

# The effect of the dependence on the work of other auditors on error in analysts' earnings forecasts

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## Abstract

**Purpose** – This paper aims to examine the effect of audit quality of consolidated financial statements on the accuracy of analysts' earnings forecasts from the viewpoint of users of financial statements.

**Design/methodology/approach** – This paper investigates the effect of dependence on the work of other auditors on error in analysts' earnings forecasts based on samples from 2011 to 2012 (the period since implementation of the International Financial Reporting Standards in Korea). In addition, this paper examines the effects of use of Big 4 auditors, use of auditors with industry expertise and the proportion of overseas subsidiaries in relation to all subsidiaries on the association between dependence on the work of other auditors and error in analysts' earnings forecasts.

**Findings** – This paper finds a positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts, suggesting that more dependence on the work of other auditors decreases the quality of the audit of consolidated financial statements; thus, to the extent that low-quality audits decrease reporting reliability, analysts' forecasts are less likely to be accurate. This paper also finds that the positive relationship between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened when the principal auditor is a Big 4 auditor or one with industry expertise, because such auditors provide higher-quality audit services. However, the positive relationship between dependence on the work of other auditors and error in analysts' earnings forecasts is further strengthened in cases where the proportion of overseas subsidiaries to all subsidiaries is higher. These results suggest that the complexity of the consolidation process increases as the proportion of overseas subsidiaries increases.

**Originality/value** – The findings are useful in analyzing the effects of adoption of the New ISA, implemented in 2014, which does not allow the division of audit responsibilities between principal auditors and other auditors. This paper also provides insights for regulators and practitioners to improve the auditor appointment system in the future.

**Keywords** Audit quality, Forecast error, Analysts, Other auditors, Principal auditors

**Paper type** Research paper



## 1. Introduction

Listed companies in Korea are required to prepare and disclose consolidated financial statements in accordance with the International Financial Reporting Standards (IFRS) as of 2011. The most remarkable feature in the IFRS is that it defines consolidated financial statements as the primary financial statements of a controlling company holding one or more subsidiaries; this is a major change compared to the previous accounting standards. Following IFRS adoption, listed companies are required to prepare and disclose consolidated

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financial statements not only for annual reports but also for quarterly and semi-annual financial reports. For financial statement users, IFRS adoption brought a fundamental shift in the notion of consolidated financial statements as a source of primary information, in addition to non-consolidated (i.e. individual) financial statements. In the past, financial analysts announced earnings forecasts based on non-consolidated financial statements. However, now that financial analysts must use consolidated financial statements to forecast earnings because of the implementation of the IFRS, consolidated financial statements have become critical for future investment decision-making.

The major advantage of consolidated financial statements is that they deliver systematic information on the financial condition and performance of an economic entity, which consists of a controlling company and its subsidiaries. These are regarded as one economic entity based on their interdependent and organic relationship, although they are legally separate, independent entities. Prior to implementation of the IFRS, users of financial statements in Korea paid more attention to non-consolidated financial statements than to consolidated financial statements, treating the former as primary financial statements. Research on consolidated financial statements has therefore been focused on either their usefulness or their audit quality. In relation to their usefulness, prior studies have shown that consolidated financial statements present incrementally useful information, in addition to that provided by non-consolidated financial statements. This information is based on trade volume or analysis of excess returns and value relevance (Chun, 1994; Hwang, 1995; Kim *et al.*, 2001; Kim and Na, 2002; Shin, 2008; Park and Ji, 2009; Ji *et al.*, 2010).

In preparing consolidated financial statements, the principal auditors are responsible for direction, supervision and performance of the consolidated financial statements audit in accordance with the revised Korean Auditing Standard 600 “Audits of Group Financial Statements” (including the Work of Subsidiary Auditors) in the light of IFRS[1]. This revision requires the principal auditors to obtain sufficient audit evidence from subsidiaries auditors. The purpose of Korean Auditing Standard 600 is to establish concrete standards and detailed guidance for audit procedures in consolidation process from a risk-based approach. Earlier studies on the quality of audits of consolidated financial statements demonstrate that audit quality increases as the ratio and size of the principal auditor’s[2] audit coverage increases, and also that increased audit complexity of consolidated financial statements decreases audit quality (Choi *et al.*, 2009; Park and Park, 2010; Ji *et al.*, 2010; Choi *et al.*, 2010; Lee *et al.*, 2011, 2013). This study focuses on the influence of the quality of consolidated financial statements on error in analysts’ earnings forecasts. Specifically, we investigate the relation between dependence on the work of other auditors and error in analysts’ earnings forecasts. In addition, we provide evidence that audit quality (measured in terms of the principal auditor’s size and industry expertise) weakens the positive relation between dependence on the work of other auditors and error in analysts’ earnings forecasts. On the other hand, the proportion of overseas subsidiaries to all subsidiaries strengthens the positive relation between dependence on the work of other auditors and error in analysts’ earnings forecasts.

In general, there is a positive relation between audit quality and forecast accuracy (Behn *et al.*, 2008; Kim *et al.*, 2008; Lim *et al.*, 2009). It is critical to have an in-depth understanding of the consolidated economic entity, its diverse accounting issues and audit risk to audit consolidated financial statements successfully. Accordingly, relevant information must be clearly communicated between the principal auditor of a controlling entity and other auditors to ensure high-quality audits of consolidated financial statements (Choi *et al.*, 2009; Lee *et al.*, 2013)[3]. When the findings of a principal auditor differ from those of other auditors, efficient and effective communication between them may be challenging. If

communication between two parties fails, the quality of the audit is likely to deteriorate (Choi *et al.*, 2009; Park and Park 2010; Ji *et al.*, 2010; Choi *et al.*, 2010; Lee *et al.*, 2011, 2013). In addition, greater dependence on the work of other auditors in auditing consolidated financial statements is likely to reduce information sharing and knowledge spillover between the principal auditor and other auditors. Thus, more dependence on other auditors decreases audit quality, which, in turn, increases error in analysts' earnings forecasts.

Use of Big 4 auditors and industry specialist auditors has been used as a proxy of high audit quality in many studies. In general, audit quality is higher for Big 4 auditors than for other auditors (Teoh and Wong, 1993; Becker *et al.*, 1998; Francis and Krishnan, 1999; Weber and Willenborg, 2003; Behn *et al.*, 2008; Kim, 2006; Goh *et al.*, 2009; Kwon and Ki, 2011; Choi and Lee, 2014), and use of industry specialist auditors increases audit quality (O'Keefe *et al.*, 1994; Gramling *et al.*, 2001; Balsam *et al.*, 2003; Krishnan, 2003; Chung and Lee, 1996; Jung, 1997; Kwon *et al.*, 2008; Kim *et al.*, 2008). Using auditing by Big 4 auditors or industry specialists increases both audit quality and the reliability of accounting information, which enhances analysts' forecast accuracy (Behn *et al.*, 2008; Kim *et al.*, 2008). An in-depth understanding of the complicated procedures involved in auditing consolidated financial statements is required to perform a successful audit (Choi *et al.*, 2010), and significant differences in audit quality may exist conditional on the principal auditor's size or industry expertise. Therefore, we expect that the effect of dependence on the work of other auditors on error in analysts' earnings forecasts is weakened when the principal auditor is a Big 4 auditor or industry specialist.

Organizational complexity, proxied by the number of domestic and overseas subsidiaries, increases the complexity of the consolidation process (Simunic, 1980; Francis, 1984; Chan *et al.*, 1993) and, in turn, decreases audit quality (Choi *et al.*, 2009). When an overseas subsidiary is small, it is not subject to an external audit. In this case, the quality of the audit of consolidated financial statements is lower, as potential errors in the overseas subsidiary's financial statements may flow to the consolidated financial statements. When Big 4 audit firms with international networks are hired, local member firms, which belong to these networks, conduct external audits in the region. Despite their involvement in international networks, communication between the principal auditors and the subsidiary auditors remains challenging. From the financial analysts' perspective, it is difficult to obtain information on overseas subsidiaries. Thus, a greater proportion of overseas subsidiaries to all subsidiaries owned by a multi-national company (MNC) may decrease the forecasting accuracy by financial analysts. Thus, we conjecture that a positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts is strengthened when there is a greater proportion of overseas subsidiaries to all subsidiaries.

