

Analyst Coverage And Audit Efforts: Empirical Approach To Audit Hours

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ABSTRACT

This study investigates the effect of financial analyst coverage on audit efforts by examining the association between the number of analyst followings and audit hours. Existing literatures report that there are inconsistent results between analyst coverage and audit efforts, and most studies used audit fee as a proxy for audit efforts. However, audit fee may cause measurement error. We consider that audit hour is a better proxy for measuring audit efforts than audit fee because practically auditors are less likely to charge extra audit fee for their additional efforts in competitive audit market. Also, after audit engagement contract, the amount of audit fee is almost fixed. Thus, it cannot reflect variable auditors' decision whether inputting additional efforts or not during audit service. Intuitively, audit hours are more accurate measure of audit efforts as long as it indicates how much hours auditors work. For the above reasons, we use unique dataset of audit hours in Korea. We find that analyst coverage is positively associated with audit hour. This means auditors make more efforts on their audit service in case of greater analyst following, and they crucially consider reputational damage from audit failure when they provide audit services to their clients with great analyst following. Next, we still observe the positive relation in both pre and post global financial crisis periods. Lastly, we find that BIG4 auditors are more concerned about reputational loss than Non-Big4 in case of greater analyst following.

Keywords: Analyst Coverage; Analyst Following; Audit Hours; Audit Quality

1. INTRODUCTION

This paper investigates the impact of analyst coverage on audit hours using Korean data. Sell side analysts, we usually called “analysts”, play a role of information intermediaries or information providers in the financial market (Yoo et al., 2013). They roundly collect enormous financial information from corporate insiders or managers, and subsequently disseminate their processed financial information to current and prospective investors. In other words, they are both financial information users and financial information providers.

Analysts also evaluate firm value and recommend potential profitable firms to investors. For the firm evaluation, they do perform risk analysis for their target companies. We think that analysts may consider the audit risk as a risk factor for their evaluation, and consider that analyst coverage may affect to auditors' audit efforts to reduce audit risk. Therefore, we test the relation between analyst coverage and auditors' audit efforts empirically in this study.

Previous studies investigate how analyst coverage effect on audit fee. Especially, Yim (2012) investigates the association between analyst coverage and audit efforts using international data (sample of audit hours from total 31 countries). The study reports that analyst coverage could reduce audit fees. Greater analyst following brings better information environment and leads more transparency of firms' accounting data. Then, auditor can save their efforts from their clients which became more transparent by the effect of analyst coverage. Therefore, prior literatures find that there is a negative association between analyst coverage and audit fee in U.S. or China. This argument supports that analyst coverage plays a role of corporate governance to constrain manager's opportunistic earnings management behavior (Gotti et al., 2011; Haw et al., 2012).

In contrast, the other side of researchers argue that there is a positive relation between analyst coverage and audit fees due to the possibility of reputation damage (Keune and Johnstone, 2011). Generally, the companies with greater analysts following receive much higher interests from voluminous investors. The investors also can collect the companies' financial information easily from the analysts. In this circumstance, the auditors who work for the companies with greater analysts may provide more effort on their audit service. Because if they do wrong or make some mistakes during their audit service, they have more chance to face reputational damage by suing or blaming from the investors. To put it simply, the auditors will be under much higher pressure on their audit service when they work for the clients with many watching eyes. This argues that auditors consider the influence of analyst coverage during their audit service.

As we explained above, the results of the association between analyst coverage and audit fee are still inconsistent. Add to the prior studies, we use audit hours as a proxy for the audit efforts instead of audit fee in this study. Audit fee may be a noisy indicator of audit risk and lack of control for audit efforts (O'Keefe et al., 1994). Practically, it is difficult that auditors charge extra audit fee as much as they make efforts on their audit service after audit engagement contract. Therefore, audit fee may not reflect the actual amount of audit efforts in highly competitive audit market. Furthermore, abnormally high audit fees may be an indication of poor audit quality since economic interdependencies between auditors and their clients may impair auditor's independence (Choi et al., 2006; 2008). Intuitively, we believe that audit hours are more accurate measure of audit efforts as long as it indicates how much hours auditors work.

