경영학 석사 학위 논문

Are Big 4 Auditors Different from Non-Big 4 Auditors in terms of Audit Quality? – Evidence from Korean Firms

2013년 02월

서울대학교 대학원

경영학과 회계학전공

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Abstract

Are Big 4 Auditors Different from Non-Big 4 Auditors in terms of Audit Quality? – Evidence from Korean Firms

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The great interest of auditing literatures is to investigate reasonable audit quality of audit firms or auditors. The selection of auditors between Big 4 and Non-Big 4 continuously receives much attention by stakeholders. In this study, I examine whether Big 4 and Non-Big 4 differences in audit quality proxies are attributed to client characteristics in Korean setting, similar to Lawrence et al. (2011) using U.S. firms. In my analysis, I use two audit-quality proxies – discretionary accruals and the magnitude of conservatism – and employ propensity-score matched model to control the client characteristics differences between two clienteles while estimating the audit-quality effects. Comparing ordinary least square regression and propensity-score matched model results, I find the treatment effects of Big 4 auditors are significantly different from those of Non-Big 4 auditors with respect to discretionary accruals, but insignificantly different from those of Non-Big 4 auditors with respect to the magnitude of conservatism. My results suggest that the differences in these proxies between Big 4 and Non-Big 4 auditors depend on the types of audit-quality measures used for Korean client firms, meaning discretionary accruals results between Big 4 and Non-Big 4 are not a reflection of their respective clients' characteristics while conservatism results are. I caution the reader that this study does not

fully answer the question of such audit-quality differences, but the future research should explore the alternative methodologies to separate client characteristics from the audit-quality effects.

Keywords : Big 4; Non-Big 4; audit quality; discretionary accruals; the magnitude of conservatism; propensity-score matching.

Student Number : 2011-20548

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I. Introduction

The great interest of the auditing literatures is to maintain better audit-quality by audit firms. In that regard, the selection of audit firms between Big 4 and Non-Big 4 continues to be an important factor by academicians, regulators, investors, and other stakeholders[1]. DeAngelo (1981) emphasizes that the larger the audit firm size, the higher the audit-quality and the lesser to behave opportunistically by audit firms. Also, Palmrose (1988) and Khurana and Raman (2004) show that the litigation exposure is the great concern for Big 4 audit firms, so the Big 4 audit firms provide better audit-quality than Non-Big 4 audit firms. However, Kim (2006) concludes that the Big 4 audit firms are more concerned about reputation than litigation risk in Korea, perhaps due to lower litigation costs.

According to prior studies about audit quality difference of auditors, Big 4 auditors are generally associated with better audit quality, superior to Non-Big 4 auditors (Becker et al. 1998; Francis and Krishnan 1999; Behn et al. 2008; Krishnan 2003; Hwang and Kang 2007; Goh et al. 2009)[2]. As well, U.S. Government Accountability Office (GAO) has issued a report that Non-Big 4 audit firms are less likely to be selected by client firms because client firms perceive Non-Big 4 auditors are not capable of dealing with their business complexity issues due to lack of industry or technical expertise, of capital formation, of global reach, and of reputation, but not because Non-Big 4 auditors perform lower audit-quality (GAO 2003; GAO 2008). In that regard, some literatures discuss the Non-Big 4 audit firms or auditors superiority. Louis (2005) gives an evidence that the acquirer audited by Non-Big 4 audit firms do outperform those of audited by Big 4 audit

1) After the collapse of Arthur Anderson, there are Big 4 audit firms afterwards. In this study, the term Big 4 is interchangeably used as Big8, Big6 or Big5 audit firms.

2) Several non-auditing literatures use audit firm size, *Big 4* auditor, as a proxy for reputation, disclosure quality, issuance of stock, or information credibility (Beatty 1989; Guentler and Willenborg 1999; Mitton 2002; Smart and Zutter 2003; Gul et al. 2010).

firms. Also, some Korean prior literatures explain that superior audit quality provided by Big 4 audit firms is insignificant, meaning Big 4 and Non-Big 4 audit firms are indifferent in terms of audit quality (Na 2004; Jo and Kim 2006; Choi 2005). This proposes some evidence that Non-Big 4 auditors have comparative advantage in some areas, such as merger and acquisition, because those audit firms may have superior knowledge of local markets, and have close and long-term relationship with local business communities (Berton 1994; Boone et al. 2000).

Comparing to the U.S. empirical findings, the prior literatures about audit quality differential reasons between Big 4 and Non-Big 4 audit firms are mixed in Korean firm environment, either because of inevitable measurement error in the audit quality model or of inherent characteristics of Korean economic environment (Goh et al. 2009). Also, those findings may be possible due to the significantly different client characteristic distributions across Big 4 and Non-Big 4 firms (Lawrence et al. 2011; Lee 2011, 2012). So, it is important to consider the fact whether differences of audit quality proxies' empirical findings simply reflect client, not auditor or audit firm, characteristics.

Following Lawrence et al. (2011), which examine whether the differences in proxies for audit quality between Big 4 and Non-Big 4 auditors could be a reflection of their respective clients' characteristics in U.S. setting, the question arises as to inconsistent differences of audit quality proxies in Korea being due to client characteristics as well. So, I examine the differences in audit quality proxies between Big 4 and Non-Big 4 auditors are attributed to client characteristics, not to audit firm characteristics or to its auditing practices. I perform the research questions by using ordinary least square (OLS) regression and propensity-score matched model with three different discretionary accruals and magnitude of conservatism proxies using publicly traded Korean firms listed on KOSPI

market from 2000 to 2009. The findings of my study are as follows. For the discretionary accruals measures, I find that the Big 4 auditors do provide better audit quality, less discretionary accruals, than Non-Big 4 auditors, even after the client characteristics are balanced between Big 4 and Non-Big 4 audit firms. For the magnitude of conservatism, I find that Big 4 auditors are more conservative than Non-Big 4 auditors by using OLS regression, but the treatment effects of Big 4 auditors become insignificantly different from those of Non-Big 4 auditors after propensity-score matched model used. As an additional test, I investigate whether the discretionary accruals result would be due to Big 4 auditor industry specialist. The result shows that Big 4 auditor industry specialist do not provide better audit quality than Big 4 auditor non-industry specialist even after the client characteristics are balanced, suggesting Big 4 auditors, as a whole, provide lower discretionary accruals than those of Non-Big 4 auditors.

The contributions of my research are as follows. First, this is the first auditing literature using propensity-score matched model for Korean client firms. Performing different methodology, I determine whether the audit quality differentials between Big 4 and Non-Big 4 audit firms are a reflection of client or audit firm characteristics. Second, my study provides another mixed result of differences in audit quality proxies about Korean client firms, contrary to Lawrence et al. (2011). According to my results, the audit quality differential may be inconsistent depending on the types of discretionary accrual models used, or on the consideration of extensive list of client characteristics for audit quality difference between Big 4 and Non-Big 4 auditors, due to inherent Korean economic characteristics. So, my research can encourage the future research for Korean firms' clientele effects and its alternative methodologies to distinguish client characteristics from audit-quality differential effects. Third, the clear distinction of auditor industry specialist are not well made into Korean Big 4 or Non-Big 4 audit

firms because auditor industry specialist do not provide superior audit quality. Rather, this study further proves that the Big 4 audit firms, as a whole, perform better audit quality in Korean environment.

The limitations of my research are as follows. First, there is an inherent limitation of propensity-score matched model approach because I can only match with the observed attributes, meaning that unobservable attributes are not applicable to estimate the treatment effects. In other words, I cannot ensure whether all relevant client and auditor control variables are included. Second, it is hard to generalize the results given in this research because the matching reflects a trade-off between identifying the treatment effects and the ability to generalize results to the full population.

The remainder of paper is organized as follows. The Section II provides prior literatures and hypothesis development. The Section III discusses research design and sample selection, and the Section IV describes results of my research. The Section V presents additional analysis and Section VI provides conclusion.

