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The effect of audit quality on analyst following

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Abstract: Analysts' behavior is important, because they play a significant role in the capital market. Prior studies already show the effects of firm characteristics on analysts' behavior, however, there was a lack of research analyzing the effects of audits on financial analysts' behavior. Therefore, I examine the effect of audit quality on analyst following that is one of the most popular analysts' behaviors. Higher quality audit makes the users of the financial reports more reliable, thus, this reliability makes analysts easier and more accurate to forecast earnings of that firm, then analysts are more likely to follow this firm. Using two different audit quality measures, results indicate that firms receiving high-quality audit services have more analyst following than others. These results show that audit quality is also one of the determinants of analyst following behavior.

Subjects: Business, Management and Accounting; Accounting; Financial Accounting

Keywords: audit quality; analyst following; industry specialist auditors

1. Introduction

Though, Holthausen and Watts (2001) said that the relationship between accounting numbers from the financial statement and stock price is little, most of prior studies have focused on how market participants evaluate audit quality, and how this evaluation is reflected to the stock price (Becker et al. (1998), Watkins et al. (2004), Teoh and Wong (1993), Krishnan (2003), and Khurana and Raman (2004)).

Recently, Behn et al. (2008) directly showed that audit quality is related to the decision-making decision-making process by focusing on the properties of earnings forecasts by analysts. They found that analysts' earnings forecast accuracy is higher when the firm is provided higher quality audit. They also found that earnings forecast dispersion is lower when the firm provided higher

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PUBLIC INTEREST STATEMENT

Auditing is essential for the listed companies, thus, audit quality is also important for them to provide credibility of their financial statements to market participants. There are many studies about audit quality, but there are few studies that show the effect of audit quality on analysts' behavior. This study investigates whether the effect of audit quality on analyst following exists or not. I find that analysts are more likely to follow the firms with higher quality auditing. These results are consistent with the prior literature that provides an evidence that there are some effects of audit quality on properties of analyst earnings forecasts.

quality audit. This is the first finding that explains the relationship between the accounting numbers and the financial user's decision-making process.

Based on these prior studies, higher quality audit increases reporting reliability by reducing measurement errors in historical earnings. Analysts use the historical earnings to predict future earnings, thus, they can easily predict future earnings based on this highly reliable reports of the historical earnings. This was already proved by the results of the study of Behn et al. (2008). Analysts also have an incentive to issue accurate forecast for their reputation, we can predict that analysts are more likely to follow the firm provided higher quality audit because of the ease of forecast. Therefore, in this study, I examine the relationship between audit quality and the number of analysts following. I use two kinds of proxies of audit quality that are mainly used in prior researches.

The contributions of this paper are as follows: I provide an evidence that more analysts are following the firm when audit quality of the firm is high. To my knowledge, this study is the first to investigate this relationship and it extends the line of literature showing that auditing of financial statement has significant economic consequences in capital markets. I also enrich the results by using two different proxies of audit quality. Understanding analysts' behavior is important because analysts have an important role in the market as information intermediaries. Therefore, my results can contribute to market participants including firms, investors, and even auditors by understanding their behavior.

The remainder of this study proceeds as follows: Section 2 presents literature review and develops the hypothesis. Section 3 explains research design used in this study. Section 4 describes data and empirical results. Section 5 concludes the study.

2. Literature review and hypothesis

Prior studies have mainly examined about the market perception of audit quality. Teoh and Wong (1993) suggest that Big 5 auditors provide the higher quality audit than non-Big 5 auditors. To investigate this relationship, they compare the earnings response coefficients (ERC) of the firms that are provided audit service by Big 5 auditors and those are provided audit service by non-Big 5 auditors. Krishnan (2003) found that market returns are more closely related to the discretionary accruals of the firms that provided audit service by Big 5 auditors than the firms are provided audit by non-Big 5 auditors. Khurana and Raman (2004) also found that investors' perception of financial reporting quality increases with perceived audit quality.

There also exist studies about industry specialization and audit quality. O'Keefe et al. (1994) document that compliance with auditing standards is higher for industry specialist auditors than for non-specialists. There are some researches about that industry specialist auditors are expected to provide higher-quality audit services than non-specialist auditors (Balsam et al., 2003; Beasley & Petroni, 2001). Owghoso et al. (2002) also showed that industry experienced auditors are better able to detect errors within their industry specialization than outside their specialization.