Korea provides a good research setting to examine the association between analyst coverage and audit efforts because firms in Korea are required to disclose audit hours to the public.¹ Especially, Korean government has strengthened auditors' legal liability to protect minority shareholders after the promulgation of the new Securities Law in 2000, and therefore, the possibility of auditors' reputation damage and litigation risk are amplified since.² Therefore, Korea setting fits to investigate the effect of analyst coverage on audit efforts under strong minority shareholders protection law. In this setting, we test whether auditors adjust their audit efforts by analyst coverage. To our knowledge, there is no study has been done with the association between analyst coverage and audit hours.³ Therefore, this is an open empirical question.

Using 2,173 Korean firm-year observations during 2002 to 2010 period, we find that analyst coverage is positively associated with audit hours on average. Results of all model specifications demonstrate that analyst coverage constitutes incremental explanatory power to existing audit hours models. It shows that as analyst coverage increases, companies' perceived risk environment is altered to be more transparent, and therefore auditors decide to input more audit efforts to the company. We investigate how auditors perceive the company's business risks which can bring reputational damage in the pre and post global financial crisis period (Xu et al., 2011; Yim et al., 2012). We find a positive association between analyst coverage and audit hours in both periods. Further, we find that the relation between analyst coverage and audit hour is stronger in the BIG4 auditors than Non-Big4. This implies that Big4 auditors are more concerned about their reputational damage than Non BIG4 auditors.

The remainder of our paper is as follows. Section Two briefly reviews prior studies and develops our hypotheses. Section Three describes our research method and sample. Section Four presents our empirical findings. Finally, Section Five is the conclusion.

¹ Caramanis and Lennox (2008) use a unique database of audit hours in Greece to investigate the association between audit effort and accrual earnings management.

² As an example of the minority shareholder protection law in Korea, minority shareholders of Daewoo Electronics claimed the responsibility of audit failing to the external auditors of Daewoo Electronics in 2000. It was the largest indemnification case of that external auditor makes reparation to minority shareholders for the sake of poor auditing in Korea.

³ Yim et al. (2012) uses the international data including 74 firm-year observations in Korea and proxies audit efforts as audit fee instead of audit hours.

2. PRIOR LITERATURE AND HYPOTHESES DEVELOPMENT

2.1. Prior Literatures

Analysts play a pivotal role as information intermediaries between companies and shareholders (Chou and Shiah-Rou, 2010; Yoo et al., 2013). They analyze publicly available data what companies provide, including financial statements, earnings data and other announcements, and they disseminate their analyzed financial information to the public. Previous researches have already shown that analysts have significant influence on investor behavior (Graham et al., 2005). Analysts often interact with management directly during earnings release by conference calls. Also, they have a number of channels to express their concern about covered firms through the research reports, or through the mass media such as newspapers and TVs. However, there is little study has been done regarding analyst coverage and audit properties. When analyst coverage can give an influence on auditors' information environment directly, how auditors perceive the analysts' activity is a fundamental empirical question. Prior studies investigate how analyst coverage effect on audit properties by using audit fees as a proxy for audit efforts to reduce audit risk⁴. However, their results are mixed; both positive and negative relations between analyst coverage and audit fees are reported.

Analyst coverage improves companies' disclosure level and promotes a better information environment. Haw et al. (2012) argue that firms with more analyst coverage have lesser information asymmetry between managers and investors, and that this reduces adverse selection problems when issuing equities. Thus, the information environment theory supports that analyst coverage reduces audit fees; auditors can save their audit efforts from improved information environments by more analyst coverage. Dyck et al. (2006) find that analysts help discovering corporate frauds directly. Thus, as analyst coverage increases, a company's fraud risk decreases. This implies that there is a negative relation between analyst coverage and audit fees. Yu (2008) finds that analysts are capable and resourceful in tracking firms regularly, and they continuously scrutinize management behavior and financial reporting irregularities. Gotti et al. (2011) suggest that the existence of a negative relationship between analyst coverage and audit fees using U.S. data from 2000 to 2007. The study supports analysts' monitoring hypothesis that analysts are one of external corporate governance mechanism to monitor managers' earnings management.

On the other hand, there can be a positive association between analyst coverage and audit fee. First, role of analysts as an independent source of monitoring mechanism can be questionable in some situations. He et al. (2011) argue that analyst coverage increases the public attention to the covered companies from other analysts, media and many investors. The possibility of audit failure being detected could be an important factor that auditors consider in assessing the expected costs of the clients' risk. As a result, auditors would incur higher costs from reputational damage if they provide unsatisfactory audit service for firms with greater analyst coverage than for firms with lesser analyst coverage. Yim et al. (2012) suggest that analyst coverage is positively associated with audit fees in especially in Canada, Denmark, Italy, Japan and U.S.⁵ Therefore, greater analyst coverage amplifies auditors' perceived risks, and thus auditors ask more audit fees to the companies with greater analyst coverage.⁶ To sum up the above discussion, the positive association between analyst coverage and audit fees is also conceivable.