Using a sample of consolidated financial statements considered as primary financial statements after implementation of the IFRS in Korea, we document several interesting findings. First, greater dependence on the work of other auditors increases error in analysts' earnings forecasts, thereby decreasing the quality of audits of consolidated financial statements. To the extent that low-quality audits decrease reporting reliability, analysts' forecasts are less likely to be accurate. Second, the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened when the principal auditor is a Big 4 auditor or one with industry expertise, because such auditors provide higher-quality audit services. Third, the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts is further strengthened when the proportion of overseas subsidiaries to all subsidiaries is greater. These results suggest that the complexity of the consolidation process increases as the proportion of overseas subsidiaries increases.

Our study contributes to the literature in several ways. We examine the effect of the quality of the audit of consolidated financial statements on the accuracy of financial analysts' earnings forecasts from the viewpoint of accounting information users in the capital market. In the past, researchers have focused on the usefulness or audit quality of consolidated financial statements. In addition, the study period encompasses the time post-IFRS adoption, when usage of consolidated financial statements as the primary financial statements is required, whereas prior studies on consolidated financial statements use pre-IFRS data. This study therefore provides a unique setting in which dependence on the work of other auditors in audits of consolidated financial statements can be investigated. This perspective has not been considered in previous research based on non-consolidated financial statements.

Prior to 2014, the Korean Auditing Standards Board allowed principal auditors to use the audit work of other auditors in auditing consolidated financial statements. However, since 2014, the New ISA (New International Standards on Auditing) no longer allows the principal auditor and other auditors to assume separate responsibilities; the principal auditor is now required to be fully responsible for all audit work with regard to consolidated financial statements. Now, accounting firms must select audit firms based on their consolidated financial statements rather than their non-consolidated financial statements. Clearly, further discussion is necessary of the resulting changes in accounting and the audit environment since IFRS adoption[4]. Focusing on the audit responsibilities associated with consolidated financial statements, we provide evidence that greater dependence on other auditors decreases the accuracy of financial analysts' earnings forecasts. Using dependence on other auditors as a comprehensive measure of the responsibilities of the principal auditor, we provide evidence of the effect of IFRS adoption on the accuracy of financial analysts' earnings forecast. In previous studies, financial analysts' earnings forecast accuracy was examined using non-consolidated financial statements, and dependence on other auditors was not considered. However, in this study, we investigate the relation between errors in financial analysts' earnings forecasts and the quality of consolidated financial statements, providing insights for practitioners, regulators and policy makers.

The remainder of this paper is organized as follows. In Section 2, we describe the theoretical background and prior literature. In Section 3, we develop our hypothesis based on the findings of the studies discussed in Section 2. Section 4 reports data and research design, and Section 5 presents the empirical results. We summarize and conclude our study in Section 6.

## 2. Theoretical background and prior literature

### 2.1 Consolidated financial statements and principal auditors

Listed companies in Korea prepare and disclose consolidated financial statements in accordance with the IFRS as of 2011. The most notable feature of the IFRS compared to previous accounting standards is that consolidated financial statements serve as the primary financial statements of controlling companies holding one or more subsidiaries. Following IFRS adoption, listed companies are mandated to prepare and disclose consolidated financial statements not only for annual reports but also for quarterly and semi-annual financial reports. For financial statement users, IFRS adoption brought a fundamental shift in thinking: from consolidated financial statements as supplemental information to consolidated financial statements as primary information.

Consolidated financial statements show assets, liabilities, equities, revenues, expenses and cash flows of a controlling group and its subsidiaries, treating them as one economic entity. In accordance with Korea IFRS Article No. 1,110, consolidated financial statements are prepared when a controlling company controls one or more subsidiaries[5]. To

accomplish this, non-consolidated financial statements are accumulated of the controlling company and its subsidiaries minus investment accounts of all parties, intercompany transactions, separate non-controlling shares, investments of the controlling company's net assets and current net income.

According to the old Korean Auditing Standard 600, "Audits of Group Financial Statements (Including the Work of Subsidiary Auditors)", the principal auditor may use the audit work of other auditors in auditing consolidated financial statements, but the principal auditor has separate responsibilities from those of subsidiary auditors. When the principal auditor decides to utilize another auditor's report to inform their audit opinion, the principal auditor's report should clearly state this fact and indicate the amount of coverage of the financial statements audited by the other auditors. However, the New ISA implemented in 2014 does not separate the responsibilities of the principal auditor and other auditors. The New ISA places the responsibility for consolidated financial statements on the principal auditor. In other words, the principal auditor of an investment company has comprehensive audit responsibilities, although the audit of consolidated financial statements may involve multiple other auditors.

The majority of Korean companies hire multiple auditors to audit consolidated financial statements; the current practice of selecting an auditor at the subsidiary level is very common. The difference between the principal auditor and other auditors influences financial statement users in the capital market, though they bear no separate responsibilities. Thus, in this study, we examine the effect of dependence on other auditors on error in financial analysts' earnings forecasts.

### *2.2 Principal auditors' audit work on consolidated financial statements*

Research on consolidated financial statements evaluates the usefulness of consolidated financial statements and their audit quality. Consolidated financial statements offer incremental information based on analysis of trade volumes or excess returns, in addition to that provided by non-consolidated financial statements (Chun, 1994; Hwang, 1995; Kim *et al.*, 2001; Kim and Na, 2002; Shin, 2008; Park and Ji, 2009; Ji *et al.*, 2010; Kim *et al.*, 2014). Prior literature on the quality of the audit of consolidated financial statements focuses on the amount of coverage of the principal auditors in relation to that of other auditors, the complexity of the audit of consolidated financial statements or the size of the principal auditor. Choi *et al.* (2009) provide evidence that audit quality, as measured by discretionary accruals, decreases when the proportion of other auditors and the number of subsidiaries increase. Choi *et al.* (2009) indicate that when a controlling company and its subsidiaries are audited by different auditors, communication among all parties may be inefficient. Shin and Han (2014) also find evidence that auditor conformity enhances audit quality, as measured by discretionary accruals, of subsidiaries. In addition, when the principal auditor depends more on the work of subsidiary auditors or the number of subsidiaries increases, again, audit quality is decreased. Park and Park (2010) and Ji *et al.* (2010) also provide evidence that the quality of the audit of consolidated financial statements decreases as the dependence of the principal auditor on the work of subsidiary auditors increases.

Choi *et al.* (2010) find that the quality of the audit of consolidated financial statements is enhanced when the principal auditor covers more of the audit or is a large firm. In addition, there is a positive relation between principal auditor size and audit quality. Lee *et al.* (2011) indicate that when the principal auditor is one of the Big 4 accounting firms and their coverage of the audit of consolidated financial statements is greater, the accounting treatment is more conservative. This positive relation between the audit coverage ratio by



principal auditors and conservatism is further strengthened by the factor principal auditor size.

Lee *et al.* (2013) argue that audit coverage affects both audit quality and audit efficiency in auditing of consolidated financial statements. In particular, the authors find that higher audit coverage by the principal auditor promotes early submission of the audit report, and discretionary accruals are decreased when the audit coverage is greater in the audit of consolidated financial statements.

In sum, past research finds evidence that consolidated financial statements are useful in the capital market. In addition, researchers find that principal auditors' audit coverage, the complexity of the audit of consolidated financial statements and the size of the principal auditor are significantly associated with audit quality. This study examines the effect of the amount of audit coverage by principal auditors in auditing of consolidated financial statements on the accuracy of analysts' earnings forecasts. We expect to find a significant relation between accuracy in analysts' earnings forecasts and audit coverage given a significant association between accounting, audit quality and accuracy in analysts' earnings forecasts.

### 2.3 Analysts' earnings forecasts

Many previous studies of financial analysts' forecasts focus on forecast accuracy. Research on earlier time periods confirms the relative superiority and usefulness of forecasting accuracy as analyzed in time-series models of forecasting earnings and actual earnings forecasts provided by financial analysts (Brown and Rozeff, 1979; Brown *et al.*, 1987; Heo, 1991; Lee and Chang, 1992; Jeong, 2003).