A lot of researches examined the analysts' behavior because they play an important role in the capital market. One of the most popular analysts' behavior is analyst forecast. Schipper (1991) mentioned that analysts use public information, such as accounting earnings, when they forecast the future performance of the firm. Abarbanell and Bushee (1997) showed that historical earnings have an effect on analysts' forecast revisions. Analysts also react to the management forecast since they have incentives to issue accurate earnings forecasts (Hong & Kubik, 2003; Lim, 2001). Additionally, analysts' reaction to management disclosures are affected by some firm characteristics. Tan et al. (2010) found that the reactions of analysts to management disclosures are influenced by accuracy of the former management disclosures. Jeong (2016) finds that accounting conservatism or corporate governance of the firm also have an effect on the analysts' forecast revisions.

Previous studies about the analyst following are also performed a lot. Many studies have examined the determinants of analyst following. Moyer et al. (1989) examined the relation

between insider stock ownership and analyst coverage for a sample of S&P 500 firms in the U.S. Bricker et al. (2000) found an inverse relationship between the complexity of a firm and the number of analysts following that firm. Barth et al. (2001) also found that firms with higher R&D expenses and higher advertising expenses are covered by significantly more analysts. This is more specific determinant of analyst following. Ackert and Athanassakos (2003) examined that the percentage of institutional holdings affects the number of analyst coverage negatively. There are many studies about the determinants of analyst following. But no one showed that audit quality can be also determinant of analyst following.

Generally, the purpose of the audit is to improve client firms' financial reporting quality for the users of these financial reports. Thus, many people have studied about this audit is really improving client firm's financial reporting quality. Actually, after audit became mandatory, people try to figure out this role of audit using audit quality. Becker et al. (1998) examined that high-quality audits decrease earnings management. Earnings management is one of the measures of the quality of the financial reports. Watkins et al. (2004) suggest that unintentional measurement errors could be reduced by high-quality audits.

In this line of research, there is a study about the decision-making process of the financial statement users. Behn et al. (2008) firstly answered the question of whether the audit quality is related to an actual effect in properties of analyst earnings forecasts. They suggest that higher quality audit increases reporting reliability by reducing measurement errors in historical earnings. Using this reliable financial reporting about the historical earnings, analysts predict future earnings. Therefore, higher quality audit increases reporting reliability, and then the analysts easily predict future earnings based on this financial reporting. They already provided an evidence by examining that the higher reliability makes an accuracy and dispersion of analysts' earnings forecast. They found that audit quality is positively associated with analyst earnings forecast accuracy, and negatively associated with analyst earnings forecast dispersion. This is the first study to figure out the relationship between audit quality and financial statement users' decision-making process. However, this study only about the decision process of analyst forecasting. There is no study about the relationship between audit quality and analysts' following decision process.

These previous studies said that higher quality audit makes the users of the financial reports reliable. Behn et al. (2008)'s result shows that these reliable financial reports through the higher quality audit is also could use to forecast firm's future earnings. Thus, this reliability makes analysts easier and more accurate to forecast earnings of that firm, and then analysts are more likely to follow this firm, because of this ease of forecasting. Therefore, I hypothesize that a quality audit is positively related to the number of analysts following.

H1: Audit quality is positively related to the number of analysts following.

There are some evidence that audit quality is higher when firm audited by Big 5 auditors. DeAngelo (1981) and Datar et al. (1991) investigate that larger and more prestigious public accounting firms have more incentive to supply a high-quality audit, because larger and more prestigious accounting firms concerned about protecting their reputation. Further, DeFond and Jiambalvo (1993) provide evidence consistent with the view that Big 5 auditors provide higher quality audits. Craswell et al. (1995), Francis and Krishnan (1995), and Francis and Reynolds (2000) find that the large audit firms have brand-name reputation and behave qualitatively differently from smaller audit firms. Thus, I use Auditor variable which indicates whether the firm is audited by Big 5 auditors or not, as a proxy of audit quality.

Industry specialization is also related to audit quality. As I mentioned in the previous section, there are some researches about that industry specialist auditors are expected to provide higher-quality

audit services than non-specialist auditors (Balsam et al., 2003; Beasley & Petroni, 2001). Therefore, I also use industry specialization variable as a proxy of audit quality. Using these two proxies of audit quality, I examined the relationship between audit quality and the number of analysts following.

3. Research design

3.1. Research model

To test H1, I use NumAF variable as a dependent variable. NumAF is the number of analyst following for the specific firm-year. As an independent variable, as many previous researchers used, I use auditor size variable (Auditor) for one of the proxies of audit quality. “Auditor” variable is equal to 1, if the firm audited by Big 5 auditor, and 0, otherwise. I also use the industry specialization variable (ISpec) for the other proxy of audit quality. ISpec is defined by the sum of the square root of the total assets of clients that an auditor has in a particular industry divided by the sum of the square root of the total assets of all clients of the auditor (Choi & Doogar, 2005). To classify the particular industry, I use the 2-digit SIC code. As Behn et al. (2008) used, I also classify tiny auditors that have fewer than 10 clients per year as non-specialist (ISpec = 0).