Most prior studies use audit fee data as a proxy of audit efforts due to the unavailability of large datasets of audit hours. In this study, we collect audit hours data of Korea and test the association between analyst coverage and audit hours.

⁴ Audit risk is the risk that the auditor expresses an inappropriate audit opinion when the financial statements are materially misstated (Bell et al., 2005). Generally Accepted Auditing Standards indicate that auditors need to use their judgment for assessing audit risks, to decide extent of audit procedures, and to perform auditing procedures for reducing audit risk to an acceptable level (PCAOB, AU Section 322).

⁵ The main difference between Yim et al. (2012) and Gotti et al. (2012) is that sample of Gotti et al. (2012) was limited to firms that were covered by at least one analyst. Yim et al. (2012) include firms that are not followed by analysts to reflect the effect of analyst coverage on audit fees.

⁶ Auditors should modify audit programs for each engagement in response to changes in audit risk. Auditors are required to do so by regulation (American Institute of Certified Public Accountants) and they should do so for themselves. This is because audit failures sometimes arising from unresponsiveness to changes in risk can be costly such as reputation damage.

2.2. Hypotheses Development

The association between analyst coverage and audit fees is inconsistent. (Gotti et al., 2012; Yim et al., 2012; Haw et al., 2012). It can be negative which is due to better information environment under greater analysts following, analysts' ability of discovering corporate frauds or of reducing earnings management (Lang and Lundhome, 1996; Dick et al., 2007; Yu, 2008). On the other hand, it can be positive which is due to auditors' concern about reputation damage and litigation risk (Lev, 1995; Keune and Johnstone, 2011).

Contrary to audit fee studies, there is little study has been done with analyst coverage on audit hour due to unavailability of large dataset. Audit hours can be more accurate measure to capture auditors' actual audit efforts than audit fees because audit fees can be affected by non audit service, auditor independence, or audit fee agreement at initial audit engagement. In this paper, we investigate the association between analyst coverage and audit hour using Korean large audit hours dataset. Korean government has strengthened auditors' legal liability to protect minority shareholders after the promulgation of the new Securities Law in 2000, and thus analysts potentially generate an environment that more strongly affects the auditors' judgment how much audit effort should be required. In this circumstance, auditors will consider the influence of the extent of analyst following when they make the judgment. Further, there is no study has been done with analyst coverage and audit hours in emerging countries such as Korea. We believe that this is an open empirical question whether analyst coverage can affect on the audit hours model.

Thus, it is hard to discern the exact direction of the association between analyst following and audit fee in Korean stock market. Hence, the first hypothesis is non-directional as follows:

H1: Analyst Coverage is on average associated with audit hours.

We argue that auditors respond to analyst coverage because analyst coverage can be a link between audit failure and higher possibility of potential reputation damage. Given that BIG4 auditors are more concerned with reputation damage compared with their Non-BIG4 auditors. We predict that a positive association between analyst coverage and audit hour is more pronounced in BIG4 auditors. Specifically, all things being equal, for firms with BIG4 auditors, the effect of analyst coverage on audit hour is relatively stronger to compare with the effect for firms with NON-BIG4 auditors. Therefore, our second hypothesis is as follows.

H2: The positive relation between the analyst coverage and audit hours is more pronounced in BIG4 auditors.

3. RESEARCH METHODOLOGY

3.1. Analyst Coverage

Analyst Coverage is measured as the number of analysts who issued a forecast of a firm's earnings in any given year. We use a residual value from analyst coverage from Yu (2008). Analyst coverage is associated with factors such as firm size, past performance, growth, external financing activities, and volatility of business (Bhushan, 1989; Yu, 2008). The specific model is as follows.

$$ANAL_t = \beta_0 + \beta_1 LNMV_t + \beta_2 ROA_t + \beta_3 LOSS_t + \beta_4 ISSUE_t + \beta_5 RECORR_t + \beta_6 ROESTD_t + \text{Industry Dummies} + \varepsilon \quad \text{Equation (1)}$$

Where

LNMV: Natural log of market value of equity.

ROA: Return on assets.

LOSS: Indicator variables of loss.

ISSUE: Indicator variable for equity or debt issuance.