In addition, earlier investigations of the determinants of forecast accuracy demonstrate that for larger (Basi *et al.*, 1976; Das *et al.*, 1998; Jeong, 2003; Lim and Jeong 2006; Lim *et al.*, 2009) and older firms (Basi *et al.*, 1976), risks are lower (Basi *et al.*, 1976), the debt ratio is lower (Behn *et al.*, 2008; Ahn *et al.*, 2006) and analysts' earnings forecast accuracy increases. Moreover, this increase is also evident in audits of higher quality (Behn *et al.*, 2008; Kim *et al.*, 2008; Lim *et al.*, 2009), in statements of higher earnings quality (Das *et al.*, 1998; Bradshaw *et al.*, 2001; Eames and Glover, 2003; Ahn *et al.*, 2005; Jeong and Lim, 2005; Lim and Jeong, 2006; Cho and Jo 2009), in firms with improved corporate disclosure (Hope, 2003; Yoon *et al.*, 2011; Liu and O'Farrell, 2013) and in firms with better internal controls (Yang and Yeo, 2013).

High-quality auditors may improve analysts' earnings forecast accuracy through their impact on the decision usefulness of financial statements (Wu and Wilson, 2015). Behn *et al.* (2008) examines the relation between analysts' earnings forecasts and audit quality. They find that the accuracy of analysts' earnings forecasts and forecast dispersion are associated with firms audited by Big 4 auditors. In other words, when a firm is audited by one of the Big 4, analysts' earnings forecasts are more accurate and less forecast dispersion is evident. Kim *et al.* (2008) also indicate that analysts' earnings forecast accuracy is greater and forecast dispersion is smaller for firms audited by industry specialist auditors. From the analyst viewpoint, Kim *et al.* (2008) argue that there is a significant difference in audit quality based on auditors' industry expertise, and that this factor has a significant effect on accounting information reliability. The authors suggest that higher audit quality based on industry expertise alleviates information asymmetry in the market by providing reliable accounting information to analysts.

Prior research on the association between audit quality and the accuracy of analysts' earnings forecasts focuses on non-consolidated financial statements. It therefore remains to examine the accuracy of analysts' earnings forecasts for consolidated financial statements. In this study, we fill this void by investigating the association between audit coverage

provided by the principal auditor, which influences the quality of the audit of consolidated financial statements and the accuracy of analysts' earnings forecasts.

### 3. Hypothesis development

Analysts' earnings forecasts are predictions of a firm's earnings provided by outside parties. In general, financial analysts act as information intermediaries between firms and investors, and the accuracy of their earnings forecasts directly impacts their reputation and compensation (Stickel, 1992; Leone and Wu, 2007; Fang and Yasuda, 2009). Thus, financial analysts have incentives to predict earnings accurately to market participants based on information obtained from multiple channels (Waymire, 1986; Hassell and Jennings, 1986). Accounting information from financial statements is fundamental for financial analysts (Brown *et al.*, 1987; Lang and Lundholm, 1996). Research on earnings predictability provides evidence that the accuracy of analysts' earnings forecasts increases when accounting information quality and audit quality are high (Das *et al.*, 1998; Bradshaw *et al.*, 2001; Eames and Glover, 2003; Behn *et al.*, 2008; Ahn *et al.*, 2005; Jeong and Lim, 2005; Lim and Jeong, 2006; Cho and Jo, 2009; Kim *et al.*, 2008; Lim *et al.*, 2009; Wu and Wilson, 2015).

Under the New ISA, the principal auditor of a controlling company is responsible for consolidated financial statements, including the elements of the audit covered by subsidiary auditors. When the principal auditor uses the work of other auditors, regulations dictate that the principal auditor shall assess the other auditors' ability, obtain evidence of the quality of the work performed by other auditors and document material findings and remediation processes provided by other auditors (Korean Auditing Standards 600; Auditing Practice Procedure 3-780). However, these guidelines are minimum requirements to control audit risk from the principal auditors' perspective; they are insufficient to improve audit quality. Effective communication between the principal auditor and other auditors is required, reflecting deep understanding of the needs of the consolidated group, diverse accounting issues and audit risk to produce a high-quality audit of consolidated financial statements (Choi *et al.*, 2009; Lee *et al.*, 2013). In this regards, prior literature indicate that audit quality of consolidated financial statements is higher when audit proportion of the principal auditor (other auditors) is greater (smaller) (Choi *et al.*, 2009; Park and Park, 2010; Ji *et al.*, 2010; Choi *et al.*, 2010; Lee *et al.*, 2011, 2013).

The first hypothesis in our study examines the relation between dependence on other auditors and error in analysts' earnings forecasts to test whether higher quality of the audit improves the reliability of financial statements. In turn, improved reliability of financial statements increases the accuracy of financial analysts' forecasts (Titman and Trueman, 1986). Higher-quality accounting information and higher-quality auditing also improve analysts' earnings forecast accuracy (Bradshaw *et al.*, 2001; Eames and Glover, 2003; Behn *et al.*, 2008; Kim *et al.*, 2008; Wu and Wilson, 2015). In addition, greater dependence on the work of other auditors decreases the efficiency of communication between the principal auditor and other auditors, which results in a lower-quality audit (Choi *et al.*, 2009; Lee *et al.*, 2013). In essence, greater dependence on the work of other auditors increases error in analysts' earnings forecasts[6]. We therefore present our first hypothesis:

*H1.* Error in analysts' earnings forecasts increases when dependence on the work of other auditors increases.

Auditing by Big 4 auditors and auditor industry expertise are important determinants of higher audit quality at the audit firm level. Most prior studies on audit quality provide evidence that audit quality of Big 4 auditors is better than that of non-Big 4 (Teoh and Wong, 1993; Becker *et al.*, 1998; Francis and Krishnan, 1999; Weber and Willenborg, 2003; Behn

*et al.*, 2008; Kim, 2006; Goh *et al.*, 2009; Kwon and Ki, 2011; Choi and Lee, 2014). Also, auditor industry specialization increases audit quality (O'Keefe *et al.*, 1994; Gramling *et al.*, 2001; Balsam *et al.*, 2003; Krishnan, 2003; Chung and Lee, 1996; Chung, 1997; Kwon *et al.*, 2008; Kim *et al.*, 2008). The reliability of accounting information increases notably when Big 4 or industry specialist auditors perform audits, and, in turn, analysts' forecasting accuracy increases (Behn *et al.*, 2008; Kim *et al.*, 2008). Auditing consolidated financial statements requires in-depth understanding of various complicated procedures due to the relative complexity of these statements compared to that of non-consolidated financial statements (Choi *et al.*, 2010). Additionally, the size and industry expertise of the principal auditor have significant influence on the quality of the audit. The positive relation between dependence on the work of other auditors by the principal auditor and audit quality is strengthened when the principal auditor is a Big 4 auditor (Choi *et al.*, 2010; Lee *et al.*, 2011).

The second hypothesis examines whether the relation between dependence on the work of other auditors and error in analysts' earnings forecasts is moderated by the quality of the audit performed by the principal auditor, proxied in this study by Big 4 membership or industry expertise. We predict that the quality of the audit will be higher when it is performed by a principal auditor, that is, a Big 4 accounting firm, even when dependence on the work of other auditors is higher. In a similar vein, use of industry specialists, who have experience and knowledge specific to the industry, as principal auditors is expected to weaken the positive association between dependence on the work of other auditors and the accuracy of analysts' forecasts[7]. Therefore, we posit our second hypothesis:

- H2.* The positive association between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened when the quality of the audit performed by the principal auditor is higher.
- H2(a).* The positive association between dependence on other auditors and error in analysts' earnings forecasts is weakened when the principal auditor is from a Big 4.
- H2(b).* The positive association between dependence on other auditors and error in analysts' earnings forecasts is weakened when the principal auditor is an industry specialist.