I examine the relationship between audit quality and analyst following using these two proxies put together in the regression. I put the interaction term of these two proxies to determine whether the effect of auditor industry specialization on analyst following varies with auditor size. As Behn et al. (2008) expected, industry specialization to have less impact on the audit quality of Big 5 auditors given that Big 5 auditors tend to have a larger client base and more experience.

I use the model basically based on the model of Lang et al. (2004). They performed the multi-variate analysis to identify the relationship between ownerships and the number of analysts following. They use the ownership variables as main variables, hence I tried to use these variables as control variables. They use insider ownership variable that is related to analyst following because of the relationship that is verified by Moyer et al. (1989). They also use investor ownership variable which is also related to analyst following proved by Ackert and Athanassakos (2003). Original model of Lang et al. (2004) includes variable that indicates the firm is cross listed in the US or not, because Baker et al. (2002) and Lang et al. (2003) find that firms with exchange-listed ADRs have greater analyst coverage. However, in this paper, I use only US sample, I exclude this variable in my model. Furthermore, I finally didn't use the ownership variables that used in Lang et al. (2004) because of lack of data. Thus, I use this final model for H1:

$$\begin{aligned} \text{NumAF} = & \alpha_0 + \alpha_1 \text{Auditor} + \alpha_2 \text{ISpec} + \alpha_3 \text{Auditor} * \text{ISpec} \\ & + \alpha_4 \text{LnAssets} + \alpha_5 \text{EarnGrow} + \alpha_6 \text{RetSTD} + \alpha_7 \text{RetEarnCorr} \\ & + \alpha_8 \text{EarnSurp} + \alpha_9 \text{Industrydummy} \end{aligned} \quad (1)$$

Where, NumAF: the number of analyst following for the specific firm-year

Auditor: dummy variable that equals to 1, if the firm audited by Big 5 auditor, and 0, otherwise

ISpec: the sum of the square root of the total assets of clients that an auditor has in a particular industry divided by the sum of the square root of the total assets of all clients of the auditor

LnAssets: the log of total assets converted to millions of U.S. dollars

EarnGrow: the average growth in earnings over the preceding three years

RetSTD: the standard deviation of monthly returns over the previous three years (winsorized at the 95th percentile); in cases where monthly returns are not available, annual returns are used

RetEarnCorr = the correlation between annual returns and earnings over the previous three years

EarnSurp = the absolute value of the difference between current earnings per share and earnings per share from the prior year, divided by the firm's stock price

Industry dummy = indicator variables indicate 2-digit SIC code

LnAssets means a firm size that calculated by the log of total assets converted to millions of U.S. dollars. It is included because larger firms are likely to have more analysts covering them (Bhushan, 1989; Brennan & Hughes, 1991). EarnGrow is included to capture the possibility that analysts may be attracted to high-growth firms. It is calculated by the average growth in earnings over the preceding 3 years. RetSTD means a return variability that is negatively related to the number of analysts following a U.S. firm, indicating that analysts prefer to follow firms with less performance variability. I set this variable as the standard deviation of monthly returns over the previous 3 years (winsorized at the 95th percentile). In cases where monthly returns are not available, annual returns are used. RetEarnCorr is likely to reduce analysts' incentives to follow firms because it reduces the potential returns to forecasting earnings. I set it as the correlation between annual returns and earnings over the previous 3 years. The percentage earnings surprise (EarnSurp) is included to control for the fact that forecast characteristics are likely to be affected by the magnitude of the earnings information to be disclosed. It is calculated by the absolute value of the difference between current earnings per share and earnings per share from the prior year, divided by the firm's stock price. To control for industry effects, I also include industry classification dummies that indicate the 2-digit SIC code.

4. Data and empirical results

4.1. Sample and data

To investigate the hypotheses, I use the sample of U.S. firms with available for 4 years from 2001 to 2004, because of the limitation of Corporate Library database which is related to auditor variables. Data related to analyst following are available from I/B/E/S and other financial data are available from Compustat database. I use stock market-related data from CRSP database. From these various databases, the final sample except for ownership variables consists of 4,539 firm-year observations. The final sample excludes ownership variables, because institutional ownership data in the Corporate Library have many missing values, and Corporate Library itself also quite small (fully 7,304 firm-year observations).