RECORR: Correlation between firm return and market return (Bhushan, 1989).

ROESTD: Standard deviation of return on equity.

In above equation, we use the residual value of equation as “residual analyst coverage”, and we use it as a supplementary proxy for analyst coverage. The “residual analyst coverage” is uncorrelated with firm size, past performance, growth, external financing, or volatility of business. Therefore, we use the number of analyst coverage and the residual analyst coverage in this study.

3.2 Model Specification

$$LAH_t = \beta_0 + \beta_1 ANAL_t (\text{Residual } ANAL_t) + \beta_2 LNSIZE_{t-1} + \beta_3 BIG4_{t-1} + \beta_4 CON_{t-1} + \beta_5 INVERC_{t-1} + \beta_6 LIQ_{t-1} + \beta_7 ROA_{t-1} + \beta_8 LOSS_{t-1} + \beta_9 FIRST_{t-1} + \beta_{10} ISSUE_{t-1} + \beta_{11} LEV_{t-1} + \text{Year Dummies} + \varepsilon \quad \text{Equation (2)}$$

Where

3.2.1 Dependent Variables

- *LAH*: Natural log of audit hours.

3.2.2 Key variables

- *ANAL*: Number of analyst coverage.
- *Residual ANAL*: Residual Value from Equation (1).

3.2.3 Control Variables

- *LNSIZE*: Natural log of the total assets.
- *BIG4*: A dummy variable, one if auditor is one of Big4, and zero otherwise.
- *CON*: A dummy variable, one if the firm makes consolidated financial statement, and zero

3.2.4 Otherwise

- *INVERC*: Inventory plus receivables divided by total assets.
- *LIQ*: Current assets divided by current liabilities.
- *ROA*: Return on Assets.
- *LOSS*: Indicator variables of loss.
- *FIRST*: A dummy variable, one if an audit is a first year audit, and zero otherwise.
- *ISSUE*: Indicator variable for equity or debt issuance.
- *LEV*: Leverage, Liabilities scaled by total assets.
- *Year Dummy*: Year dummy variables.

Various proxies are included for audit hour model that are known to affect the audit efforts. The control variables used in this research is similar to those used in other prior literatures (Reynold et al., 2004; Rhee et al., 2012). The specific variable explanation is as follows.

- Natural log of audit hour (*LAH*): In this paper, dependent variable is natural log of audit hour as a proxy for the external auditors' audit efforts.
- Number of analyst coverage (*ANAL*): Our independent variable can be number of analyst coverage. We expect non-directional association between *Anal* and *LAH*.
- Natural log of total assets (*LNSIZE*): We include the client size variable based on O'Keefe et al. (1994). They provide the evidence that size of audit is one of the most important factors of audit hour. We expect positive association between *LNSIZE* and *LAH*.
- BIG4* auditors (*BIG4*): We include the *BIG4* dummy variable because *BIG4* auditors are more likely to reduce the magnitude of abnormal accruals by spending more audit hours (Caramanis and Lennox, 2008). We expect positive association between *BIG4* and *LAH*.
- Consolidated financial statement (*CON*): We include audit complexity measure such as consolidated

- financial statement. Auditors input more hours to make complex consolidated financial statement. We expect positive association between *CON* and *LAH*.
- (f) Inventory and receivables ratio (*INVERC*): Inventory or receivables ratio is the sum of inventory and receivables divided by total assets. *INVERC* is involved as an audit complexity measure. We expect positive association between *INVERC* and *LAH*.
 - (g) Quick ratio (*LIQ*): Quick ratio represents short term solvency ratio. We expect negative association between *LIQ* and *LAH*.
 - (h) Return on assets (*ROA*): We also involve return on assets in this paper. When there is good financial condition, manager's willingness to conduct material misstatement is reduced. Then auditors need less audit hour to detect material misstatement. We expect negative association between *ROA* and *LAH*.
 - (i) Loss indicators (*LOSS*): Loss is closely related to audit risk which financial difficulty is associated with manager's earnings management. We expect positive association between *LOSS* and *LAH*.
 - (j) First audit engagement (*FIRST*): The initial audit engagement variable is included in our regression model because new auditors are more likely to work more hours because they should spend more time to understand the business of new client. We expect positive association between *First* and *LAH*.
 - (k) Stock and debt issuance (*ISSUE*): Stock or debt issuance is closely related to potential litigation costs or higher monitoring costs. Auditors put more efforts with higher litigation costs. We expect positive association between *ISSUE* and *LAH*.
 - (l) Leverage (*LEV*): Simunic (1980) suggests that leverage can be the important determinant for the audit resources. We included the leverage variables because auditors are more likely to spend more audit hours for risky clients (Ashbaugh et al., 2003). We expect positive association between *LEV* and *LAH*.
 - (m) Year Dummy: Year dummy variables are included to control for differences in audit hours across over years.⁷