In preparing consolidated financial statements, the controlling company combines the financial statements of the parent firm and its subsidiaries line by line, eliminating all intercompany transactions. When the end of the reporting period of the subsidiary differs from that of parent, adjustments must be made for the effects of significant transactions or events that occur between that date and the date of issuing of the parent's financial statements. Also, consolidated financial statements must be prepared using uniform accounting policies; thus, appropriate adjustments are required under the circumstances that subsidiaries use accounting policies other than those adopted in the consolidated financial statements. Therefore, the greater the number of subsidiaries or overseas subsidiaries, the more complicated the consolidating process is (Simunic, 1980; Francis, 1984; Chan *et al.*, 1993), which in turn decreases audit quality (Choi *et al.*, 2009). Small overseas subsidiaries are not subject to external audits. In such cases, the quality of the audit of consolidated financial statements may be lower, as potential error on the financial statements of the overseas subsidiary may flow into the consolidated financial statement. Even when audit firms belong to international networks, the local member firm conducts the external audit in the region; in such cases, communication between principal auditors and other auditors may still be challenging despite international connections. It can be difficult for analysts to obtain



reliable information on overseas subsidiaries; thus, a higher proportion of overseas subsidiaries to all subsidiaries may decrease the accuracy of financial analysts' forecasts. Thus, we conjecture that error in analysts' earnings forecasting increases when dependence on the work of subsidiaries' auditors increases.

The third hypothesis investigates the effect of dependence on the work of other auditors on error in analysts' earnings forecasts with consideration of the proportion of overseas subsidiaries. The quality of the audit of consolidated financial statements decreases as the proportion of overseas subsidiaries increases, as analysts have more difficulty obtaining sufficient information in relation to overseas subsidiaries. Thus, the effect of dependence on the work of other auditors on error in analysts' earnings forecasts will be greater when the proportion of overseas subsidiaries to all subsidiaries in the MNC is higher. We therefore posit our third hypothesis:

- H3.* The positive association between dependence on the work of other auditors and error in analysts' earnings forecasts is strengthened when the proportion of overseas subsidiaries to all subsidiaries is higher.

#### 4. Research methodology and sample selection

##### 4.1 Error in analysts' earnings forecasts and auditor industry specialization

Earnings forecast error is measured as the absolute value of forecast error, which is the difference between actual earnings per share and analysts' predicted earnings. The earnings forecast error variable evaluates the accuracy of earnings predictions (Das *et al.*, 1998; Behn *et al.*, 2008; Sonu *et al.*, 2010). Earnings forecast error is measured as shown in equation (1):

$$AFE_t = \frac{|EPS_t - FEPS_t|}{P_{t-1}} \quad (1)$$

In equation (1),  $EPS_t$  denotes the actual earnings per share at time  $t$ ,  $FEPS_t$  is the median consensus of forecasts of period  $t$  earnings made during the period starting three months before the corresponding year end and  $P_{t-1}$  is the adjusted stock price at the end of period  $t - 1$ .

This study operationalizes auditor industry specialization using a market share approach. First, we measure auditor market shares based on the number of clients and the square root of the total assets of clients that an auditor has in a particular industry (Kwon *et al.*, 2008; Kim *et al.*, 2008). Other researchers use a number of approaches to measure auditor industry specialization based on market shares. For example, Balsam *et al.* (2003), Kwon *et al.* (2008) and Kim *et al.* (2008) define industry specialist auditors as those with the most market shares and those who hold more than 10-20 per cent of the market shares compared to the next market leader. Palmrose (1986) and Krishnan (2003) define industry specialist auditors as those whose market shares exceed 15 per cent. However, measurement of the industry auditor specialist variable is subject to researchers' discretion (Han *et al.*, 2012). In this study, auditor industry specialization is defined using the number of clients and the square root of the total assets of clients that an auditor has in a particular industry. To classify industries, we use the SIC code in accordance with the Korea Standard Industrial Classification announced by the Korea National Statistical Office.

##### 4.2 Research models

*H1* examines the effect of dependence on the work of other auditors on error in analysts' earnings forecasts. We use the following empirical model, including control variables that affect the accuracy of analysts' earnings forecasts:

$$\begin{aligned} AFE = & \beta_0 + \beta_1 OAS(OAT) + \beta_2 ROA + \beta_3 VOL + \beta_4 BIG4 + \beta_5 TENURE \\ & + \beta_6 LEV + \beta_7 SIZE + \beta_8 MTB + \beta_9 BETA + \beta_{10} EL + \beta_{11} FOLLOW \\ & + \beta_{12} MARKET + YRdummy + INDDummy + \varepsilon \text{ formula} \end{aligned} \quad (2)$$

Definitions of variables:

AFE	= analysts' earnings forecast error ( actual EPS – EPS median consensus of forecasts /adjusted price at the end of period $t - 1$ );
OAS (OAT)	= dependence on the work of other auditors based on revenue (total assets);
ROA	= net income/average total assets;
VOL	= standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year;
BIG4	= indicator variable that equals 1 if the auditor is Big 4, otherwise 0;
TENURE	= natural logarithm of continuous employment for the auditor;
LEV	= total liabilities/total assets;
SIZE	= natural logarithm of total assets at the end of period $t$ ;
MTB	= market value of equity divided by book value of equity;
BET	= market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year;
EL	= actual earnings per share/adjusted stock price at the end of period $t - 1$ ;
FOLLOW	= natural logarithm of the number of analysts who announce firms' earnings predictions; and
MARKET	= indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ.

OAS (OAT) in equation (2) indicates dependence on the work of other auditors as measured using revenue (total assets). The ratio of dependence on the work of other auditors based on revenue (total assets) to all dependence on the work of other auditors is stated in an introductory paragraph of the consolidated audit report. If the empirical results show a significant positive relation between the  $\beta_1$  coefficient of OAS (OAT) and error in analysts' earnings forecasts, it indicates that the effect of dependence on the work of other auditors increases error in analysts' earnings forecasts.

Equation (2) includes control variables that may affect error in analysts' earnings forecasts. Earlier studies indicate that operational performance influences either optimistic or pessimistic bias in analysts' earnings forecasts. In addition, firms' choice of the level of earnings determines reported earnings, which affects error in analysts' earnings forecasts (Das *et al.*, 1998; Abarbanell and Lehavy, 2003; Eames and Glover, 2003; Sonu *et al.*, 2010). We include ROA to control for operational performance of firms. In addition, analysts' forecast error increases in the presence of high information uncertainty due to the inferior information environment (Jiang *et al.*, 2005; Zhang, 2006a; Zhang, 2006b). Information uncertainty is defined in terms of value ambiguity or the degree to which a firm's value may be rationally estimated by sophisticated investors at acceptable cost and measured in relation to a firm's fundamental value or stock volatility (Jiang *et al.*, 2005; Zhang, 2006a). In this study, information uncertainty is represented by the standard deviation of stock returns (VOL) as a control variable (Jeong and Lim, 2005; Ahn *et al.*, 2006; Zhang, 2006b; Sonu *et al.*, 2010). Prior studies indicate that audit quality is positively associated with analysts' earnings forecast accuracy (Behn *et al.*, 2008; Kim *et al.*, 2008; Lim *et al.*, 2009; Sonu *et al.*, 2010; Wu and Wilson, 2015). Thus, we include a variable representing when the auditor is from a Big 4 (BIG4) and

continued audit duration of the auditor (TENURE) to control for audit quality. We also include leverage (LEV) as a control variable, as managers have fewer incentives to manage earnings when leverage is low. As a result, the accuracy of analysts' earnings forecasts increases (Behn *et al.*, 2008; Ahn *et al.*, 2006; Jeon *et al.*, 2007; Koh *et al.*, 2008). Firm size (SIZE) is included because larger firms (compared to smaller firms) typically disseminate more information to the investment community, which decreases error in analysts' earnings forecasts (Das *et al.*, 1998; Jeong, 2003; Lim and Jeong, 2006; Lim *et al.*, 2009). The higher the market-to-book (MTB) ratio, the higher the expected earnings growth of a firm (Collins and Kothari, 1989). We therefore include MTB as a control variable, as expected earnings growth affects future earnings, which is more likely to impact error in analysts' earnings forecasts (Koh *et al.*, 2011; Sonu *et al.*, 2010). Furthermore, we include BETA, which represents the systematic risk to which a firm is exposed, the actual earnings per share in relation to the adjusted stock price showing the profit level (EL) and the number of analysts (FOLLOW) who provide earnings forecasts. The samples used in this study include listed companies on the Korea Stock Exchange markets: the KOSPI and KOSDAQ. Thus, we take the type of market (MARKET) into consideration, as error in analysts' earnings forecasts is influenced by different listing standards and related criteria according to each market. Finally, industry dummies and year dummies are included.

