sectionally each year using all firm-year observations in the same two-digit SIC code. DA is the residuals in (1) run with no intercept.

This study estimates a stochastic frontier function to test how DA is related to audit hours and firm characteristics. Consider a production function $y_i = g(x_i, \beta) + \varepsilon_i$ ($i = 1, 2, \ldots, N$), where y_i is the output, x_i is the vector of inputs, β is the vector of parameters, and ε_i is the error term for observation *i*. The stochastic frontier model postulates that the error term consists of two independent components, $\varepsilon_i = v_i - u_i$, where $v_i \sim N(0, \sigma_v^2)$ is a two-sided error term representing the usual statistical noise found in conventional regression equations and $u_i \geq 0$ is a one-sided error term representing technical inefficiency (Aigner *et al.*, 1977; Meeusen and van den Broeck, 1977; Jondrow *et al.*, 1982). An assumption about the distribution of u_i, such as half-normal, exponential, normal-gamma, or non-negative truncated distributions, is needed to separate estimates of the components v_i and u_i.

We specify a Cobb-Douglas production frontier where the output is earnings quality (i.e., positive DA+) and the input variables are total audit fees, total audit hours and the audit hours incurred by each professional position. The u_i is assumed to be distributed as the absolute value of a $N(0, \sigma_u^2)$ variable, signifying that each firm's output lies on or above its frontier. This implies that any deviation from the frontier is caused by production activities controlled by the firm. The following equation summarises our empirical model for the determinants of DA:

$$\ln DA_{i,t} = \beta_0 + \beta_1 * \ln AUDIT_{i,t} + \Sigma_{k=2}^{4} \beta_k * \ln FIRM_{k,i,t} + v_{i,t} - u_{i,t} \quad (2)$$

where, for each firm i and period t, DA is the DA+ and the earnings quality factor, *AUDIT* indicates the audit fees, total audit hours and audit hours incurred by the five professional positions.

Table 1
Variable Definitions

Variable			*Definition*
DA			Discretionary accruals estimated using the modified Jones model (Dechow *et al.*, 1995). We select positive DA+ to test our hypothesis.
AUDIT	*Audit fees*		Total audit fees, expressed in million Korean won
	Audit hours	*Total hours*	Total audit hours
		Quality reviewer	Audit hours of engagement quality reviewers
		Partner	Audit hours of partners who are registered CPAs
		CPA	Audit hours of registered CPAs who are not partners
		Apprentice	Audit hours of non-registered CPAs who have passed CPA exams and are under the apprenticeship programme in accounting firms
		IT expert	Audit hours of IT experts
FIRM	ASSET		Total assets, expressed in billion Korean won
	REINV		(Receivables + Inventories) / total assets
	ROA		Net income / total assets

We select three firm characteristic variables (FIRM) to control the moderation that affects the relationship between *AUDIT* and DA: ASSET to control for the size of the entity, REINV to control for accruals and audit risk, and ROA to control for the profitability. Variable definitions are summarised in Table 1. The DA reflects accruals that are due to management's choices. A high amount of DA+ indicates lower quality earnings and signal that management may be choosing aggressive accounting to overstate earnings. Therefore, the proposed hypothesis can be accepted if the estimate for β_1 is significantly negative in (2).

DATA AND DESCRIPTIVE STATISTICS

Since 2014, the Korean FSS has required all accounting firms to disclose audit hours incurred by each professional position in their audit reports. We utilise annual individual firm data for each of the two years from 2014 to 2015, resulting in a total of 2,802 observations. The unbalanced panel data was collected from the audit reports submitted by accounting firms to the FSS. Table 2 provides descriptive statistics for the variables used in our analysis.