3.4 Sample Selection

Our empirical analysis is based on a sample of Korean firms from 2002 to 2010. We extract accounting and stock return data from the Korea Information Services Value (Hereafter KisValue) database. As of April of each year, we select companies that satisfy the following criteria (1) financial statement data with positive book value of equity available on KisValue database; (2) all of the proxies are available; (3) firms in non-financial industry; (4) fiscal year ended December 31. This process yields final sample of 2,173 annual firm-year observations from KOSPI / KOSDAQ listed companies between 2002 and 2010. Table 1 shows the sample distribution by analyst coverage and by year for the hypotheses tests. We present the observations by the number of analyst coverage in Panel A and by number of year in Panel B respectively.

⁷ In this paper, we use firm level clustering regression. Therefore, we do not need to control industry dummies in this study.

Table 1. Sample Distributions

Panel A: Sample Distribution By Analyst Coverage				
Number of Analyst	Number of Observations	Number of Analyst	Number of Observations	
1	389	14	55	
2	286	15	58	
3	197	16	55	
4	116	17	52	
5	131	18	58	
6	107	19	40	
7	93	20	23	
8	71	21	40	
9	79	22	34	
10	72	23	15	
11	42	24	9	
12	65	25	28	
13	58	Total	2,173	

Panel B: Sample Distribution By Year				
Year	Number of Observations	Year	Number of Observations	
2002	200	2007	247	
2003	206	2008	235	
2004	227	2009	259	
2005	262	2010	272	
2006	265	Total	2,173	

4. EMPIRICAL RESULTS

4.1 Descriptive Statistics

Table 2 provides descriptive statistics for the variables. Due to skewness, the variables are winsorized at the one percent level. Mean of audit hours (median) is 2,045(1,051). Average (median) of analyst coverage is 7.582(5.00). Other control variables show similar values statistically with prior papers (Kwon et al., 2009).

This table presents the distributions of main variables used in this study.

Table 2. Descriptive Statistics

Variables	Mean	Std Dev	1%	5%	10%	25%	Median	75%	90%	95%	99%	No. of Obs.
AUDIT HOUR	2,045	3077	9	60	296	601	1,051	2,212	4550	6800	23100	2,173
ANALCOV	7.582	6.592	1.000	1.000	1.000	2.000	5.000	12.000	18.000	21.000	25.000	2,173
RECORR	0.339	0.522	-0.947	-0.666	-0.477	-0.016	0.451	0.801	0.936	0.967	0.996	2,173
ROESTD	0.117	0.208	0.007	0.014	0.020	0.034	0.059	0.109	0.217	0.433	1.516	2,173
LNMV	19.673	1.649	16.757	17.383	17.741	18.428	19.387	20.811	22.048	22.810	23.969	2,173
ISSUE	0.622	0.485	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	2,173
LNSIZE	20.197	1.612	17.453	17.955	18.264	18.902	19.947	21.318	22.482	23.229	24.291	2,173
BIG4	0.737	0.440	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	2,173
CON	0.717	0.451	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	2,173
INVERC	0.275	0.145	0.017	0.061	0.100	0.169	0.258	0.369	0.472	0.543	0.684	2,173
LIQ	1.971	1.768	0.245	0.536	0.680	0.960	1.410	2.249	3.814	5.559	10.641	2,173
ROA	0.058	0.068	-0.235	-0.047	0.001	0.026	0.058	0.096	0.135	0.163	0.229	2,173
LOSS	0.097	0.296	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	2,173
FIRST	0.162	0.369	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	2,173
LEV	0.435	0.184	0.073	0.142	0.184	0.290	0.444	0.573	0.677	0.726	0.845	2,173

Notes) *AUDIT HOUR*: Audit hour. *ANALCOV*: Number of analysts following. *RECORR*: Correlation between firm return and market return (Bhushan, 1989). *ROESTD*: Standard deviation of return on equity. *LNMV*: Natural log of market capitalization. *ISSUE*: Indicator variable for equity or debt issuance. *LNSIZE*: Natural log of total assets. *BIG4*: Indicator variable if auditor belongs to big4 auditor 0 otherwise. *CON*: Indicator variable that equals to 1 if auditor makes consolidated financial statement 0 otherwise. *INVERC*: Inventory and Account receivables ratio. *LIQ*: Current ratio. *ROA*: Return on assets. *FIRST*: A dummy variable, 1 if an audit is a first year audit, and 0 otherwise. *LEV*: Debt ratio.