II. Prior Literatures and Hypothesis Development

2.1 Prior Literatures

Following the streams of auditing research, the academicians, politicians, and practitioners have a great interest on audit quality and its measures. Accordingly, the prior literatures have used various proxies to assess audit quality, and in turn, to determine whether audit quality differential between Big 4 and Non-Big 4 auditors would exist. The set of audit quality difference literatures mainly focus on the quality of client's financial statements to observe its audit quality in which the studies are given with comparable results. The discretionary accruals is the one proxy used, reflecting the auditor's constraint over management's reporting

decisions. For U.S. studies, Becker et al. (1998) have examined the relation between audit quality and earnings management, and concluded that clients of Big 6 auditors report less income increasing discretionary accrual than Non-Big 6 auditors do. Also, Krishnan (2003) have examined whether there is linkage between audit quality and pricing of discretionary accruals, and the results have shown that Big 6 auditors enhance credibility of reported accruals by minimizing noise, and help to improve ability of discretionary accrual to predict future levels of profitability. Similarly, several Korean studies also use discretionary accruals to determine the audit quality differentiation. Hwang and Kang (2007) have explained inconsistent results of Big 5 audit quality superiority in Korean setting by studying the audit quality differential based on the size of client firm and their reliability of financial statements. In aggregate, they have concluded that audited financial statements have relatively smaller discretionary accruals than unaudited financial statements. Segregating by client sizes, small- and mid-sized firms (asset amount less than KRW 50 billion), Local Big and Local Small audit firms provide lower discretionary accruals than Big 5 audit firms. However, large-sized firms (asset amount greater than KRW 500 billion), Big 5 audit firms show greater audit quality than Non-Big 5 audit firms. Also, Goh et al. (2009) have investigated the association between Big 4 or industry specialist auditors (ISP) and audit quality. They provide the results that after post-Asian economic crisis in Korea, the Big 4/ISP has improved audit quality, perhaps due to enhanced regulation and monitoring role. The concern for discretionary accruals measure is that it includes potential measurement error since this proxy captures not only the effectiveness of constraining management's opportunism, but also management's signaling attempts and random noise (Guay et al. 1996).

Due to the potential measurement errors in measuring accounting information, another proxy that auditing research uses is the magnitude of

conservatism which presents how quickly the financial statements reflect the economic losses than economic gains (Basu 1997; Dechow and Dichev 2002; Ball and Shivakumar 2005, 2006). In other words, this proxy better reflects the quality of accounting information because the magnitude of conservatism measure limits managements' behavior to omit economic losses, which enhances the transparency of financial statements and reduces the investment risks (Park 2005; Choi and Yoon 2006). For U.S. studies, Francis and Krishnan (1999) have examined whether accounting accruals increase a firm's likelihood of receiving modified audit report for either asset realization uncertainties or going concern problems. They have showed that Big 6 auditors are more conservative indicating the rational auditor will respond by increasing rate of audit report modification for accrual firms. For Korean studies, Park (2005) addresses the magnitude of conservatism by Korean client firms has been increased after Asian-economic crisis. Using audit-fee, Kim et al. (2008) have examined the association between abnormal audit and non-audit fees and audit quality measured by the magnitude of conservatism, and concluded that the higher abnormal audit and non-audit fees the lesser conservative financial statements of client firms.

In sum, I employ two proxies – discretionary accruals and the magnitude of conservatism – to capture various aspects of Big 4 and non-Big 4 audit quality differential.

2.2 Hypothesis Development

The selection of Big 4 auditors over Non-Big 4 auditors is generally preferred because of reputation, litigation costs, more resources or expertise (Palmrose 1988; Khurana and Raman 2004; Kim 2006). However recent literatures inform that Non-Big 4 auditors are indifferent from or provide relatively better audit quality than Big 4 auditors since they have comparative advantage in some accounting practices, superior knowledge of

local markets or long-term customer relationships (Berton 1994; Boone et al. 2000; Louis 2005; Goh et al. 2009). In other words, Non-Big 4 auditors seem to provide lower audit quality than Big 4 does because of lack of technical skills or expertise, reputation, or capacity of the firm, not because of Non-Big 4's poor accounting or auditing practices (GAO 2003, 2008).

The general interpretation of discretionary accruals researches is that Big 4 auditors enhance the credibility of financial information by minimizing the noise, provide better predictability of future levels of profitability, and allow less management's accounting flexibility. Those mean that Big 4 auditors report lower income increasing or decreasing discretionary accrual than Non-Big 4 do (Becker et al. 1998; Krishnan 2003; Hwang and Kang 2007 etc.). However, some literatures provide the evidence that the discretionary accrual of Big 4 is indifferent from discretionary accrual of Non-Big 4. Lawrence et al. (2011) and Lee (2011, 2012) indicate that Big 4 does not provide lower discretionary accruals than Non-Big 4, but the difference is attributed to client characteristics or to audit firm characteristics separately. Also, there is no association between Big 4 and discretionary accruals in Korean pre- and post-economic crisis periods (Goh et al. 2009). For these inconsistent results, the first hypothesis is as follows in null form:

H1: Big 4 auditors do not provide lower discretionary accruals than Non-Big 4 auditors.

According to Basu (1997), the firms tend to recognize timely economic losses more promptly while delay the recognition of timely economic gains – asymmetric timeliness behavior reveals. Nevertheless, on average, the standard accounting practices generally do not allow firms to account for expected future economic gains in cash flow until those gains are actually realized. Francis and Krishnan (1999) show that Big 4 auditors are more conservative because they are more likely to issue both asset

realization uncertainties and going-concern problems modified audit reports for high-accrual firms. Also, Choi et al. (2011) provide evidence that by the enactment of Sarbanes-Oxley Act (SOX), the Big 4 auditors' demand of financial reporting conservatism has been unitarily increased as new clients' acceptance after SOX. However, there are little or no prior literatures for Non-Big 4 auditors also demand for higher level of financial reporting conservatism as Big 4 auditors do. Nevertheless, the recent accounting literatures address the question of firm's behavior of timely loss recognition because such a similar behavior may arise due to regularities deflated mean earnings and variance of stock returns (Patatoukas and Thomas 2011) – but in this study, I will focus on timely loss recognition theorem since I am not discussing about the problems of Basu (1997) measurement itself. Thus, it is worthwhile to investigate whether such asymmetric timeliness behavior is found by both Big 4 auditors and Non-Big 4 auditors in Korean settings.

H2: Big 4 auditors are not more conservative than Non-Big 4 auditors.

III. Research Design and Sample Selection

3.1 Propensity Score Matching

Potential selection bias, endogeneity issue, is always a concern addressed in accounting literature, and the studies of audit quality differential are no exceptions. Heckman's two-stage selection model (Heckman 1979) is widely used to observe whether selection bias exists, meaning all the right variables are used in the models while few unobservable variables are left to affect the outcome. Even though Heckman's two-stage selection model is popular, there are substantial problems of using this model. For instance, it is difficult for researchers to identify the valid instrument variables. Also, there are multicollinearity issue between endogenous variable and inverse of Mills' ratio, selection of unobservable factors, and particular model

specification (Francis et al. 2010). In other words, Heckman's two-stage model is partial-matched variables process that unbiased parameter is estimated only if an identical functional relationship between control variables and outcome variables for each level of treatment exists (Armstrong et al. 2010).

In order to examine a relationship between probability of selecting Big 4 auditors and its audit quality differential in a more robust to misspecification of functional form way, I employ 'Propensity Score Matching (PSM)' to alleviate endogeneity issues, a selection bias. PSM, introduced by Rosenbaum and Rubin (1983), is the conditional probability of being treated based on individual covariates. In other words, PSM allows to match the treatment firm with control firm that is similar across all observable relevant variables, reducing the selection biases in making estimates of casual treatment effects. For example, Armstrong et al. (2010), the first paper in accounting literature using PSM, have found that the relation between equity-based compensation and accounting irregularities does not hold. As well, Lawrence et al. (2011) conclude that there is no significant audit quality differential between Big 4 auditors and Non-Big 4 auditors using PSM.

Even though there are great benefits of PSM, researchers should be cautious on interpreting the results given for the number of caveats. To employ PSM, the large sample dataset is required because the number of observations is substantially reduced after the matching process – generalization issue may arise. Also, treatment group and control group should have substantial overlap because there may have a substantial error making control group to look better while treatment group to look worse. There is a possibility that a hidden bias remained because the matching only controls for observed variables (Shadish et al. 2002).

The basic assumption of PSM is to have a treatment group and

some type of appropriate non-treated group from selected control group, where in this study the treatment group is probability of selecting Big 4 auditors (Lawrence et al. 2011). Then, all relevant attributes, particularly for audit-quality proxy analysis, between the groups are included to estimate the propensity score such as size of client firms, return on asset, leverage and others since there is no exclusion restrictions required.