Table 2
Descriptive Statistics for Pooled Data (N = 2,802)

Variable		*Mean*	*Standard deviation*	*Q1*	*Median*	*Q3*
DA		-0.003	0.121	-0.044	-0.002	0.040
Audit fees (Unit: Korean million won)		107	172	50	70	100
Audit hours	*Total hours*	1,405	2,024	676	906	1,397
	Quality reviewer	21	19	12	16	24
	Partner	110	101	42	72	150
	CPA	934	1,366	439	615	943
	Apprentice	283	461	1	162	360
	IT expert	56	318	1	1	40
ASSET *(Unit: Korean billion won)*		914	6,239	65	126	305
REINV		0.251	0.147	0.141	0.236	0.342
ROA		0.002	0.161	-0.011	0.025	0.059

The mean of DA is the negative value of -0.003, signifying that total accruals are less than non-discretionary accruals and firms manage earnings downwards. We use the positive value of DA to estimate equation (2). On average, the audit hours incurred by CPAs are 934, accounting for 66.5% (=934/1,405) of total hours. The apprentice CPAs provide 283 audit hours, making up 20.1% of total hours. The median values of audit fees, all audit hour-related variables and ASSET are much smaller than the mean values, indicating that the data are skewed to the right. Then we take logarithms of all variables to normalise the distributions. The high standard deviations suggest that the sample firms vary greatly in their size.

EMPIRICAL RESULTS

(A) Correlations

Table 3 reports Pearson and Spearman correlations between the selected variables over the two years. All variables were logarithmically transformed prior to calculating the correlation coefficients.

Table 3
Correlations Matrix (p-values in parenthesis)

	DA	*Audit fees*	*Total hours*	*Quality reviewer*	*Partner*	*CPA*	*Apprent-ice*	*IT expert*	*ASSET*	*REINV*	*ROA*
DA	-	-0.097 (p<0.01)	-0.091 (p<0.01)	-0.076 (p<0.01)	-0.089 (p<0.01)	-0.067 (p<0.01)	-0.047 (0.013)	-0.033 (0.084)	-0.015 (0.412)	0.114 (p<0.01)	0.351 (p<0.01)
Audit fees	-0.043 (0.022)	-	0.774 (p<0.01)	0.445 (p<0.01)	0.21 (p<0.01)	0.703 (p<0.01)	0.544 (p<0.01)	0.513 (p<0.01)	0.634 (p<0.01)	-0.047 (0.012)	-0.03 (0.111)
Total hours	-0.027 (0.147)	0.875 (p<0.01)	-	0.49 (p<0.01)	0.182 (p<0.01)	0.896 (p<0.01)	0.682 (p<0.01)	0.616 (p<0.01)	0.684 (p<0.01)	-0.043 (0.023)	-0.016 (0.386)
Quality reviewer	-0.029 (0.124)	0.544 (p<0.01)	0.572 (p<0.01)	-	0.313 (p<0.01)	0.411 (p<0.01)	0.342 (p<0.01)	0.31 (p<0.01)	0.378 (p<0.01)	-0.072 (p<0.01)	-0.014 (0.465)
Partner	-0.039 (0.040)	0.295 (p<0.01)	0.287 (p<0.01)	0.33 (p<0.01)	-	0.131 (p<0.01)	-0.144 (p<0.01)	-0.092 (p<0.01)	0.165 (p<0.01)	-0.013 (0.481)	-0.076 (p<0.01)
CPA	-0.017 (0.359)	0.82 (p<0.01)	0.936 (p<0.01)	0.509 (p<0.01)	0.216 (p<0.01)	-	0.425 (p<0.01)	0.479 (p<0.01)	0.631 (p<0.01)	-0.049 (p<0.01)	-0.013 (0.498)
Apprent-ice	0.001 (0.954)	0.445 (p<0.01)	0.534 (p<0.01)	0.26 (p<0.01)	-0.258 (p<0.01)	0.352 (p<0.01)	-	0.652 (p<0.01)	0.484 (p<0.01)	-0.04 (0.034)	0.018 (0.328)
IT expert	-0.008 (0.679)	0.597 (p<0.01)	0.668 (p<0.01)	0.35 (p<0.01)	-0.047 (0.013)	0.554 (p<0.01)	0.568 (p<0.01)	-	0.476 (p<0.01)	-0.067 (p<0.01)	0.024 (0.196)
ASSET	0.063 (0.001)	0.774 (p<0.01)	0.808 (p<0.01)	0.492 (p<0.01)	0.245 (p<0.01)	0.761 (p<0.01)	0.409 (p<0.01)	0.565 (p<0.01)	-	-0.004 (0.826)	0.142 (p<0.01)
REINV	0.063 (p<0.01)	-0.053 (p<0.01)	-0.064 (p<0.01)	-0.065 (p<0.01)	-0.018 (0.338)	-0.063 (p<0.01)	-0.05 (p<0.01)	-0.06 (p<0.01)	-0.06 (p<0.01)	-	0.084 (p<0.01)
ROA	0.456 (p<0.01)	-0.01 (0.6)	0.016 (0.383)	-0.001 (0.948)	0.000 (0.987)	0.009 (0.645)	0.037 (0.05)	0.036 (0.056)	0.111 (p<0.01)	0.017 (0.36)	-