4.2. Univariate Analysis

Table 3 gives the Pearson correlations are reported separately for the first stage and second stage regression model. In Panel A, Our dependent Variables Natural log of audit hour (*LNHOUR*) is positively (+) associated with *ANAL*, *LNSIZE*, *BIG4*, *CON*, *ISSUE*, and *LEV* while it is negatively (-) associated with *INVERC*, *LIQ*, and *LOSS*. *ANAL* of an independent variable is positively (+) associated with *LNSIZE*, *BIG4*, *CON*, *ROA*, *ISSUE*, and *LEV*, but it is negatively *INVERC*, *LIQ*, and *LOSS*. In addition, in Panel B, number of analyst following is positively (+) associated with *LNMV*, *ROA*, and *ISSUE*, but it is negatively (-) associated with *LOSS* and *ROESTD*. Natural log of audit hour is significantly associated with control variables. However, the implication of the univariate result is limited. Therefore, we perform multivariate regression analyses to examine the overall association between analyst coverage and audit hour with control variables. The result of multiple regression analysis is reported below.

This table presents Pearson correlations between key variables for the pooled sample. Please see note of Table 2 for the explanations of variables except for the followings. Bold numbers indicate the significance level at 5 percent levels or better (two-tailed).

Table 3. Pair-wise Correlations between Key Variables

Panel A											
	<i>LHOUR</i>	<i>ANAL</i>	<i>LNSIZE</i>	<i>BIG</i>	<i>CON</i>	<i>INVERC</i>	<i>LIQ</i>	<i>ROA</i>	<i>LOSS</i>	<i>FIRST</i>	<i>ISSUE</i>
<i>ANAL</i>	0.40										
<i>LNSIZE</i>	0.60	0.65									
<i>BIG4</i>	0.37	0.27	0.36								
<i>CON</i>	0.32	0.31	0.48	0.18							
<i>INVERC</i>	-0.20	-0.32	-0.36	-0.13	-0.23						
<i>LIQ</i>	-0.19	-0.19	-0.39	-0.19	-0.24	0.06					
<i>ROA</i>	0.01	0.09	-0.12	-0.07	-0.10	0.05	0.28				
<i>LOSS</i>	-0.05	-0.06	-0.01	0.02	-0.01	-0.06	-0.07	-0.65			
<i>FIRST</i>	0.03	-0.02	0.02	0.03	0.01	0.01	-0.03	0.02	-0.01		
<i>ISSUE</i>	0.09	0.06	0.15	0.07	0.04	-0.03	-0.16	-0.14	0.08	0.02	
<i>LEV</i>	0.17	0.12	0.38	0.14	0.18	0.07	-0.70	-0.40	0.20	0.02	0.28
No. of Obs.	2,173	2,173	2,173	2,173	2,173	2,173	2,173	2,173	2,173	2,173	2,173

Panel B						
	<i>ANALCOV</i>	<i>LNMV</i>	<i>LOSS</i>	<i>ROA</i>	<i>ISSUE</i>	<i>ROESTD</i>
<i>LNMV</i>	0.72					
<i>LOSS</i>	-0.09	-0.11				
<i>ROA</i>	0.09	0.08	-0.30			
<i>ISSUE</i>	0.16	0.18	-0.20	0.20		
<i>ROESTD</i>	-0.08	-0.06	0.20	-0.19	0.04	
<i>RECORR</i>	0.03	-0.01	-0.01	0.06	0.07	0.00
No. of Obs.	2,173	2,173	2,173	2,173	2,173	2,173

4.3. Multivariate Analysis

Table 4 presents the result from the overall association between analyst coverage and audit hours. Following Peterson (2009), this paper uses firm level clustering regression to remove the effects of the cross-sectional correlation in error terms inherent to panel data. The purpose of the Model 1 is to observe the association between analyst coverage and audit hours without considering other factors that might be correlated with analyst coverage in determining audit hours⁸. In this test, analyst coverage is positively associated with audit hours (t-value=14.911). Model 2 shows that the analyst coverage is positively associated with audit hours including control variables (t-value = 3.110). Following Yim et al. (2012), we conduct additional analyses with pre and post Global financial Crisis. Empirical results show that there is consistent positive association between analyst coverage and audit hours between pre and post global financial crisis. Therefore, there is little effect with Global financial Crisis with altering auditor’s audit efforts. Other control variables *LNSIZE*, and *BIG4* is positively associated with audit

⁸ Similar empirical results are reported when we use lagged analyst coverage.

hours. In general, the coefficients on the control variables are in the predicted direction. Overall, in the multiple regression models, we confirm our conjecture that analyst coverage is a significant determinant of audit hours.