H2 examines whether higher audit quality weakens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts. We conjecture that auditing by Big 4 (industry specialists) increases the reliability of accounting information, which improves analysts' earnings forecast accuracy. In turn, auditing by Big 4 (industry specialists) weakens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts. We use equation (3) to derive the empirical results for testing of H2. Equation (3) adds an indicator variable of BIG4 or a continuous variable of industry expertise measured according to the number of market shares of industry specialist auditors for a particular industry to equation (2) and an interaction variable with OAS (OAT). If  $\beta_2$ , the coefficient of OAS (OAT)  $\times$  BIG4, is negative, the result indicates that auditing by a Big 4 (industry specialists) weakens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts:

$$\begin{aligned} AFE = & \beta_0 + \beta_1 OAS(OAT) + \beta_2 OAS(OAT) \times BIG4(MSN \text{ OR } MSAT) + \beta_3 ROA \\ & + \beta_4 VOL + \beta_5 BIG4 (MSN \text{ OR } MSAT) + \beta_6 TENURE + \beta_7 LEV + \beta_8 SIZE \\ & + \beta_9 MTB + \beta_{10} BETA + \beta_{11} EL + \beta_{12} FOLLOW + \beta_{13} MARKET \quad (3) \\ & + YRdummy + INDDummy + \varepsilon \text{ formula} \end{aligned}$$

Definitions of variables:

- MSN = market shares of auditors based on the number of clients in a particular industry (the number of clients in a particular industry/total number of firms in a particular industry); and
- MSAT = market shares of auditors based on the square root of the total assets of clients that an auditor has in a particular industry (total of the square root of the total assets that an auditor has in a particular industry/total of the square root of the total assets of all firms in that particular industry).

H3 investigates whether having a greater proportion of overseas subsidiaries in relation to all subsidiaries strengthens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts. A greater proportion of overseas

subsidiaries may lower the quality of the audit of consolidated financial statements, and analysts may have more difficulty obtaining sufficient information to make forecasts. Thus, we conjecture that having a greater proportion of overseas subsidiaries in relation to all subsidiaries strengthens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts. We use equation (4) to confirm our *H3*. Equation (4) includes an indicator variable showing a group with a higher proportion of overseas subsidiaries based on the median value ( $ABRD = 1$ ) and a group with a lower proportion of overseas subsidiaries ( $ABRD = 0$ ), as well as an interaction variable with OAS (OAT). If  $\beta_2$ , the coefficient of  $OAS(OAT) \times ABRD$ , is positive, it indicates that having a greater proportion of overseas subsidiaries increases the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts.

Definitions of variables:

$ABRD$  = indicator variable if the proportion of overseas subsidiaries to all subsidiaries (the number of overseas subsidiaries/the total number of subsidiaries) is greater than the median value of 1, otherwise 0.

#### 4.3 Sample selection

The sample consists of top-level consolidated companies only (to avoid double-counting) listed from 2011 to 2012, during the period since the IFRS was mandated in Korea, excluding financial institutions. The sample is limited to companies with information available on dependence on the work of other auditors in consolidated audit reports filed to the Korean Financial Supervisory Service Electronic System and information about error in analysts' earnings forecasts. Data regarding analysts' earnings forecasts are extracted from Data Guide Pro, operated by FnGuide. We note that the number of audits demonstrating dependence on the work of other auditors based on revenue is 223, whereas the number of audits demonstrating dependence on the work of other auditors based on total assets is 228. This discrepancy stems from the fact that five companies do not disclose information about dependence on the work of other auditors based on revenue in their consolidated audit reports.

## 5. Empirical results

### 5.1 Descriptive statistics and Pearson correlations

Table I presents descriptive statistics for each variable used in this study. The mean (median) value of the dependent variable in this study, error in analysts' earnings forecasts (AFE), is 0.027 (0.015)[8]. The mean (median) values of the main variables of interest, dependence on the work of auditors from subsidiaries based on revenue (OAS) and dependence on the work of other auditors base on total assets (OAT), are 0.170 (0.076) and 0.162 (0.076), respectively. The mean value of BIG4 is 88.2 per cent, which implies that a majority of controlling companies select Big 4 auditors to be responsible for auditing their consolidated financial statements. The mean values of the auditor industry expertise measures, market shares of auditors based on the number of clients in a particular industry (MSN) and market shares of auditors based on the square root of the total assets of clients that an auditor has in a particular industry (MSAT), are 0.148 and 0.204, respectively. The mean (median) value of the measure of audit complexity (ABRD) is 0.567 (0.600), which indicates that 56.7 per cent of subsidiaries in our sample are located overseas. The mean (median) value for TENURE, which is a logged value of auditors' employment history, is 1.205 (1.386), and the mean (median) values for LEV, SIZE and MTB, which represent the ratio of total debts to total assets, firm size, and the market-to-book ratio, respectively, are

Variable	Mean	SD	Q1	Med	Q3
AFE	0.027	0.033	0.007	0.015	0.034
OAS	0.170	0.213	0.000	0.076	0.293
OAT	0.162	0.192	0.000	0.076	0.275
BIG4	0.882	0.324	1.000	1.000	1.000
MSN	0.148	0.072	0.105	0.143	0.199
MSAT	0.204	0.093	0.177	0.221	0.266
ABRD	0.567	0.285	0.333	0.600	0.785
ROA	0.045	0.050	0.013	0.037	0.070
VOL	0.412	0.120	0.323	0.405	0.488
TENURE	1.205	0.468	1.099	1.386	1.609
LEV	0.515	0.178	0.358	0.561	0.644
SIZE	28.584	1.767	27.140	28.673	29.985
MTB	0.781	0.732	0.331	0.515	1.017
BETA	1.099	0.498	0.690	1.071	1.460
EL	0.053	0.086	0.028	0.053	0.096
FOLLOW	1.694	1.144	0.693	1.946	2.708
MARKET	0.750	0.433	0.500	1.000	1.000

**Notes:** (1) Definitions of Variables: AFE = error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; BIG4 = indicator variable that equals 1 if the auditor is Big 4, otherwise 0; MSN (MSAT) = market shares of auditors based on the number of clients (square root of the total assets of clients) that an auditor has in a particular industry; ABRD = proportion of overseas subsidiaries to all subsidiaries (number of overseas subsidiaries/total number of subsidiaries); ROA = net income/average total assets; VOL = standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year; TENURE = natural logarithm of continued auditing period for the auditor; LEV = total liabilities/total assets; SIZE = natural logarithm of total assets at the end of period  $t$ ; MTB = market value of equity divided by book value of equity; BETA = market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year; EL = actual earnings per share/adjusted stock price at the end of period  $t - 1$ ; FOLLOW = natural logarithm of the number of analysts who make earnings forecasts; MARKET = indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ; (2) Observations with values greater than the 99th percentile (less than the 1st percentile) of their respective distributions were winsorized and set to equal the value at the 99th percentile (or 1st percentile) for continuous variables in the descriptive statistics reported in Table I

**Table I.**  
Descriptive statistics

0.515 (0.561), 28.584 (28.673) and 0.781 (0.515), respectively. Finally, the mean (median) value of the level of actual earnings compared to the stock price at the end of the previous year, EL, is 0.053 (0.053), and the mean (median) value of the logged value of the number of analysts announcing earnings forecasts, FOLLOW, is 1.694 (1.946).

Table II provides the Pearson's correlation matrix for the variables used in the regression model. The positive correlation between dependence on other auditors based on revenue (OAS) and error in analysts' earnings forecasts is significant at the 5 per cent level. On the other hand, there is no significant correlation between dependence on other auditors based on total assets (OAT) and error in analysts' earnings forecasts. An increase in error in analysts' earnings forecasts indicates a decrease in the accuracy of earnings forecasts. These results from the univariate analysis indicating a positive correlation between error in analysts' earnings forecasts and dependence on the work of other auditors based on revenue enable us to predict the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts. In addition, there is a positive correlation between dependence on the work of other auditors based on revenue and total assets, OAS (OAT), and the proportion of overseas subsidiaries to all subsidiaries (ABRD) at the 1 per cent level. Furthermore, error in AFE is negatively correlated with ROA, BIG4, FOLLOW, EL, MTB, and at the 1 per cent level. On the other hand, AFE is significantly and positively correlated





with VOL, LEV and BETA. The results described in Table II are aligned with those in prior literature and the expectations specified earlier in this study.