To perform PSM, I use logit model to estimate the propensity scores, a predicted probability of selecting Big 4 auditors by client firms. Since this matching model does not require exclusion restrictions as explained above, the comprehensive lists of general attributes are included to estimate the propensity score (Armstrong et al. 2010; Lawrence et al. 2011). For each audit-quality analysis, I include related variables including Chaney et al. (2004) selection model and respective audit-quality regressions. Accordingly, I estimate the propensity-score model of predicting auditor choice as follows:

$$\boldsymbol{BIG\ 4_{i,t} = \beta_0 + \beta_1 LNASSET_{i,t} + \beta_2 LEVERAGE_{i,t} + \beta_3 ATURN_{i,t} + \beta_4 ROA\_OI_{i,t} + \beta_5 INVREC_{i,t} + \beta_6 CFO\_A_{i,t} + \beta_7 LAGTAC_{i,t} + \beta_8 LOSS_{i,t} + \beta_9 BTM_{i,t} + \beta_{10} SGROWTH_{i,t} + INDUSTRY\_FE + YEAR\_FE + \varepsilon_{i,t}} \quad \textbf{(1)}$$

where for firm *i* and fiscal year *t;*

BIG 4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;
LNASSET = natural logarithm of total assets at the end of the year t;
LEVERAGE = total liability$_t$/totalequity$_t$;
ATURN = sales$_t$/totalassets$_{t-1}$;
ROA_OI = net income$_t$/averageoperatingincome$_{t-1}$;
INVREC =(account receivables$_t$+inventory$_t$)/totalasset$_t$;
CFO_A = operating cash flow$_t$/averagetotalasset$_{t-1}$;
LAGTAC = lag value of total asset;
LOSS = 1 if net income is negative in the year t, 0 otherwise;
BTM = equity$_t$/marketvalue$_t$;
SGROWTH = (sales$_t$–lagsales)/averagetotalasset$_{t-1}$;

So, I include the related variables following respective audit quality analysis, and I estimate the propensity-score model using Equation (1). Then, without replacement, I match Non-Big 4 audit client with Big 4 audit client having

the closest predicted value from Equation (1) within a maximum distance (i.e. caliper) of 3 percent. Based on this caliper distance, I match 50.00 percent of Non-Big 4 audit client to Big 4 audit client for both discretionary accruals and the magnitude of conservatism. In effect, a pseudo "random" sample is created where auditor type is randomly allocated to both the treatment and control groups (Heckman and Navarro-Lozano 2004). So, any significant resulting differences, such as difference in means, between two groups show treatment effect and not pre-existing client characteristics (Heckman et al. 1997, 1998). In my study, I also perform OLS regression to compare with propensity-score model and to examine whether there are any remaining characteristic imbalances between two groups and general cross-sectional characteristic variations.

3.2 Sample Selection

I examine Korean firms, listed on KOSPI (Korea Composite Stock Price Index similar to New York Stock Exchange in United States), from year 2000 to 2009. I select the firms that follow the criteria below:

(a) Include non-financial Korean firms;

(b) Include firms for which financial data are available from New Kis-Value;

(c) Include firms that return data are available from KCMI-SD 2010;

First, I only observe firms in KOSPI market because most of large firms including *Chaebol* firms are listed on KOSPI, and firms should comply with strict requirements, meaning the characteristics are different from mid- or small-sized firms. I exclude Korean firms that follow different accounting practices such as financial sectors or utility sectors because these will impair comparability among different firms in other industries. Also, in order to test my main variable of interest, I include the firms for which data are

available from New Kis-Value and KCMI-SD 2010. Specifically, the financial data is collected from New Kis-Value and the return data is from KCMI-SD 2010.

I start the sample period from the year 2000 because I want to minimize Asian economic effect of 1997. According to prior studies, many Korean firms have experienced bankruptcy or abnormal business operation (Goh et al. 2009; Choi et al. 2006) pre- and post-1997, which may affect my research results. Also, I select the last sample year to be 2009 because the return data from KCMI-SD 2010 is available only up to 2009.

Accordingly I obtain a discretionary accrual sample of 3,146 firm-year observations, of which 2,095 are Big 4 clients and 1,051 are Non-Big 4 clients. Also, I obtain magnitude of conservatism sample of 2,679 firm-year observations, of which 1,815 are Big 4 clients and 864 are Non-Big 4 clients.

IV. Results

4.1 Analysis 1: Discretionary Accruals

4.1.1 Method

I measure discretionary accruals in three different methods (Kothari et al. 2005): discretionary accruals from modified-Jones model with ROA (DA1), discretionary accruals from performance-matched modified-Jones model (DA2), and discretionary accruals from modified-Jones model (DA3)[3].

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3) First, the discretionary accruals from modified-Jones model with ROA (DA1) is as follows and is estimated by year and by two-digit KSIC (Korean Standard Industrial Classification) code, scaling by lagged total assets:
$TA_{it} = \delta_0 + \delta_1(1/ASSETS_{it-1}) + \delta_2 \Delta SALES_{it} + \delta_3 PPE_{it} + \delta_4 ROA_{it} + \varepsilon_{it}$
Second, the discretionary accruals from performance-matched modified-Jones model (DA2) is a performance-matched discretionary accrual measure adjusting a firm's estimated discretionary accrual by subtracting the corresponding discretionary accrual of a firm matched on the basis of industry and current year's return on assets.
Third, the discretionary accruals from modified-Jones model (DA3) is estimated for each

I examine both absolute and directional value of discretionary accruals to test the effects of audit quality differences. To test the audit quality differences between Big 4 and Non-Big 4 being attributable to client characteristics, the following model is used:

$$DA1_{i,t}(DA2_{i,t} or DA3_{i,t}) = \beta_0 + \beta_1 BIG4_{i,t} + \beta_2 LNASSET_{i,t} + \beta_3 LEVERAGE_{i,t-1} + \beta_4 ATURN_{i,t-1} + \beta_5 ROA\_OI_{i,t-1} + \beta_6 INVREC_{i,t} + \beta_7 CFO\_A_{i,t} + \beta_8 LAGTAC_{i,t} + \beta_9 LOSS_{i,t} + \beta_{10} BTM_{i,t} + \beta_{11} SGROWTH_{i,t} + INDUSTRY\_FE + YEAR\_FE + \varepsilon_{i,t} \quad (2)$$

where for firm *i* and fiscal year *t;*

DA1 = discretionary accruals from modified-Jones model with ROA;
DA2 = discretionary accruals from performance-matched modified-Jones model;
DA3 = discretionary accruals from modified-Jones model;

Big 4 is the main variable of interest in my research study, and is used consistent with prior research. Following Lawrence et al. (2011), I include *LNASSET, LEVERAGE, ATURN,* and *ROA_OI* to control the client size, financial risk on discretionary accruals and the residual variation in accruals due to firm-specific performance, respectively. Also, *INVREC* is used to control business complexity (Kim et al. 2008), *CFO_A* is used to control the significant negative relationship between operating cash flow and accruals (Dechow et al. 1995; Becker et al. 1998; DeFond and Subramanyam1998; Hwang and Kang 2007), *LAGTAC* is used as substitute variable for various omitted ones (Becker et al. 1998; Hwang and Kang 2007), *LOSS* is used to control negative profit firms (Burgstaher and Dichev 1997; Kim et al. 2008), *BTM* and *SGROWTH* is used to control risk factor (Khurana and Raman 2004). The variable definitions are consistent with Equation (1).

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industry and year as for the Jones model except that change in accounts receivable is subtracted from the change in sales:
$TA_{it} = \beta_0 + \beta_1(1/ASSETS_{it-1}) + \beta_2(\Delta SALES_{it} - \Delta AR_{it}) + \beta_3 PPE_{it} + \varepsilon_{it}$

4.1.2 Result

Table 1 presents the descriptive statistics for full and propensity-score matched samples for publicly traded Korean firms. In full sample, there are 3,146 firm-year observations, of which 2,095 (66.59%) and 1,051 (33.41%) are Big 4 and Non-Big 4 clients respectively. The descriptive statistics in full sample indicate significantly different clienteles between Big 4 and Non-Big 4 auditors. Accordingly, the Big 4 clients are significantly larger than Non-Big 4 clients, where natural logarithm of total assets of Big 4 clients are 26.5500 and Non-Big 4 clients are 25.5776 (t-statistics: 19.7267). Also, Big 4 clients are more profitable, leveraged, and complex business structure, and significantly less discretionary accruals and current assets than Non-Big 4 clients.

[Insert Table 1]

For the propensity-score matched sample, I use Equation (1) to calculate propensity scores by imposing a caliper distance of 3 percent. Following the descriptive statistics of propensity-score matched sample, I obtain 1,924 firm-year observations of propensity-score matched sample, of which 962 for Big 4 and Non-Big 4 clients each. As shown in Table 1, the propensity-score model appears effective in forming a balanced sample of Big 4 and Non-Big 4 clients, because control variables except *LNASSET* become insignificantly different at 10 percent level between two client groups. Also, the discretionary accruals used for my analysis are still significantly different between two client groups, except DA2, but the significance level notably becomes lower after matching between Big 4 and Non-Big 4 clients.