This table presents the results of regressions of the analyst coverage and audit hour with a set of control variables. See the notes of Table 2 for the definitions of the variables. t-statistics, reported in bracket, are adjusted for firm level clustering to correct for serial correlation within a cluster (a firm). ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

Table 4. Regression results for Analyst Coverage and Audit Hour

Variables	<i>LNHOUR</i>			
	Model 1	Model 2	Pre-GFC	Post-GFC
<i>ANALCOV</i>	0.093*** [14.911]	0.015*** [3.110]	0.021** [2.584]	0.009** [2.272]
<i>LNSIZE</i>		0.421*** [15.084]	0.399*** [10.158]	0.450*** [17.692]
<i>BIG4</i>		0.379*** [6.068]	0.438*** [4.731]	0.273*** [5.066]
<i>CON</i>		0.125* [1.894]	0.160 [1.632]	0.076 [1.319]
<i>INVERC</i>		0.002 [0.012]	0.011 [0.037]	0.059 [0.323]
<i>LIG</i>		0.014 [0.746]	0.036 [1.290]	-0.013 [-0.971]
<i>ROA</i>		0.545 [1.102]	1.110 [1.303]	-0.271 [-0.690]
<i>LOSS</i>		0.101 [1.295]	0.098 [0.714]	0.118* [1.709]
<i>FIRST</i>		-0.013 [-0.290]	-0.026 [-0.293]	-0.002 [-0.080]
<i>ISSUE</i>		-0.065 [-1.368]	-0.135* [-1.753]	0.013 [0.355]
<i>LEV</i>		0.078 [0.316]	0.458 [1.220]	-0.435** [-2.447]
Constant	3.844*** [26.942]	-4.282*** [-7.937]	-4.143*** [-5.491]	-1.984*** [-3.923]
Year Dummy			Included	
N. of Obs.	2,173	2,173	1,160	1,013
R-squared	0.479	0.653	0.597	0.758

Table 5 shows that the association between analyst coverage and audit hours are altered toward presence of Big4 auditors. To test the association, we divided our whole sample into two groups; Big4 and Non-BIG4. Empirical results show that the relation between analyst coverage and audit hours is significantly positive in Big4 sample only. This implies that Big4 auditors are more concerned about potential litigation risk arising from analyst coverage which is closely correlated with the amount of disclosure level. In Non Big4 sample, analyst coverage is positive but insignificantly associated with audit hours. This means that non-big4 auditors consider less about their reputation damage from the effect of greater analyst coverage. This finding suggests that Big4 auditors input more audit efforts in response to greater analyst coverage with disclosure level increasing.

This table presents the results of separation regressions of the analyst coverage and audit hour with a set of control variables. See the notes of Table 2 for the definitions of the variables. t-statistics, reported in bracket, are adjusted for firm level clustering to correct for serial correlation within a cluster (a firm). ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

Table 5. Separation Regression results for Analyst Coverage and Audit Hour by BIG4 auditors

Variables	LNHOUR	
	BIG4	NON-BIG4
ANALCOV	0.016*** [3.426]	0.002 [0.122]
LNSIZE	0.418*** [14.224]	0.442*** [6.651]
CON	0.163** [2.067]	0.066 [0.630]
INVERC	-0.015 [-0.069]	0.118 [0.370]
LIG	-0.009 [-0.376]	0.032 [1.065]
ROA	-0.074 [-0.137]	1.984* [1.913]
LOSS	0.067 [0.752]	0.124 [0.753]
FIRST	-0.040 [-0.921]	0.078 [0.606]
ISSUE	-0.024 [-0.464]	-0.190* [-1.834]
LEV	-0.125 [-0.452]	0.342 [0.792]
Constant	-1.693*** [-2.908]	-2.276* [-1.761]
Year Dummy	Included	
N. of Obs.	1,602	571
R-squared	0.613	0.543