Descriptive statistics of variables using in the regression model are shown in Table 1. The median firm is followed by eleven analysts and the sample firms maximally followed by 59 analysts. The

Table 1. Descriptive statistics

Variable	N	Mean	Median	Standard Deviation	Minimum Value	Maximum Value
NumAF	4,539	13.126	11	9.997	1	59
Auditor	4,539	0.979	1	0.143	0	1
ISpec	4,539	0.057	0.037	0.092	0.000	1
LnAssets	4,539	7.658	7.516	1.678	2.325	14.210
EarnGrow	4,539	0.051	-0.006	9.367	-247	308
RetSTD	4,539	0.149	0.128	0.078	0.030	1.587
RetEarnCorr	4,539	0.069	0.140	0.694	-0.999	0.999
EarnSurp	4,539	0.123	0.019	1.639	0	101.026

median value of Auditor variable is 1, which means above 50% of the firms in the sample are audited by Big 5 auditors and the median of average earnings growth of the previous 3 years is slightly minus. It means that the median firm did not grow averagely.

Table 2 shows the Pearson correlation between all variables used in the regression model. As I expected, Auditor variable is correlated with NumAF variable, positively and significantly, and ISpec variable is not significantly correlated with NumAF variable. However, ISpec and Auditor has a negatively significant correlation, thus, ISpec variable is correlated with NumAF or not is remains to empirical question for further analyses. In control variables, between RetEarnCorr and RetSTD, and EarnSurp and RetSTD have significant correlation.

4.2. Univariate test results

As a first step, I perform univariate tests of analyst following based on two audit quality proxy variables. Table 3, Panel A reports the mean number of analyst following in each case of Auditor size (Big 5 vs Non-Big 5) and whether the testing result of their difference is significant or not. Firms audited by Big 5 auditors averagely followed by 13.189 analysts and firms audited by non-Big 5 auditors averagely followed by 10.179 analysts. As I expected, firms audited by Big 5 auditors are followed by more analysts, with 1 percent significance level ($t = -2.91$). In panel B, I also have t-test about the industry specialization variable. For this test, I divided sample into three sub-samples. (1) has ISpec value in lowest quintile ($n = 1,124$), (3) has value in highest quintile ($n = 1,143$), (2) has value in other quintiles ($n = 2,272$). After that, I perform a test about the difference between (1) and (3). This difference is also significant with 1% significance level.

4.3. Multivariate test results

I perform regressions using two proxies for audit quality as independent variables, and the number of analysts variable(NumAF) as a dependent variable. Regression results using equation (1) are found in Table 4. In panel A, I use raw value of ISpec variable by definition. In column (1), I put only Auditor variable and didn't put ISpec and interaction variable. In column (2), I put Auditor variable and ISpec variable but didn't put the interaction variable. Results in column (1) show that the coefficient of Auditor variable is positive, but not significant. In column (2), coefficients of Auditor and ISpec are significantly negative. However, in column (3), considering interaction effect between Auditor variable and ISpec variable, the coefficient of Auditor variable is positively significant ($t = 2.19$), as I expected. The coefficient of ISpec variable is also positive but, it's not significant ($t = 1.35$). These results mean that Auditor and ISpec variable has significantly negative interaction, thus, using only Auditor variable or only ISpec variable is not meaningful.

In Panel A, even in column (3), the coefficient of ISpec is not significant. However, it can be changed using quintile value instead of ISpec variable's raw value, thus, I perform another regressions using quintile value of industry specialization. In Panel B, consistent with my prediction, the coefficient of ISquin variable is positively significant with 1 percent significance level ($t = 7.70$). Additionally, the coefficient of Auditor variable is positively significant ($t = 4.75$, with 1% significance level) and interaction variable is also negatively significant ($t = -12.52$, with 1 percent significance level). These results suggest that firms audited by Big 5 auditors are less affected by industry specialization, and firms audited by non-Big 5 auditors are more affected by industry specialization. Controlling this interaction effect, firms audited by Big 5 auditors are followed by more analysts and firms audited by industry special auditors are also followed by more analysts. It is consistent with my hypothesis that analysts are more likely to follow the firms that are provided high-quality audit service.