[Insert Table 2]

Table 2 shows the result of the first discretionary accruals (DA1), modified-Jones model with ROA, and I confirm the results of Becker et al. (1998), Lawrence et al. (2011), Kim (2006), Goh et al. (2009) and others

for the full sample. Specifically in column 1, there is a negative and significant result for *BIG 4* of -0.005 ($p < 0.05$), and some control variable coefficients are significant. The column 2 and 3 of Table 2 provide the directional results of discretionary accruals. Even though the signs of directional discretionary accruals are concluded as expected, they are insignificant meaning Big 4 auditors seem to have indifferent audit quality from Non-Big 4 auditors based on income-increasing or income-decreasing discretionary accruals. The last three columns of Table 2 present the results of propensity-score matched samples. Compared to Lawrence et al. (2011), I find more significant multivariate *BIG 4* coefficient of -0.006 ($p < 0.01$), suggesting that once the client characteristics are balanced between two clienteles, the treatment effect of *BIG 4* auditors are more significant from those of *Non-Big 4* auditors with respect to DA1. Moreover, the directional discretionary accruals, especially income-decreasing discretionary accruals of -0.004 ($p < 0.1$), become significant (column 6) suggesting that after propensity-score matched, *BIG 4* auditors are less likely to deviate abnormal accruals from normal accruals than *Non-Big 4* auditors do. All control variables are as expected as previous studies shown.

[Insert Table 3]

Table 3 presents the result of second discretionary accruals (DA2), performance-matched modified-Jones model. Unlike Table 2 results, I find a negative and insignificant result for *BIG 4* of -0.005 ($p > 0.10$) while most of the control variable coefficients are significant. This result is consistent with Goh et al. (2009) that the discretionary accruals indicate mixed results in Korean setting. Also, similar to the Table 2, column 2 and 3 of directional discretionary accruals provide insignificant results with expected signs. The last three columns of Table 3 present the results of propensity-score matched samples. As consistent with Lawrence et al. (2011), I find insignificant multivariate *BIG 4* coefficient of -0.005 ($p > 0.10$),

indicating that once the client characteristics are balanced between two clienteles, the treatment effect of *BIG 4* auditors are insignificant from those of *Non-Big 4* auditors with respect to DA2. As well, the directional discretionary accruals of propensity-matched score model continuously provide insignificant results, which further support audit-quality indifference between *BIG 4* auditors and *Non-Big 4* auditors. All control variables are significant as previous studies shown.

[Insert Table 4]

Table 4 shows the result of third discretionary accruals (DA3), modified-Jones model. Similar to the results of Table 2, the column 1 gives the result of a negative and significant result for *BIG 4* of -0.006 ($p < 0.10$), and the most of the control variable coefficients are significant. While the income-increasing discretionary accruals provide a negative and insignificant result of -0.001 ($p > 0.10$), the income-decreasing discretionary accruals give a negative and significant result for *BIG 4* of -0.006 ($p < 0.10$) meaning *BIG 4* auditors tend to perform better audit-quality difference for income-decreasing clients than those of *Non-Big 4*. After client characteristics are balanced between two clienteles as shown in the last three columns of Table 4, I once again find the treatment effect of *BIG 4* auditors to be negative and more significant from those of *Non-Big 4* auditors with respect to DA3. Also, the income-decreasing discretionary accruals (column 6) present more significant results suggesting that *BIG 4* auditors provide better audit-quality than *Non-Big 4* auditors for income-decreasing firms.

In summary, the first hypothesis is not supported from my results of discretionary accruals. I can conclude the audit quality for discretionary accruals is higher for the client of Big 4 auditors in Korea even after controlling for firm characteristics. In other words, Big 4 auditors provide lower discretionary accruals, better audit quality, in Korean setting,

inconsistent with Lawrence et al. (2011). Nevertheless, I can also find that all discretionary accruals provide inconsistent results for Big 4 auditors as shown in prior studies, before and after propensity-matched score is formulated, which gives me the question of discretionary accruals model appropriateness for Korean firms' audit-quality measure. These results encourage me for the future research for Korean firms' clientele effects and its alternative methodologies to distinguish client characteristics from audit-quality differential effects.

4.2 Analysis 2: The Magnitude of Conservatism

4.2.1 Method

To measure the magnitude of conservatism, I follow Basu (1997) model based on the relationship between accounting earnings and stock returns of Korean firms. The main interest in this measure is whether Big 4 auditors perform more conservative auditing practices than Non-Big 4 auditors do, before and after treatment effects have been in place. I use the following model to measure magnitude of conservatism[4]:

$$X_{i,t}/P_{i,t-1}=\beta_0+\beta_1 RET_{i,t}+\beta_2 D_{i,t}+\beta_3 D*RET_{i,t-1}+\beta_4 BIG4_{i,t-1}+\beta_5 BIG4*RET_{i,t-1}+\beta_6 BIG4*D_{i,t}+\beta_7 BIG4*D*RET_{i,t}+INDUSTRY\_FE+YEAR\_FE+\varepsilon_{i,t}, \quad (3)$$

where for firm *i* and fiscal year *t*;

X = the earnings per share for firm i in fiscal year t;
P = the price per share at the beginning of the fiscal year;
RET = the monthly cumulated stock return for the firm over its fiscal year from fiscal year-end t-1 to fiscal year-end t;
D = a dummy variable that 1 if RET < 0 , 0 otherwise;
BIG 4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;

4) To perform propensity-score matched for magnitude of conservatism model, I estimate propensity score using Equation (1). Also, I match with the client characteristics the same as discretionary accruals used in Equation (2). The reason for propensity-score matched is to balance the treatment effects between two clienteles, so I use consistent client characteristics throughout the research paper (Lawrence et al. 2011).

The main variable of interest is $ß_7$ expecting a positive sign. In other words, as previous studies have been stated, I assume Big 4 auditors to recognize negative earnings more quickly than to positive earnings, practicing more conservatively. Nevertheless, after propensity-score matched, I assume Big 4 auditors are not as conservative as Non-Big 4 auditors, indicating similar audit-quality between two auditors group. I separate the sample years, the year 2000 to 2007 and the year 2008 alone, because there has been a global financial crisis from the end of 2007, so the data may contain errors. In order to minimize such effect, I separate the sample period[5]. The variables used are consistent with Basu (1997).

4.2.2 Result

Table 5 presents the result of magnitude of conservatism, and I confirm the results of Basu (1997), Park (2005), and Kim et al. (2008) for the sample period from the year 2000 to 2007. In column (1), the main variable of interest $ß_7$ gives 0.335 ($p < 0.05$), confirming a positive and significant results for timely loss recognition. In other words, *BIG 4* auditors allow clients to be more timely report negative earnings to public than positive earnings. However, in the year 2008 when global financial crisis is in effect, the column (2) return data seems to be abnormal because $ß_7$ is a negative and significant -0.590 ($p < 0.05$), suggesting *BIG 4* auditors allow clients to be less timely report negative earnings to public than positive earnings. Then, the total sample year in column (3) provides the positive and insignificant results, 0.173 ($p > 0.1$), suggesting that the year 2008 effect is strong, offset the magnitude of conservatism results for the year

5) The descriptive statistics for the magnitude of conservatism is available upon request. Briefly, the difference in mean between Big 4 and Non-Big 4 for $X_{i,t}/P_{i,t-1}$is-0.0403(t-statistic:-7.1700)and-0.0053(t-statistics:-0.66)forfullsampleandpropensity-scorematchedsample,respectively.Also,thedifferenceinmeanfor$ß_7$ is 0.1585 (t-statistics: 37.5495) and -0.1788 (t-statistics: -34.51) for full sample and propensity score matched model, respectively.

2000 to 2007. Overall, before propensity-score matched, I should conclude that *BIG 4* auditors have a tendency to report clients' negative earnings more quickly than positive earnings to public, more conservative.

[Insert Table 5]

To further examine my hypothesis, I perform propensity-score matched model, balancing the client characteristics of two clienteles. From the year 2000 to 2007, column (4) shows that the treatment effect of *BIG 4* auditors are insignificant from those of *Non-Big 4* auditors with respect to the magnitude of conservatism, 0.219 ($p > 0.10$). In other words, once the client characteristics are balanced, *BIG 4* auditors do not timely recognize negative earnings than positive earnings as *Non-Big 4* auditors, suggesting that both *BIG 4* auditors and *Non-Big 4* auditors behave in the same manner for magnitude of conservatism. Similarly, in column (6), the result becomes more insignificant for *BIG 4* auditors, 0.122 ($p > 0.10$), meaning *BIG 4* auditors are not more conservative than *Non-Big 4* such that audit quality is indifferent between two groups. Nevertheless, the column (5) shows a negative and significant result, -0.572 ($p < 0.05$), meaning *BIG 4* auditors are again less conservative than *Non-Big 4* auditors. However, because the year 2008 includes extraordinary return data due to global financial crisis, the result may be exceptional.