5.2 Regression analyses

H1 conjectures that a greater dependence on the work of other auditors increases error in analysts' earnings forecasts. Table III presents the empirical results using equation (2). Table III shows a significant and positive relation between the measures of dependence on other auditors, OAS (OAT), and error in analysts' earnings forecasts at the 5 per cent level (0.023,  $t = 2.52$  and 0.023,  $t = 2.25$ )[9]. This result supports H1 that greater dependence on the work of other auditors increases error in analysts' earnings forecasts.

Among the control variables, error in analysts' earnings forecasts is significantly associated with BIG4, LEV, MTB, EL and FOLLOW. If the principal auditor is a Big 4 auditor, audit quality increases and error in analysts' earnings forecasts decreases, consistent with previous reports. This result implies that the BIG4 variable and error in analysts' earnings forecasts are significantly associated, an implication which is analyzed in testing of H2. Error in analysts' earnings forecasts and LEV are also significantly and positively associated at the 5 per cent level, indicating that managers are more likely to manage earnings when firms are highly leveraged, which increases error in analysts'

Variable	Dependent variable: AFE			
	Dependence on the work of other auditors based on revenue		Dependence on the work of other auditors based on total assets	
	Coefficient	t-value	Coefficient	t-value
Intercept	0.086	1.55	0.082	1.51
OAS (OAT)	0.023	2.52**	0.023	2.25**
ROA	0.083	1.25	0.078	1.20
VOL	0.012	0.59	0.012	0.57
BIG4	-0.015	-2.51**	-0.015	-2.49**
TENURE	-0.001	-0.42	-0.001	-0.38
LEV	0.027	2.10**	0.028	2.20**
SIZE	0.000	0.41	0.000	0.35
MTB	-0.010	-2.54**	-0.009	-2.37**
BETA	0.000	0.09	0.000	0.14
EL	-0.196	-6.61***	-0.199	-6.87***
FOLLOW	-0.003	-1.63	-0.003	-1.70*
MARKET	-0.006	-1.13	-0.007	-1.24
YR dummy	Included		Included	
IND dummy	Included		Included	
Adjusted R <sup>2</sup>	44.36%		44.26%	
Observations	223		228	

**Notes:** (1) \*\*\*, \*\*, \* Indicate significance at the 1%, 5% and 10% levels, respectively. (2) Definitions of variables: AFE = error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; ROA = net income/average total assets; VOL = standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year; BIG4 = indicator variable that equals 1 if the auditor is Big 4, otherwise 0; TENURE = natural logarithm of continued auditing period for the auditor; LEV = total liabilities/total assets; SIZE = natural logarithm of total assets at the end of period  $t$ ; MTB = market value of equity divided by book value of equity; BETA = market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year; EL = actual earnings per share/adjusted stock price at the end of period  $t - 1$ ; FOLLOW = natural logarithm of the number of analysts who make earnings forecasts; MARKET = indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ

**Table III.**  
Effect of dependence on other auditors on error in analysts' earnings forecasts

earnings forecasts; this result is also aligned with results from prior literature (Behn *et al.*, 2008; Ahn *et al.*, 2006). EL is significantly and negatively associated with error in analysts' earnings forecasts at the 1 per cent level, which is consistent with the observation that an increase in profit decreases error in analysts' earnings forecasts and increases forecasting accuracy (Eames and Glover, 2003; Jeon *et al.*, 2007; Roh, 2013). In addition, MTB and error in analysts' earnings forecasts are significantly and negatively associated. Firms with high MTB are known to have high growth; such companies draw investors' attention. Thus, these companies are more likely to provide more and better quality information for financial analysts to analyze, which ultimately leads to an increase in accuracy of earnings forecasts (Koh *et al.*, 2011; Roh, 2013)[10]. Consistent with results presented in earlier reports, FOLLOW is significantly and negatively associated with error in analysts' earnings forecasts, which implies that error in analysts' earnings forecasts decreases as the number of analysts making announcements increases.

Tables IV and V present the results of our examination of the effect of dependence on the work of other auditors on error in analysts' earnings forecasts. We see that this effect is weakened when principal auditors perform high-quality audits, as shown in testing of *H2* using equation (3). More specifically, Table IV shows the interaction effect of auditing by a Big 4 principal auditor, and Table V presents the effect of auditing by a principal auditor

Variable	Dependent variable: AFE			
	Dependence on the work of other auditors based on revenue		Dependence on the work of other auditors based on total assets	
	Coefficient	<i>t</i> -value	Coefficient	<i>t</i> -value
Intercept	0.065	1.17	0.057	1.03
OAS (OAT)	0.071	3.04***	0.073	2.71***
<i>OAS</i> × <i>BIG4</i> ( <i>OAT</i> × <i>BIG4</i> )	-0.056	-2.23**	-0.057	-2.00**
ROA	0.077	1.18	0.075	1.16
VOL	0.016	0.77	0.015	0.72
BIG4	-0.005	-0.73	-0.005	-0.77
TENURE	0.000	0.07	0.000	0.13
LEV	0.026	2.02**	0.026	2.07**
SIZE	0.000	0.29	0.000	0.12
MTB	-0.009	-2.41**	-0.008	-2.26**
BETA	0.000	0.07	0.000	0.04
EL	-0.193	-6.56***	-0.200	-6.94***
FOLLOW	-0.004	-1.81*	-0.004	-1.95*
MARKET	-0.004	-0.84	-0.006	-1.04
YR dummy	Included		Included	
IND dummy	Included		Included	
Adjusted <i>R</i> <sup>2</sup>	45.45%		45.06%	
Observations	223		228	

**Notes:** (1) \*\*\*, \*\*, \* Indicate significance at the 1%, 5% and 10% levels, respectively. 2) Definitions of variables: AFE: error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; ROA = net income/average total assets; VOL = standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year; BIG4 = indicator variable that equals 1 if the auditor is Big 4, otherwise 0; TENURE = natural logarithm of continued auditing period for the auditor; LEV = total liabilities/total assets; SIZE = natural logarithm of total assets at the end of period *t*; MTB = market value of equity divided by book value of equity; BETA = market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year; EL = actual earnings per share/adjusted stock price at the end of period *t* - 1; FOLLOW = natural logarithm of the number of analysts who make earnings forecasts; MARKET = indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ

**Table IV.**  
Effect of Big 4 principal auditor on the association between dependence on the work of other auditors and analysts' earnings forecasts

Variable	Dependent variable: AFE			
	Dependence on the work of other auditors based on revenue		Dependence on the work of other auditors based on total assets	
	Coefficient	t-value	Coefficient	t-value
<i>Panel A: auditor industry expertise measured by market shares of auditors based on the number of clients</i>				
Intercept	0.097	1.78*	0.084	1.56
OAS (OAT)	0.080	4.33***	0.079	3.85***
OAS × MSN (OAT × MSN)	-0.005	-3.45***	-0.004	-3.01***
ROA	0.082	1.25	0.079	1.22
VOL	0.012	0.54	0.012	0.56
MSN	-0.012	-0.34	-0.012	-0.33
TENURE	-0.001	-0.15	-0.001	-0.18
LEV	0.034	2.61***	0.032	2.44**
SIZE	-0.002	-0.99	-0.002	-0.72
MTB	-0.011	-2.78***	-0.010	-2.54**
BETA	0.001	0.03	0.001	0.09
EL	-0.196	-6.73***	-0.201	-7.01***
FOLLOW	-0.004	-1.38	-0.004	-1.66*
MARKET	-0.006	-0.91	-0.007	-1.05
YR dummy		Included		Included
IND dummy		Included		Included
Adjusted R <sup>2</sup>		47.10%		46.32%
Observations		223		228
<i>Panel B: auditor industry expertise measured by market shares of auditors based on the square root of total assets</i>				
Intercept	0.060	1.08	0.050	0.92
OAS (OAT)	0.084	4.27***	0.086	4.01***
OAS × MSAT (OAT × MSAT)	-0.004	-3.42***	-0.004	-3.22***
ROA	0.080	1.22	0.073	1.14
VOL	0.015	0.68	0.015	0.70
MSAT	-0.009	-0.31	-0.009	-0.32
TENURE	0.001	0.06	-0.001	-0.08
LEV	0.030	2.29**	0.028	2.16**
SIZE	-0.001	-0.30	-0.001	-0.09
MTB	-0.010	-2.59**	-0.010	-2.36**
BETA	0.001	0.16	0.002	0.22
EL	-0.194	-6.69***	-0.200	-7.00***
FOLLOW	-0.004	-1.72*	-0.005	-1.97*
MARKET	-0.006	-1.04	-0.007	-1.12
YR dummy		Included		Included
IND dummy		Included		Included
Adjusted R <sup>2</sup>		47.24%		46.83%
Observations		223		228