Note: See Table 1 for variable definitions. Pearson correlations are below the diagonal, and Spearman correlations are above the diagonal. All variables were logarithmically transformed prior to calculating the correlation coefficients.

The audit fees, audit hour-related variables and ASSET are all positively correlated with each other. The Pearson correlation coefficients between DA and *Audit fees* and between DA and audit hours of *Partner* are significantly negative. The Spearman correlation coefficients between DA and *Audit fees*, between DA and *Total hours* and between DA and the audit hours of each professional position are significantly negative. This implies that there are monotonic associations between the two variables and lends some support to our research hypothesis.

(B) Stochastic Frontier Function

We document the effect of audit hours and firm characteristics on earnings quality by estimating (2). The audit hours are grouped into six categories: total audit hours and audit hours incurred by engagement quality reviewers, partners, CPAs, apprentice CPAs and IT experts. The proxy of earnings quality is DA+ estimated using the modified Jones model. Table 4 shows the results of the maximum likelihood estimation obtained for the stochastic frontier.

Table 4
Estimation of stochastic frontier function (p-values in parentheses)

Dependent variable: log of DA^{+}

	AUDIT is measured as:						
		Model (2): Audit hours					
Independent variables	*Model (1) Audit fees*	*(2-1) Total hours*	*(2-2) Quality reviewer*	*(2-3) Partner*	*(2-4) CPA*	*(2-5) Apprentice*	*(2-6) IT expert*
Constant	-0.478***	-0.574***	-0.533***	-0.508***	-0.547***	-0.529***	-0.555***
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)
AUDIT	-0.019***	-0.022***	-0.008**	-0.005*	-0.012**	-0.001	-0.002*
	(p<0.01)	(p<0.01)	(0.049)	(0.089)	(0.021)	(0.191)	(0.089)
FIRM ASSET	0.008***	0.009***	0.002	0.001	0.005*	0.001	0.002
	(p<0.01)	(p<0.01)	(0.249)	(0.519)	(0.057)	(0.48)	(0.262)
REINV	0.005**	0.004*	0.004*	0.005*	0.004*	0.004*	0.004*
	(0.044)	(0.055)	(0.065)	(0.053)	(0.059)	(0.064)	(0.065)
ROA	0.446***	0.447***	0.451***	0.453***	0.449***	0.453***	0.452***
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)
$\sigma^2 = \sigma_V^2 + \sigma_U^2$	0.017***	0.017***	0.017***	0.017***	0.017***	0.017***	0.017***
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)
$\gamma = \sigma_U^2 / \sigma^2$	0.353***	0.36***	0.374***	0.369***	0.371***	0.377***	0.373***
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)
η	-0.235***	-0.245***	-0.254***	-0.234***	-0.247***	-0.232***	-0.233***
	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)	(p<0.01)
Function coefficient	0.44	0.438	0.449	0.454	0.446	0.457	0.456
Log likelihood	2149.64	2150.87	2145.92	2145.42	2146.66	2144.85	2145.43
Mean efficiency	0.948	0.948	0.947	0.947	0.941	0.946	0.946
Likelihood ratio test $(H_0 : \sigma_U^2 = 0)$	$\chi^2 = 33.93$ (p<0.01)	$\chi^2 = 37.14$ (p<0.01)	$\chi^2 = 42.64$ (p<0.01)	$\chi^2 = 40.08$ (p<0.01)	$\chi^2 = 41.48$ (p<0.01)	$\chi^2 = 43.97$ (p<0.01)	$\chi^2 = 42.07$ (p<0.01)