In summary, the hypothesis 2 is supported that the audit quality of magnitude of conservatism between *BIG 4* auditors and *Non-Big 4* auditors are indifferent, meaning its audit quality difference is attributed to client characteristics.

V. Additional Analysis

5.1 Auditor Industry Specialization

Following discretionary accruals results of this study, where Big 4 auditors are less discretionary accruals than Non-Big 4 auditors before and

after client characteristics balanced, I further examine the hypothesis 1 to see whether Big 4 auditors' better audit quality performance is due to auditor industry specialization effect. Accordingly, the auditor industry specialization becomes important factor by many firms for better audit quality (Krishnan 2003; Ferguson et al. 2003; Francis et al. 2005; Lim and Tan 2008; Reichelt and Wang 2010).

Following prior literatures, the Big 4 auditor industry specialists perform better audit quality than Big 4 auditor non-industry specialists or Non-Big 4 auditors. For U.S. studies, Krishnan (2003) shows that auditor industry specialization is the great mechanism to limit earnings management of client firms. Similarly, the industry specialists reduce earnings management behavior and improve earnings quality in two ways: knowledge and reputation (Craswell et al. 1995). Ferguson et al. (2003) and Francis et al. (2005) highlight office-level auditor industry specialists provide better audit quality than national-level industry specialists in terms of audit-fee measure. Moreover, Reichelt and Wang (2010) and Lim and Tan (2008) provide evidence that joint national and city-specific industry specialists have the highest audit quality, provide lower abnormal accruals of client firms, are less likely to meet or beat analysts' earnings forecasts, and are more likely to issue going-concern audit opinion. Also, Carcello and Nagy (2002, 2004) show that the client financial fraud has been decreased with the support of auditor industry specialization. For Korean studies, Kwon et al. (2007) give the evidence that total assets or total sales industry specialist measures are comparable to be used for Korean firms. Sohn and Lee (2007) provide the evidence that auditor industry specialists reduce income-increasing discretionary accruals and amount of errors. Also, Na and Choi (2005) conclude the audit quality for auditor industry specialists are higher, and such an effect is prominent after Asian-economic crisis (Goh et al. 2009).

Even though the general conclusion for auditor industry specialization is to provide better audit quality service, some prior literatures have determined that auditor industry specialization is not always necessarily a proxy for better audit-quality. For U.S. studies, Reichelt and Wang (2010) show that either national- or city-industry specialists alone provide no or little audit fee premium. Also, in Taiwanese setting, auditor industry specialization does not moderate the relation between provision of non-audit service (signed and unsigned) and discretionary current accrual, and there is no interaction between provision of non-audit service and industry specialization for firm's propensity to just meet analysts' forecasts (Lim and Tan 2008). For Korean studies, Kwon and Ki (2011) observe the evidence that auditor industry specialization have no significant difference in management forecast bias and accuracy. As well, they show that even Big 4 auditor non-industry specialists and Non-Big 4 auditors can make better audit quality if they put more efforts.

Therefore, it is worthwhile to additionally analyze whether Big 4 auditor industry specialists provide better audit quality, less discretionary accruals, than other groups, where such an audit quality difference is attributed to client characteristics.

H3: Big 4 auditor industry specialists do not provide lower discretionary accruals than Big 4 auditor non-industry specialists.

5.1.1 Method

Following Goh et al. (2009), I define auditor industry specialization based on the largest clients' total market share in the industry:

$$MS_{jk} = \frac{\sum_{t=1}^{m} \sqrt{A_{ijk}^{t-1}}}{\sum_{j=1}^{n} \sum_{i=1}^{m} \sqrt{A_{ijk}^{t-1}}}$$

MS = the industry market share for specific BIG 4 auditors;
A = total asset;

Also, the discretionary accruals (DA1, DA2 and DA3) of auditor industry specialists are measured in the same manner of Equation (2):

$$DA1_{i,t}(DA2_{i,t}orDA3_{i,t}) = \beta_0 + \beta_1 INDSP_{i,t} + \beta_2 LNASSET_{i,t} + \beta_3 LEVERAGE_{i,t-1} + \beta_4 ATURN_{i,t-1} + \beta_5 ROA\_OI_{i,t-1} + \beta_6 INVREC_{i,t} + \beta_7 CFO\_A_{i,t} + \beta_8 LAGTAC_{i,t} + \beta_9 LOSS_{i,t} + \beta_{10} BTM_{i,t} + \beta_{11} SGROWTH_{i,t} + INDUSTRY\_FE + YEAR\_FE + \varepsilon_{i,t}, \quad (4)$$

where for firm *i* and fiscal year *t*;

INDSP = 1 if BIG 4 auditors are industry specialists, 0 otherwise;

5.1.2 Result

[Insert Table 6]

Table 6 presents the result of *BIG 4* auditor industry specialization with respect to three discretionary accruals measures (column (1)-(2) for DA1; column (3)-(4) for DA2; column (5)-(6) for DA3). In columns (1), (3), and (5), the OLS regression provide the results that there is the negative and insignificant variable coefficients for Big 4 auditor industry specialists (*INDSP*), -0.000 ($p > 0.10$), -0.000 ($p > 0.10$) and -0.003 ($p > 0.10$) for DA1, DA2, and DA3 respectively. In other words, as Kwon and Ki (2011) found, *INDSP* have no significant difference in discretionary accruals from Big 4 auditor non-industry specialists. The columns (2), (4), and (6) are propensity-score matched results where client characteristics are balanced between two clienteles. Again, *INDSP* is negative and insignificant, -0.001 ($p > 0.10$), -0.001 ($p > 0.10$) and -0.003 ($p > 0.10$) for DA1, DA2, and DA3 respectively, suggesting that the treatment effect of *INDSP* are insignificant from those of Big 4 auditor non-industry specialists with respect to all discretionary accruals.

Overall, it seems the auditor industry specialization is ineffective in Korea, suggesting that there is no specific classification of audit industry

specialists among Big 4 audit firms. This may be due to geographical means. In Korea, it is likely that audit firm headquarters are likely to perform majority of audit and take full responsibility of it, so classifying auditor industry specialization among audit firms is ambiguous. In that regard, there is no audit quality difference between Big 4 auditor industry specialists and the other groups, which may suggest that Big 4 audit firms as a whole provide better audit quality to clients or audit quality difference being attributed to client characteristics in terms of auditor industry specialists. However, because OLS regressions also do not provide significant results, I cautiously interpret such a result.

VI. Conclusion

In my study, I examine whether audit quality differential between Big 4 and Non-Big 4 auditors could be a reflection of client characteristics. By using a propensity-score matched model with an extensive lists of client and auditor characteristic variables, I find inconsistent results from Lawrence et al. (2011). Specifically, the treatment effects of Big 4 auditors are significantly different from those of Non-Big 4 auditors with respect to discretionary accruals, but insignificantly different from those of Non-Big 4 auditors with respect to the magnitude of conservatism and auditor industry specialists.

As mentioned, I caution the reader that my findings must be interpreted with due regard to their methodological limitations. First, an inherent limitation of this approach is that I can only match the observed attributes, meaning unobservable attributes are not applicable to estimate the treatment effects. In other words, I cannot ensure whether all relevant client and auditor control variables are included. Second, it is hard to generalize the results made in this study because the matching reflects a trade-off between identifying the treatment effects and the ability to generalize results

to the full population.

I should emphasize that my study does not resolve the underlying question as to whether audit-quality difference proxies between Big 4 and Non-Big 4 auditors can be attributed to client characteristics, but rather it provides some evidence. Nevertheless, I hope that my research results could encourage other researchers to explore Korean firms clientele effects, different from those of other countries, and to identify alternative methodologies that further separate client characteristics from audit quality differential effects.