**Notes:** (1) \*\*\*, \*\*, \* Indicate significance at the 1%, 5% and 10% levels, respectively. 2) Definitions of variables: AFE = error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; MSN (MSAT) = market shares of auditors based on the number of clients (square root of the total assets of clients) that an auditor has in a particular industry; ROA = net income/average total assets; VOL = standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year; BIG4 = indicator variable that equals 1 if the auditor is Big 4, otherwise 0; TENURE = natural logarithm of continued auditing period for the auditor; LEV = total liabilities/total assets; SIZE = natural logarithm of total assets at the end of period  $t$ ; MTB = market value of equity divided by book value of equity; BETA = market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year; EL = actual earnings per share/adjusted stock price at the end of period  $t - 1$ ; FOLLOW = natural logarithm of the number of analysts who make earnings forecasts; MARKET = indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ

**Table V.**  
Effect of auditor industry expertise on the association between dependence on the work of other auditors and analysts' earnings forecasts

with industry expertise. Table IV reports a positive association between the coefficients of OAS (OAT) and error in analysts' earnings forecasts at the 1 per cent level (0.071,  $t = 3.04$  and 0.073,  $t = 2.71$ ). The main variable of interest, an interaction term between BIG4 and OAS (OAT), is significantly and negatively associated at the 5 per cent level ( $-0.056$ ,  $t = -2.23$  and  $-0.057$ ,  $t = -2.00$ ). The results imply that error in analysts' earnings forecasts increases when dependence on the work of other auditors increases; however, if the principal auditor is a Big 4 auditor, the positive association between error in analysts' earnings forecasts and dependence on other auditors is weakened. Therefore, the results support  $H2(a)$ .

Panel A in Table V presents the results of our investigation of whether the effect of dependence on the work of other auditors on error in analysts' earnings forecasts is weakened by industry expertise, as measured by counting the number of market shares of auditors based on the number of clients (square root of the total assets of clients) that an auditor has in a particular industry. Panel B shows a similar type of analysis as that shown in Panel A with the difference that industry expertise is measured by counting the number of market shares of auditors based on the square root of the total assets of clients. In Panel A, the coefficient of OAS (OAT) is positive and significant at the 1 per cent level (0.080,  $t = 4.33$  and 0.079,  $t = 3.85$ ), but the coefficient of the interaction variable MSN and OAS (OAT) is negative and significant at the 1 per cent level ( $-0.005$ ,  $t = -3.45$  and  $-0.004$ ,  $t = -3.01$ ). This indicates that error in analysts' forecasts increases when dependence on the work of other auditors increases, and also that the effect of the principal auditor's industry expertise weakens this relation, which supports  $H2(b)$ . In Panel B, the coefficient of OAS (OAT) is also positive and significant at the 1 per cent level (0.084,  $t = 4.27$  and 0.086,  $t = 4.01$ ), but the coefficient of the interaction variable MSAT and OAS (OAT) is significant and negative at the 1 per cent level ( $-0.004$ ,  $t = -3.42$  and  $-0.004$ ,  $t = -3.22$ ). Similar to Panel A, these results provide evidence that a high-quality audit performed by the principal auditor weakens the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts, as suggested by  $H2(b)$ . The relatively complex process of auditing consolidated financial statements requires a high-quality audit (Choi *et al.*, 2010); thus, we interpret this result as follows: the relation between error in analysts' earnings forecasts and dependence on other auditors is affected by auditor size and auditor industry expertise.

To determine whether the effect is more pronounced in firms with a higher proportion of overseas subsidiaries to all subsidiaries in accordance with  $H2$ , we use equation (4). When the proportion of overseas subsidiaries to all subsidiaries is greater than the median value, ABRD is 1. On the other hand, when the proportion of overseas subsidiaries to all subsidiaries is less than the median value, ABRD is 0[11]. The variable of interest in this analysis is the interaction variable between the indicator variable (ABRD) and dependence on the work of other auditors OAS (OAT). The results of testing using equation (4) are presented in Table VI. The results of the analysis indicate a significant and positive coefficient of OAS  $\times$  ABRD (OAT  $\times$  ABRD) at the 10 per cent level[12] (0.029,  $t = 1.68$  and 0.031,  $t = 1.76$ ), which indicates that the effect of dependence on the work of other auditors on error in analysts' earnings forecasts increases for firms whose proportion of overseas subsidiaries to all subsidiaries is greater than the median value[13]. According to the report of the Financial Supervisory Services of Korea published on June 20, 2013, the average proportion of overseas subsidiaries in Korean firms was greater than that of domestic subsidiaries during our study period (58.9 per cent of overseas subsidiaries at the end of 2012). The result therefore suggests that accounting errors in audits of non-consolidated financial statements of overseas subsidiaries may flow to audits of the consolidated financial



Variable	Dependent variable: AFE			
	Dependence on other auditors based on revenue		Dependence on other auditors based on total assets	
	Coefficient	Coefficient	Coefficient	Coefficient
Intercept	0.085	1.53	0.084	1.54
OAS (OAT)	0.005	0.36	0.006	0.49
$OAS \times ABRD$ ( $OAT \times ABRD$ )	0.029	1.68*	0.031	1.76*
ABRD	-0.008	-1.74*	-0.008	-1.72*
ROA	0.092	1.38	0.082	1.25
VOL	0.011	0.52	0.009	0.46
BIG4	-0.015	-2.53**	-0.015	-2.5**
TENURE	-0.001	-0.37	-0.001	-0.36
LEV	0.030	2.33**	0.029	2.30**
SIZE	0.000	-0.32	0.000	-0.29
MTB	-0.010	-2.72***	-0.009	-2.52**
BETA	0.000	-0.04	0.000	-0.09
EL	-0.196	-6.64***	-0.200	-6.92***
FOLLOW	-0.003	-1.65	-0.003	-1.63
MARKET	-0.006	-1.06	-0.006	-1.16
YR dummy	Included		-0.002	
IND dummy	Included		Included	
Adjusted $R^2$		44.81%		44.71%
Observations		223		228

**Notes:** (1) \*\*\*, \*\*, \* Indicate significance at the 1%, 5% and 10% levels, respectively. 2) Definitions of variables: AFE = error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; ABRD = proportion of overseas subsidiaries to all subsidiaries (number of overseas subsidiaries/total number of subsidiaries) ROA = net income/average total assets; VOL = standard deviation of residuals estimated over 36 monthly stock returns and market returns prior to the end of accounting fiscal year; BIG4 = indicator variable that equals 1 if the auditor is Big 4, otherwise 0; TENURE = natural logarithm of continued auditing period for the auditor; LEV = total liabilities/total assets; SIZE = natural logarithm of total assets at the end of period  $t$ ; MTB = market value of equity divided by book value of equity; BETA = market model representing systematic risk estimate obtained over 60 months using monthly abnormal returns and market returns prior to the end of accounting fiscal year; EL = actual earnings per share/adjusted stock price at the end of period  $t - 1$ ; FOLLOW = natural logarithm of the number of analysts who make earnings forecasts; MARKET = indicator variable that equals 1 if a firm trades its shares on the KSE, and 0 if it trades on the KOSDAQ

**Table VI.**  
Effect of the proportion of overseas subsidiaries on the association between dependence on the work of other auditors and analysts' earnings forecasts

statements, which include the financial statements of both the controlling company and its subsidiaries. Under the new regulations, responsibility for the illegal activities of overseas subsidiaries reverts to the controlling company in cases where such overseas subsidiaries are not subject to an external audit. This increase in responsibility requires companies to be equipped with better internal quality control systems and to hire competent professionals to prepare reliable financial statements. This is essentially the position of the Korean Financial Supervisory Services.