5. Conclusion

The purpose of this study is to find an evidence on the effect of audit quality on the analyst following decision. Prior studies examined the relationship between audit quality and other financial factors. Before Behn et al. (2008), there is no study to show that audit quality can affect to financial reports users' decision-making process. Although Behn et al. (2008) found that high-quality audit is helpful

Table 2. Pearson correlation matrix

	NumAF	Auditor	ISpec	LnAssets	EarnGrow	RetSTD	RetEarnCorr
Auditor	0.043***						
ISpec	0.019	- 0.535**					
LnAssets	0.464***	0.068***	0.192***				
EarnGrow	0.004	0.006	- 0.008	0.005			
RetSTD	0.054***	- 0.011	- 0.110***	- 0.421***	- 0.006		
RetEarnCorr	0.012	- 0.011	0.021	- 0.012	- 0.020	0.063***	
EarnSurp	- 0.026*	- 0.003	- 0.011	- 0.018	0.010	0.067***	0.026*

Table 3. Univariate tests of analyst following

Panel A: Analyst following based on auditor size (Big 5 vs. Non-Big 5)

		(1) Auditor = 0 (n = 95)	(2) Auditor = 1 (n = 4,444)
Mean NumAF		10.179	13.189
Difference [(1)–(2)]	t-test		–2.91***

Panel B: Analyst following based on auditor industry specialization

		(1) ISpec = Low 25% Non-Specialists (n = 1,124)	(2) ISpec = Middle 50% Others (n = 2,272)	(3) ISpec = High 25% Specialists (n = 1,143)
Mean NAF		11.045		13.652
Difference [(1)–(3)]	t-test		–6.93***	

Table 4. Multivariate test results

Panel A: Using Raw Value of Industry Specialist Variable

Variable	Expected Sign	(1)	(2)	(3)
Intercept	?	–19.3009 (–16.79)***	–16.6237 (–13.32)***	–22.9730 (–15.97)***
Auditor	+	0.4980 (0.57)	–2.7391 (–2.59)***	2.6714 (2.19)**
ISpec	+		–9.1329 (–5.41)***	2.9497 (1.35)
Auditor X ISpec	–			–29.2976 (–8.67)***
LnAssets	+	3.5500 (43.07)***	3.6546 (43.29)***	3.8305 (44.46)***
EarnGrow	+	0.0032 (0.24)	0.0028 (0.21)	0.0035 (0.26)
RetSTD	–	39.3526 (22.27)***	39.0435 (22.15)***	38.4819 (22.00)***
RetEarnCorr	–	0.0504 (0.28)	0.0659 (0.37)	0.0758 (0.42)
EarnSurp	–	–0.2214 (–2.90)***	–0.2250 (–2.96)***	–0.2237 (–2.96)***
Industry dummy		Included	Included	Included
N		4,539	4,539	4,539
Adjusted-R2		29.35%	29.79%	30.92%

Panel B: Using Quintile Variable of Industry Specialist

	Expected Sign	(1)	(2)	(3)
Intercept	?	–19.3009 (–16.79)***	–18.7567 (–16.06)***	–26.4367 (–20.30)***
Auditor	+	0.4980 (0.57)	0.0246 (0.03)	4.5014 (4.75)***
ISQuin	+		–0.3109 (–2.58)***	1.3871 (7.70)***
Auditor X ISQuin	–			–49.1302 (–12.52)***

(Continued)

LnAssets	+	3.5500 (43.07)***	3.6144 (41.99)***	3.7899 (44.18)***
EarnGrow	+	0.0032 (0.24)	0.0030 (0.23)	0.0042 (0.32)
RetSTD	-	39.3526 (22.27)***	39.7604 (22.43)***	35.9057 (20.28)***
RetEarnCorr	-	0.0504 (0.28)	0.0590 (0.33)	0.0631 (0.36)
EarnSurp	-	-0.2214 (-2.90)***	-0.2238 (-2.93)***	-0.2164 (-2.89)***
Industry dummy		Included	Included	Included
N		4,539	4,539	4,539
Adjusted-R ²		29.35%	29.44%	31.79%

for analysts in their earnings forecasting process, nobody examined that high-quality audit is also helpful for analysts' following decision. This is totally different with analysts forecasting activity itself.

Therefore, in this paper, I examined whether the audit quality affects to analyst following decision or not. Controlling the interaction effect of auditor size and industry specialization, analysts are more likely to follow the firms audited by Big 5 auditors and the firms audited by industry special auditors, because the purpose of audit is providing good quality financial reports for information users. This study is the first to investigate this relationship and it extends the line of literature showing that auditing of financial statement has significant economic consequences in capital markets. Understanding analysts' behavior is important because analysts have an important role in capital market as information intermediaries. This study can contribute to market participants including firms, investors, and even auditors by understanding their behavior. The limitation of this study is that I cannot use sufficient sample because of the limitation of the database and cannot control all the factors that possibly affect to the analyst following behavior. Future studies can extend this line of research using wider sample period and consider more variables that can affect to the analysts' behavior.

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