VII. Reference

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TABLE 1

Descriptive Statistics Full and Propensity-Score Matched Samples: Discretionary Accruals and the Magnitude of Conservatism Analysis

	Full Sample				Propensity-Score Matched Sample: Matched Using the Full Model		
	All Obs. Mean Std. Dev.	Big4 Mean Std. Dev.	Non-Big4 Mean Std. Dev.	Difference in Means (t-statistic)	Big4 Mean Std. Dev.	Non-Big4 Mean Std. Dev.	Difference in Means (t-statistic)
DA1	0.0516	0.0498	0.0553	-0.0055***	0.0487	0.0547	-0.0060***
	(0.0468)	(0.0452)	(0.0496)	(-3.1282)	(0.0452)	(0.0485)	(-2.8080)
DA2	0.0850	0.0842	0.0868	-0.0026	0.0827	0.0857	-0.0030
	(0.0803)	(0.0791)	(0.0828)	(-0.8637)	(0.0810)	(0.0820)	(-0.8057)
DA3	0.0613	0.0584	0.0672	-0.0089***	0.0596	0.0661	-0.0066**
	(0.0666)	(0.0620)	(0.0746)	(-3.5267)	(0.0662)	(0.0741)	(-2.0592)
LNASSET	26.2252	26.5500	25.5776	0.9724***	25.5551	25.6612	-0.1062**
	(1.3823)	(1.4445)	(0.9652)	(19.7267)	(0.8847)	(0.9433)	(-2.5537)
LEVERAGE	0.4477	0.4583	0.4266	0.0317***	0.4278	0.4311	-0.0033
	(0.1881)	(0.1827)	(0.1969)	(4.4679)	(0.1829)	(0.1974)	(-0.3846)
ATURN	1.0294	1.0451	0.9979	0.0472**	1.0007	1.0038	-0.0031
	(0.5146)	(0.5235)	(0.4951)	(2.4283)	(0.4646)	(0.4952)	(-0.1423)
ROA_OI	0.0525	0.0574	0.0428	0.0146***	0.0443	0.0449	-0.0005
	(0.0683)	(0.0645)	(0.0745)	(5.6762)	(0.0676)	(0.0750)	(-0.1593)
INVREC	0.2977	0.2872	0.3185	-0.0313***	0.3287	0.3212	0.0075
	(0.1465)	(0.1451)	(0.1471)	(-5.6835)	(0.1484)	(0.1488)	(1.1044)
CFO_A	0.0522	0.0575	0.0416	0.0159***	0.0413	0.0439	-0.0025
	(0.0871)	(0.0857)	(0.0888)	(4.8380)	(0.0820)	(0.0870)	(-0.6609)
LAGTAC	-0.0213	-0.0216	-0.0206	-0.0011	-0.0170	-0.0198	0.0029
	(0.1019)	(0.0968)	(0.1115)	(-0.2771)	(0.1058)	(0.1098)	(0.5862)
LOSS	0.1736	0.1594	0.2017	-0.0423***	0.1942	0.1932	0.0010
	(0.3788)	(0.3662)	(0.4015)	(-2.9570)	(0.3958)	(0.3950)	(0.0575)
BTM	1.8499	1.7637	2.0219	-0.2583***	2.1047	2.0021	0.1026
	(1.3941)	(1.3802)	(1.4065)	(-4.9201)	(1.5367)	(1.3969)	(1.5365)
SGROWTH	0.0683	0.0723	0.0605	0.0118	0.0580	0.0622	-0.0042
	(0.2283)	(0.2288)	(0.2274)	(1.3665)	(0.2078)	(0.2296)	(-0.4205)
No. Obs.	3,146	2,095	1,051		962	962	
% of Total	100%	66.59%	33.41%				

*, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

The table presents the descriptive statistics for my full and propensity-score matched discretionary accruals samples and the magnitude of conservatism samples. Propensity scores were calculated using Equation (1).

Variable Definitions:

DA1 = discretionary accruals from modified-Jones model with ROA;

DA2 = discretionary accruals from performance-matched modified-Jones model;

DA3 = discretionary accruals from modified-Jones model;

LNASSET = natural logarithm of total assets at the end of the year t;

LEVERAGE = total liability$_t$ / total equity$_t$;

ATURN = sales$_t$ / total assets$_{t-1}$;

ROA_OI = net income$_t$ / average operating income$_{t-1}$;

INVREC =(account receivables$_t$ + inventory$_t$) / total asset$_t$;

CFO_A = operating cash flow$_t$ / average total asset$_{t-1}$;

LAGTAC = lag value of total asset;

LOSS = 1 if net income is negative in the year t, 0 otherwise;

BTM = equity$_t$ / market value$_t$;

SGROWTH = (sale$_t$ – lagsales) / average total asset$_{t-1}$;

TABLE 2
Discretionary Accruals Analysis: Multivariate Tests of Full and Propensity-Score Matched Samples

	Dependent Variable: |DA1|					
	Full Sample			Propensity-Score Matched Sample: Matched Using the Full Sample		
	(1) OLS Regression |DA1|	(2) OLS Regression DA1≥0	(3) OLS Regression DA1<0	(4) Multivariate Estimate |DA1|	(5) Multivariate Estimate DA1≥0	(6) Multivariate Estimate DA1<0
BIG 4	-0.005**	0.001	-0.003	-0.006***	0.001	-0.004*
	(0.017)	(0.689)	(0.116)	(0.006)	(0.783)	(0.052)
LNASSET	-0.004***	-0.001	-0.003***	-0.006***	-0.001	-0.005***
	(0.000)	(0.221)	(0.000)	(0.001)	(0.376)	(0.001)
LEVERAGE	0.013**	-0.002	0.022***	0.008	0.005	0.023***
	(0.043)	(0.711)	(0.001)	(0.276)	(0.476)	(0.001)
ATURN	0.002	-0.003	-0.001	0.003	-0.005	-0.000
	(0.505)	(0.258)	(0.651)	(0.469)	(0.216)	(0.934)
ROA_OI	0.020	0.174***	-0.180***	-0.009	0.174***	-0.169***
	(0.525)	(0.000)	(0.000)	(0.813)	(0.000)	(0.000)
INVREC	0.002	-0.013	-0.010	0.005	-0.017*	-0.018
	(0.848)	(0.121)	(0.354)	(0.768)	(0.092)	(0.230)
CFO_A	-0.013	-0.637***	0.558***	-0.063*	-0.656***	0.568***
	(0.646)	(0.000)	(0.000)	(0.052)	(0.000)	(0.000)
LAGTAC	-0.009	-0.011	-0.001	0.003	-0.005	0.008
	(0.467)	(0.406)	(0.953)	(0.869)	(0.765)	(0.542)
LOSS	0.009***	-0.021***	0.026***	0.006	-0.026***	0.029***
	(0.005)	(0.000)	(0.000)	(0.119)	(0.000)	(0.000)
BTM	-0.004***	-0.000	-0.003***	-0.004***	-0.000	-0.001
	(0.000)	(0.550)	(0.003)	(0.001)	(0.894)	(0.141)
SGROWTH	0.008	0.029***	-0.021***	0.013*	0.024***	-0.025***
	(0.168)	(0.000)	(0.000)	(0.087)	(0.001)	(0.002)
Year_FE	Included	Included	Included	Included	Included	Included
Industry_FE	Included	Included	Included	Included	Included	Included
Constant	0.154***	0.087***	0.068***	0.197***	0.089**	0.113***
	(0.000)	(0.000)	(0.006)	(0.000)	(0.022)	(0.004)
Observations	3146	1547	1599	1930	1002	928
R-squared	0.098	0.630	0.579	0.120	0.627	0.606
R^2_A	0.0873	0.621	0.569	0.103	0.613	0.590

*,**,*** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.
The table presents the results of discretionary accruals from modified-Jones model with ROA (DA1) tests using the full and propensity-score matched samples.
Multivariate estimates are based on Equation (2). Propensity scores were calculated using Equation (1).
t-statistics and p-values are calculated using clustered standard errors by firm for the multivariate analyses.
For brevity, the year-specific and industry-specific intercepts are not reported. The matching model R^2 is the pseudo R^2 for the propensity-score logistic regression.
The percentage correctly classified refers to the percentage of audit clients that are correctly classified as Big4 or Non-Big4 clients, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model.

Variable Definitions:
BIG4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;
LNASSET = natural logarithm of total assets at the end of the year t;
LEVERAGE = total liability / total equity;
ATURN = sales / total assets;
ROA_OI = net income / average operating income;
INVREC = (account receivables + inventory) / total asset;
CFO_A = operating cash flow / average total asset;
LAGTAC = lag value of total asset;
LOSS = 1 if net income is negative in the year t, 0 otherwise;
BTM = equity / market value;
SGROWTH = (sales – lagsales) / average total asset;

TABLE 3
Discretionary Accruals Analysis: Multivariate Tests of Full and Propensity-Score Matched Samples