Note: See Table 1 for variable definitions. All variables were expressed in log form prior to estimation. p-values calculated on two-tailed z-tests. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

All models exhibit highly significant parameter estimates with the exception of *Apprentice* in Model (2-5) and ASSET in Models (2-2), (2-3), (2-5) and (2-6). The *AUDIT* variable is negative and significant across models except Model (2-5). Therefore, we verify that the higher the audit fees, total audit hours, and audit hours incurred by each of engagement quality reviewers, partners, CPAs, as well as IT experts, the lower DA is (i.e., the higher the earnings quality). Therefore, companies are less likely to manage earnings upwards if audit hours of engagement quality reviewers, partners, CPAs and IT experts are higher. The coefficient estimate for *Apprentice* is negative but not significant, implying that the audit hours of apprentice CPAs could not improve firms' earnings quality. The coefficients on the firm characteristics are consistent with extant research. The ASSET coefficients are significantly positive in Models (1), (2-1) and (2-4), indicating that larger companies are more likely to manage earnings upwards. The REINV coefficients are significantly positive in all models, confirming that high audit risk is positively associated with positive DA (lower earnings quality). The positive ROA coefficients indicate that DA is positively related to companies' profitability.

The variance of the error term σ^2 is equal to 1.7% signifying that it varies along the sample firms. Because the value of ranges from 35.3% to 37.7%, the inefficiency disturbance U makes an important contribution to the total variation represented in the error component (the other 62.3–64.7% being defined by uncontrolled shocks). The mean value of technical efficiency for each model ranges from 94.1% to 94.8%, and the estimate of η is statistically negative, meaning that the technical inefficiency decreased over the period 2014–2015. We apply a likelihood ratio test that there is no technical inefficiency component $(H_0 : \sigma_U^2 = 0)$ against the alternative hypothesis $(H_1 : \sigma_U^2 > 0)$. If H_0 is not rejected, the stochastic frontier becomes an ordinary least square (OLS) estimation with normal errors $(\sigma^2 = \sigma_V^2)$ and γ equals zero. H_0 can be rejected at the 1% significance level, implying that the stochastic frontier with two error components is preferable to the OLS estimation in each model. Finally, scale economies can be measured as the sum of the parameters in the Cobb-Douglas function. The magnitude of the scale economies in the stochastic frontier is lower than one, signifying that there are decreasing returns to scale in audit activity.

CONCLUDING REMARKS

In this study, we hypothesised that a higher earnings quality could be associated with higher total audit hours or higher audit hours by each of the accounting professional positions. We classified the accounting professional positions into five groups: engagement quality reviewers, partners, CPAs, apprentice CPAs and IT experts. The proxy of earnings quality was DA estimated using the modified Jones model. Using a sample consisting of 2,802 observations from 2014 to 2015 in Korea, we found that DA (earnings quality) was negatively (positively) related to both total audit hours and audit hours by each of engagement quality reviewers, partners, CPAs and IT experts. A higher level of positive DA means income-increasing earnings management. Therefore, our findings indicate that higher audit hours reduce the extent to which managers aggressively overstate earnings. The results are consistent with firms reporting high quality earnings when audit efforts are high.

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