Following Yu (2008), we conduct additional empirical analyses to deal with the endogeneity problem. For controlling the endogeneity problem, we use “residual analyst coverage” as the supplementary proxy for analyst coverage. Analyst coverage is associated with many factors, such as firm size, past performance, and volatility of business. Some of those factors could also affect firm’s audit hours. To control of those factors, we use the residual analyst coverage and use it as the supplementary proxy for analyst coverage. Additional analyses show that residual analyst coverage is also positively associated with audit hours including control variables. As noted in Table 6, there is a consistent empirical result that residual analyst coverage is positively associated with audit hours as same as the result from Table 5. This additional test result with residual analyst coverage also supports the argument of that Big4 auditors are more concerned about analyst coverage then increase audit hours.⁹

This table presents the results of regressions of the residual analyst coverage and audit hour with a set of control variables. See the notes of Table 2 for the definitions of the variables. t-statistics, reported in bracket, are adjusted for firm level clustering to correct for serial correlation within a cluster (a firm). ***, **, * indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

⁹ We do not examine the effect of the change of analyst coverage on the change of the audit hours because analyst coverage usually does not undergo significant change every year. For this reason, Yim et al. (2012) do not examine change analysis toward analyst coverage on the audit fees.

Table 6. Regression results for Residual Analyst Coverage and Audit Hour

Variables	ANALCOV	LNHOUR		
	Model 1	Model 2	BIG4	NON-BIG4
<i>Residual ANAL</i>		0.013*** [2.642]	0.014*** [2.725]	0.004 [0.318]
<i>LNSIZE</i>		0.465*** [18.385]	0.467*** [17.319]	0.450*** [6.471]
<i>BIG4</i>		0.387*** [6.249]		
<i>CON</i>		0.122* [1.840]	0.162** [2.047]	0.064 [0.602]
<i>INVERC</i>		-0.010 [-0.052]	-0.040 [-0.180]	0.130 [0.408]
<i>LIG</i>		0.013 [0.715]	-0.009 [-0.384]	0.033 [1.096]
<i>ROA</i>	8.262*** [3.277]	0.854* [1.738]	0.271 [0.502]	2.012** [2.016]
<i>LOSS</i>	0.923** [2.023]	0.125 [1.607]	0.093 [1.035]	0.128 [0.768]
<i>FIRST</i>		-0.014 [-0.315]	-0.040 [-0.926]	0.076 [0.591]
<i>ISSUE</i>	0.374 [1.538]	-0.055 [-1.161]	-0.014 [-0.262]	-0.187* [-1.799]
<i>LEV</i>		0.010 [0.041]	-0.203 [-0.730]	0.330 [0.770]
<i>LNMV</i>	3.153*** [30.308]			
<i>RECORR</i>	0.533** [2.047]			
<i>ROESTD</i>	-1.579** [-2.287]			
Constant	-50.916*** [-27.111]	-5.011*** [-10.037]	-2.502*** [-4.509]	-2.413* [-1.779]
Year Dummy		Included		
N. of Obs.	2,173	2,173	1,602	571
R-squared	0.625	0.652	0.612	0.543

5. CONCLUSION

This study explores two important questions: whether analyst coverage can affect on audit hours and whether Big4 auditor is more concerning analyst coverage by changing audit efforts. Regarding the first question, we find a positive association between analyst coverage and audit hours, suggesting that analyst coverage makes a significant influence to auditors to input more their efforts by increasing audit hours due to the incremental chance of reputation damage from the audit failure of their clients with greater analyst following. As we expected, BIG4 auditors are more concerned about analyst coverage, and they input more audit hours than Non Big4 auditors.

Nonetheless, we acknowledge that our findings may have following caveats. First, there may be other omitted factors which bias our empirical results. In addition, we cannot rule out the possibility that our results largely depend on measurement criteria or time period. Second, our firm-year observations are constrained by the availability of analyst coverage data, and thereby it may contain a bias that our sample is toward relatively large firms. Therefore, it is challenging to say that our results can be generalized into a broader set of firms.

Despite these caveats, this study contributes to the accounting literatures by documenting that analyst coverage can be one of determinants of audit hours and that analyst coverage can make a significant influence to audit efforts. Specifically, our empirical results can help academics and stock market practitioners to understand the auditors' responses on the extent of analyst coverage and the role of financial analysts in capital market. We believe that this study may shed some light on regarding accounting or audit issues.

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