	Dependent Variable: |DA2|					
	Full Sample			Propensity-Score Matched Sample: Matched Using the Full Sample		
	(1) OLS Regression |DA2|	(2) OLS Regression DA2>0	(3) OLS Regression DA2<0	(4) Multivariate Estimate |DA2|	(5) Multivariate Estimate DA2>0	(6) Multivariate Estimate DA2<0
BIG 4	-0.005	0.005	-0.008	-0.005	0.005	-0.008
	(0.178)	(0.150)	(0.105)	(0.145)	(0.192)	(0.108)
LNASSET	-0.003**	0.000	-0.003	-0.005*	-0.002	-0.004
	(0.049)	(0.929)	(0.163)	(0.058)	(0.530)	(0.218)
LEVERAGE	0.023**	-0.023**	0.037***	0.019*	-0.025**	0.050***
	(0.014)	(0.022)	(0.005)	(0.072)	(0.034)	(0.001)
ATURN	0.010*	0.004	0.012*	0.012*	0.010	0.013
	(0.064)	(0.436)	(0.090)	(0.076)	(0.101)	(0.224)
ROA_OI	-0.203***	0.116**	-0.395***	-0.306***	0.043	-0.460***
	(0.000)	(0.022)	(0.000)	(0.000)	(0.425)	(0.000)
INVREC	-0.004	-0.018	0.000	-0.009	-0.020	-0.019
	(0.823)	(0.322)	(0.995)	(0.677)	(0.315)	(0.510)
CFO_A	0.140***	-0.406***	0.457***	0.138***	-0.406***	0.454***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LAGTAC	-0.015	-0.019	-0.021	-0.003	-0.010	-0.016
	(0.397)	(0.393)	(0.361)	(0.898)	(0.700)	(0.662)
LOSS	0.025***	-0.021***	0.043***	0.018***	-0.033***	0.038***
	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)	(0.000)
BTM	-0.008***	-0.006***	-0.008***	-0.008***	-0.006***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.007)
SGROWTH	0.021**	0.007	0.015	0.031***	0.019	0.017
	(0.011)	(0.483)	(0.164)	(0.006)	(0.170)	(0.296)
Year_FE	Included	Included	Included	Included	Included	Included
Industry_FE	Included	Included	Included	Included	Included	Included
Constant	0.143***	0.090*	0.108**	0.202***	0.129**	0.145*
	(0.001)	(0.052)	(0.046)	(0.002)	(0.046)	(0.086)
Observations	3093	1340	1751	1895	848	1046
R-squared	0.122	0.221	0.244	0.153	0.268	0.284
R^2_A	0.111	0.198	0.228	0.136	0.235	0.259

*;**;*** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.
The table presents the results of discretionary accruals from performance-matched modified-Jones model (DA2) tests using the full and propensity-score matched samples.
Multivariate estimates are based on Equation (2). Propensity scores were calculated using Equation (1).
t-statistics and p-values are calculated using clustered standard errors by firm for the multivariate analyses.
For brevity, the year-specific and industry-specific intercepts are not reported. The matching model R^2 is the pseudo R^2 for the propensity-score logistic regression.
The percentage correctly classified refers to the percentage of audit clients that are correctly classified as Big4 or Non-Big4 clients, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model.

Variable Definitions:
BIG4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;
LNASSET = natural logarithm of total assets at the end of the year t;
LEVERAGE = total liability_t / total equity_t;
ATURN = sales_t / total assets_{t-1};
ROA_OI = net income_t / average operating income_{t-1};
INVREC = (account receivables_t + inventory_t) / total asset_t;
CFO_A = operating cash flow_t / average total asset_{t-1};
LAGTAC = lag value of total asset;
LOSS = 1 if net income is negative in the year t, 0 otherwise;
BTM = equity_t / market value_t;
SGROWTH = (sales_t – lagsales) / average total asset_{t-1};

TABLE 4
Discretionary Accruals Analysis: Multivariate Tests of Full and Propensity-Score Matched Samples

	Dependent Variable: |DA3|					
	Full Sample			Propensity-Score Matched Sample: Matched Using the Full Sample		
	(1) OLS Regression |DA3|	(2) OLS Regression DA3>0	(3) OLS Regression DA3<0	(4) Multivariate Estimate |DA3|	(5) Multivariate Estimate DA3>0	(6) Multivariate Estimate DA3<0
BIG 4	-0.006*	-0.001	-0.006*	-0.008***	-0.003	-0.008**
	(0.069)	(0.636)	(0.077)	(0.009)	(0.455)	(0.021)
LNASSET	-0.007***	-0.004***	-0.006***	-0.008***	-0.004*	-0.006*
	(0.000)	(0.004)	(0.000)	(0.001)	(0.076)	(0.076)
LEVERAGE	0.029***	-0.017*	0.061***	0.025**	-0.001	0.051***
	(0.001)	(0.082)	(0.000)	(0.025)	(0.958)	(0.000)
ATURN	0.004	0.005	-0.004	0.005	0.008	-0.003
	(0.466)	(0.264)	(0.449)	(0.484)	(0.285)	(0.685)
ROA_OI	-0.146***	0.243***	-0.527***	-0.204***	0.178***	-0.512***
	(0.006)	(0.000)	(0.000)	(0.001)	(0.007)	(0.000)
INVREC	-0.003	-0.031**	-0.015	-0.002	-0.033*	-0.023
	(0.848)	(0.020)	(0.496)	(0.920)	(0.062)	(0.410)
CFO A	-0.015	-0.627***	0.583***	-0.030	-0.619***	0.562***
	(0.645)	(0.000)	(0.000)	(0.458)	(0.000)	(0.000)
LAGTAC	-0.041**	-0.067***	-0.017	-0.038*	-0.073***	-0.016
	(0.015)	(0.001)	(0.394)	(0.086)	(0.007)	(0.548)
LOSS	0.018***	-0.044***	0.052***	0.008	-0.054***	0.052***
	(0.000)	(0.000)	(0.000)	(0.159)	(0.000)	(0.000)
BTM	-0.008***	-0.007***	-0.007***	-0.009***	-0.008***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SGROWTH	-0.000	-0.024***	0.010	0.005	-0.024**	0.016
	(0.967)	(0.004)	(0.315)	(0.685)	(0.023)	(0.246)
Year_FE	Included	Included	Included	Included	Included	Included
Industry_FE	Included	Included	Included	Included	Included	Included
Constant	0.249***	0.182***	0.158***	0.266***	0.188***	0.149*
	(0.000)	(0.000)	(0.001)	(0.000)	(0.003)	(0.074)
Observations	3146	1592	1554	1930	998	932
R-squared	0.167	0.442	0.469	0.189	0.428	0.483
R^2_A	0.157	0.429	0.456	0.173	0.407	0.462

*;**;*** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.
The table presents the results of discretionary accruals from modified-Jones model (DA3) tests using the full and propensity-score matched samples.
Multivariate estimates are based on Equation (2). Propensity scores were calculated using Equation (1).
t-statistics and p-values are calculated using clustered standard errors by firm for the multivariate analyses.
For brevity, the year-specific and industry-specific intercepts are not reported. The matching model R^2 is the pseudo R^2 for the propensity-score logistic regression.
The percentage correctly classified refers to the percentage of audit clients that are correctly classified as Big4 or Non-Big4 clients, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model.

Variable Definitions:
BIG4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;
LNASSET = natural logarithm of total assets at the end of the year t;
LEVERAGE = total liability$_t$ / total equity$_t$;
ATURN = sales$_t$ / total assets$_{t-1}$;
ROA_OI = net income$_t$ / average operating income$_{t-1}$;
INVREC = (account receivables$_t$ + inventory$_t$) / total asset$_t$;
CFO_A = operating cash flow$_t$ / average total asset$_{t-1}$;
LAGTAC = lag value of total asset;
LOSS = 1 if net income is negative in the year t, 0 otherwise;
BTM = equity$_t$ / market value$_t$;
SGROWTH = (sales$_t$ – lagsales) / average total asset$_{t-1}$;

Table 5
The Magnitude of Conservatism Analysis: Univariate and Multivariate Tests Full and Propensity-Score Matched Samples

	Dependent Variable: $X_{i,t}/P_{i,t-1}$					
	Full Sample			Propensity-Score Matched Sample: Matched Using the Full Sample		
	(1) OLS Regression 2000-2007	(2) OLS Regression 2008	(3) OLS Regression 2000-2008	(4) Multivariate Estimate 2000-2007	(5) Multivariate Estimate 2008	(6) Multivariate Estimate 2000-2008
RET	0.127***	-0.357**	0.124***	0.131***	-0.401***	0.129***
	(0.000)	(0.011)	(0.000)	(0.000)	(0.007)	(0.000)
D	-0.059	-0.069	-0.034	-0.067*	-0.106	-0.044
	(0.125)	(0.235)	(0.307)	(0.084)	(0.103)	(0.196)
*D*RET*	0.034	0.983***	0.170	-0.063	0.957***	0.086
	(0.790)	(0.000)	(0.112)	(0.641)	(0.000)	(0.449)
BIG 4	0.023	-0.093*	0.020	0.010	-0.062	0.013
	(0.302)	(0.076)	(0.355)	(0.691)	(0.418)	(0.589)
*BIG 4*RET*	-0.051*	0.311	-0.047*	-0.063	0.459**	-0.064*
	(0.072)	(0.111)	(0.088)	(0.104)	(0.033)	(0.092)
*BIG 4*D*	0.085*	0.079	0.059	0.049	0.109	0.033
	(0.073)	(0.251)	(0.148)	(0.364)	(0.287)	(0.491)
*BIG 4*D*RET*	0.335**	-0.590**	0.173	0.219	-0.572**	0.122
	(0.027)	(0.011)	(0.165)	(0.222)	(0.033)	(0.429)
Year FE	Included	Included	Included	Included	Included	Included
Industry FE	Included	Included	Included	Included	Included	Included
Constant	0.089***	0.156***	0.090***	0.069*	0.148**	0.291***
	(0.008)	(0.002)	(0.003)	(0.058)	(0.026)	(0.000)
Observations	2272	407	2679	1380	221	1601
R-squared	0.145	0.341	0.170	0.140	0.404	0.163
R²_A	0.134	0.296	0.160	0.122	0.331	0.146

*,**,*** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.
The table presents the results of my magnitude of conservatism tests using the full and propensity-score matched samples.
Multivariate estimates are based on Equation (3). Propensity scores were calculated using Equation (1).
t-statistics and p-values are calculated using clustered standard errors by firm for the multivariate analyses.
For brevity, the year-specific and industry-specific intercepts are not reported. The matching model R^2 is the pseudo R^2 for the propensity-score logistic regression.
The percentage correctly classified refers to the percentage of audit clients that are correctly classified as Big4 or Non-Big4 clients, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model.

Variable Definitions:
X = the earnings per share for firm i in fiscal year t;
P = the price per share at the beginning of the fiscal year;
RET = the stock return for the firm cumulated over its fiscal year from fiscal year-end t-1 to fiscal year-end t;
D = a dummy variable that 1 if RET < 0, 0 otherwise;
BIG4 = 1 if the client has Big 4 auditors in the year t, 0 otherwise;

TABLE 6
Additional Discretionary Accruals Analysis:
Multivariate Tests of Full and Propensity-Score Matched Samples

	Dependent Variable: |DA1|		Dependent Variable: |DA2|		Dependent Variable: |DA3|	
	(1) OLS Regression	(2) Propensity-Score Matched	(3) OLS Regression	(4) Propensity-Score Matched	(5) OLS Regression	(6) Propensity-Score Matched
INDSP	-0.000	-0.001	-0.000	-0.001	-0.003	-0.003
	(0.837)	(0.771)	(0.924)	(0.793)	(0.335)	(0.262)
LNASSET	-0.003***	-0.004***	-0.003	-0.002	-0.006***	-0.006***
	(0.001)	(0.001)	(0.149)	(0.332)	(0.000)	(0.000)
LEVERAGE	0.018**	0.025***	0.019	0.025	0.034***	0.024*
	(0.022)	(0.009)	(0.123)	(0.101)	(0.002)	(0.057)
ATURN	0.000	0.002	0.009	0.005	0.003	-0.000
	(0.868)	(0.645)	(0.138)	(0.439)	(0.631)	(0.979)
ROA_OI	0.050	0.051	-0.138**	-0.104	-0.103*	-0.135**
	(0.157)	(0.221)	(0.016)	(0.144)	(0.054)	(0.042)
INVREC	-0.000	-0.002	-0.003	0.023	-0.001	-0.001
	(0.987)	(0.908)	(0.881)	(0.406)	(0.971)	(0.963)
CFO_A	-0.004	0.004	0.135***	0.136***	-0.017	-0.012
	(0.927)	(0.923)	(0.001)	(0.010)	(0.709)	(0.813)
LAGTAC	-0.012	-0.022	0.011	-0.008	-0.014	-0.029
	(0.489)	(0.291)	(0.639)	(0.783)	(0.501)	(0.240)
LOSS	0.013***	0.011**	0.029***	0.031***	0.022***	0.024***
	(0.001)	(0.016)	(0.000)	(0.000)	(0.000)	(0.001)
BTM	-0.004***	-0.003**	-0.006***	-0.005**	-0.007***	-0.007***
	(0.000)	(0.016)	(0.004)	(0.031)	(0.000)	(0.000)
SGROWTH	0.008	0.003	0.015	0.008	0.001	0.006
	(0.179)	(0.745)	(0.148)	(0.505)	(0.936)	(0.589)
Year_FE	Included	Included	Included	Included	Included	Included
Industry_FE	Included	Included	Included	Included	Included	Included
Constant	0.129***	0.152***	0.131***	0.104*	0.196***	0.209***
	(0.000)	(0.000)	(0.008)	(0.082)	(0.000)	(0.000)
Observations	2095	1416	2062	1392	2095	1416
R-squared	0.097	0.104	0.121	0.119	0.164	0.164
R²_A	0.0803	0.0802	0.105	0.0958	0.149	0.142

*,**,*** indicate significance at the 0.10, 0.05 and 0.01 levels, respectively.
The table presents the results of my discretionary accruals tests (DA1; DA2; DA3) using the full and propensity-score matched samples.
Multivariate estimates are based on Equation (4). Propensity scores were calculated using Equation (1).
t-statistics and p-values are caluculated using clustered standard errors by firm for the multivariate analyses.
For brevity, the year-specific and industry-specific intercepts are not reported. The matching model R^2 is the pseudo R^2 for the propensity-score logistic regression.
The percentage correctly classified refers to the percentage of audit clients that are correctly classified as Big 4 or Non-Big 4 clients, based on a 50 percent cutoff level, using the predicted probabilities from the propensity-score model.

Variable Definitions:
INDSP = 1 if BIG 4 auditors are industry specialists, 0 otherwise;
LNASSET = natural logarithm of total assets at the end of the year t;
LEVERAGE = total liability$_t$ / total equity$_t$;
ATURN = sales$_t$ / total assets$_{t-1}$;
ROA_OI = net income$_t$ / average operating income$_{t-1}$;
INVREC = (account receivables$_t$ + inventory$_t$) / total asset$_t$;
CFO_A = operating cash flow$_t$ / average total asset$_{t-1}$;
LAGTAC = lag value of total asset;
LOSS = 1 if net income is negative in the year t, 0 otherwise;
BTM = equity$_t$ / market value$_t$;
SGROWTH = (sales$_t$ – lag sales) / average total asset$_{t-1}$;

국문초록

회계법인과 회계사들이 합리적인 감사품질을 유지하는지에 대한 연구는 현재 회계 감사 논문들의 최대의 관심사 중 하나이다. 회사의 이해관계자들은 자신들과 관련 있는 회사들이 Big 4 와 Non-Big 4 중 어느 회계법인을 선택하는지에 대해 많은 관심을 두고 있다. 미국 기업들을 대상으로 한 Lawrence et al. (2011)을 바탕으로, 본 논문에서는 한국 기업들을 대상으로 Big 4 와 Non-Big 4 사이의 감사품질 측정치에 대한 차이가 감사대상인 회사들의 고유의 특성들에 의해 생겼는지 보고자 한다. 감사품질을 추정하기 위한 측정치들로 재량적 발생액과 보수적 회계처리 수준을 사용하였고, 경향점수 모형 (propensity-score matched model)을 사용하여 두 집단간의 감사대상인 회사들의 특성들을 통제한 후 감사품질의 효과를 측정하였다. Ordinary least square 회귀분석과 propensity-score matched model을 비교하여 분석한 결과, 처리효과 (treatment effect)에 따른 Big 4 회계법인의 재량적 발생액이 Non-Big 4 회계법인보다 낮은 결과를 얻었는데, 이는 감사대상인 고객 회사의 고유의 특성 때문이 아니고 회계법인 수준에서 차이가 있다는 것을 시사한다. 반면에, 처리효과에 따른 Big 4 이나 Non-Big 4 회계법인의 보수적 회계처리 수준은 비슷하다는 결과를 얻었는데, 즉 과거 논문에서의 감사품질의 차이는 회계법인 수준에서가 아닌 감사대상인 고객 회사들의 고유의 특성 때문이었다는 것을 이 논문 결과를 통해 알 수 있었다. 이 결과들을 종합해보면, 한국 내의 Big 4 와 Non-Big 4의 감사품질의 차이는 감사품질 측정치 선택에 따라 달라진 다는 것을 알 수 있었다. 본 논문의 공헌점은 비록 논문의 결과가 회계법인들의 감사품질 차이에 대한 의문점의 모든 해결책을 제시해주고 있지는 않으나, 앞으로 감사대상인의 고유의 특성과 감사품질의 효과를 분리하여 측정 할 수 있는 다른 방법론의 연구들에 방향성을 제시하고 있다는 점에서 그 의의를 찾을 수 있다.

한글색인어: Big 4; Non-Big4; 감사품질; 재량적 발생액; 보수적 회계처리 수준; 경향점수 모형.