We perform an additional analysis including an interaction variable, dependence on the work of other auditors (OAS), quality of the principal auditor's audit (BIG4 and industry expertise) and the proportion of overseas subsidiaries to all subsidiaries (ABRD) to examine comprehensively the effect of these variables on our variable of interest. Panel A in Table VII, which excludes the results of the control variables, reports a significant and positive coefficient for  $OAS \times ABRD$  at the 5 per cent level (0.116,  $t = 2.49$ ). However, the coefficient of  $OAS \times ABRD \times BIG4$  is significant and negative at the 5 per cent level ( $-0.098$ ,  $t = -2.10$ ). In Panel B, the coefficient of  $OAS \times ABRD$  is significant and positive at the 5 per cent level (0.079,  $t = 2.26$  and 0.078,  $t = 2.16$ ), but the coefficient of  $OAS \times ABRD \times MSN$  (MSAT)

Variable	Dependent variable: AFE Dependence on the work of other auditors based on revenue			
	Coefficient		t-value	
<i>Panel A: effect of the proportion of overseas subsidiaries and Big 4</i>				
Intercept	0.071		1.27	
OAS	-0.026		-0.54	
OAS × ABRD	0.116		2.49**	
OAS × BIG4	0.031		0.65	
OAS × ABRD × BIG4	-0.098		-2.10**	
Adjusted R <sup>2</sup>		46.70%		
Observations		223		
Variable	Dependent variable: AFE			
	Industry Expertise Measure: Number of Clients (MSN)		Industry Expertise Measure: Square Root of Total Assets of Clients (MSAT)	
	Coefficient	t-value	Coefficient	t-value
<i>Panel B: effect of the proportion of overseas subsidiaries and industry expertise</i>				
Intercept	0.096	1.77*	0.054	0.99
OAS	0.018	0.52	0.024	0.69
OAS × ABRD	0.079	2.26**	0.078	2.16**
OAS × MSN (MSAT)	-0.001	-0.49	-0.002	-0.71
OAS × ABRD × MSN (MSAT)	-0.004	-1.82*	-0.003	-1.72*
Adjusted R <sup>2</sup>	47.84%		47.94%	
Observations	223		223	

**Table VII.**  
Effect of the proportion of overseas subsidiaries and Big 4 (industry expertise) on the association between dependence on the work of other auditors and analysts' earnings forecasts

**Notes:** (1) \*\*\*, \*\*, \* indicate significance at the 1%, 5% and 10% levels, respectively. 2) Definitions of variables: AFE = error in analysts' earnings forecasts; OAS = dependence on the work of other auditors based on revenue; OAT = dependence on the work of other auditors based on total assets; ABRD = proportion of overseas subsidiaries to all subsidiaries (number of overseas subsidiaries/total number of subsidiaries); MSN (MSAT) = market shares of auditors based on the number of clients (square root of the total assets of clients) that an auditor has in a particular industry

is significant and negative at the 10 per cent level ( $-0.004, t = -1.82$  and  $-0.003, t = -1.72$ ). These results imply that the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts is greater in firms with a greater proportion of overseas subsidiaries to all subsidiaries. However, the relation between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened when the quality of the audit performed by the principal auditor is high.

Overall, the results suggest that inefficient communications caused by dependence on the work of other auditors has a negative impact on the quality of the audit of consolidated financial statements (Choi *et al.*, 2009), which increases error in analysts' earnings forecasts. However, if the quality of the audit performed by the principal auditor is high, the positive association between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened. On the other hand, having a greater proportion of overseas subsidiaries compared to all subsidiaries increases audit complexity, which strengthens the positive association between dependence on the work of other auditors and error in analysts' earnings forecasts.

## 6. Conclusion

Implementation of the IFRS in 2011 results in the need for research on consolidated financial statements, as most studies published before this time focus on the associations between

audit quality in the capital market using non-consolidated financial statements. In this study, we examine the effect of the quality of the audit of consolidated financial statements on the accuracy of analysts' earnings forecasts from the viewpoint of users of financial statements. More specifically, we investigate the effect of dependence on the work of other auditors on error in analysts' earnings forecasts. In addition, we analyze the effects of use of Big 4 auditors, use of auditors with industry expertise and the proportion of overseas subsidiaries in relation to all subsidiaries on the association between dependence on the work of other auditors and error in analysts' earnings forecasts.

The results of the empirical analysis based on samples from 2011 to 2012 (the period since implementation of the IFRS in Korea) are as follows. First, error in analysts' earnings forecasts increases when dependence on the work of other auditors increases. The result indicates that dependence on the work of other auditors decreases the quality of the audit of consolidated financial statements. As a result, the accuracy of analysts' earnings forecasts decreases. Second, the results of the regression analysis, including the interaction between use of Big 4 auditors and those with industry expertise and dependence on the work of other auditors, provide evidence that a higher-quality audit is required for consolidated financial statements compared to non-consolidated financial statements. Thus, when the principal auditor is a Big 4 auditor or has industry expertise, the positive relation between dependence on the work of other auditors and error in analysts' earnings forecasts is weakened. Third, the coefficient of the interaction between having a greater proportion of overseas subsidiaries to all subsidiaries and dependence on the work of other auditors is positive and significant, implying that having a greater proportion of overseas subsidiaries to all subsidiaries increases process complexity, which in turn increases information asymmetry. As a result, dependence on the work of other auditors increases error in analysts' earnings forecasts.

According to the New ISA, the principal auditor is solely responsible for the auditing of consolidated financial statements; by contrast, previous standards separated the responsibilities between the principal auditor and other auditors. In response to this, accounting firms raised concerns over the selection of audit firms, asserting that the selection should be at the level of consolidated financial statements rather than at the level of non-consolidated financial statements. Further discussion is required of the changes in accounting regulations and the audit environment for IFRS-adopting countries. This study sheds light on this discussion of the responsibilities associated with the auditing of consolidated financial statements, indicating that greater dependence by the principal auditor on the work of other auditors decreases the accuracy of financial analysts' earnings forecasts.

#### Notes

1. Under the revised Korean Auditing Standard 600 "Audits of Group Financial Statements" (Including the Work of Subsidiary Auditors) as of December 2012, the principal auditors are required to plan the audit scope for the consolidated financial statements, understand group-wide controls, obtain sufficient and appropriate audit evidence on the base of audit work provided by other auditors, evaluate the appropriateness of performance materiality determined by other auditors and identify deficiencies in internal control to communicate to those in charged with corporate governance at the company.
2. When two or more auditors are engaged in auditing consolidated financial statements, the principal auditor may rely on the work of other auditors in accordance with the Korean Auditing Standard 600 "Audits of Group Financial Statements (Including the Work of Subsidiary Auditors)". When the principal auditor utilizes the report of another auditor to form an audit opinion of the financial statements, the principal auditor has discretion over and responsibility for the work provided by

and the audit areas covered by other auditors. At the beginning of the audit, the principal auditor should state this fact clearly, indicating the portion of the financial statements audited by other auditors. In this study, we refer to the auditor of the controlling firm who is responsible for auditing consolidated financial statements as the principal auditor and auditors of subsidiaries who are different from the principal auditor as other auditors.

3. In preparing consolidated financial statements, the controlling company combines the financial statements of the parent and its subsidiaries line by line and eliminates all intercompany transactions. Also, consolidated financial statements must be prepared using uniform accounting policies; thus, appropriate adjustments are required when subsidiaries use accounting policies other than those adopted in the consolidated financial statements.
4. Several companies aligned their audits between the controlling firm and its subsidiaries before adoption of the new international auditing standards. For example, the Hyundai Heavy Industries Group re-elected Samjung KPMG LLC as their auditors for the year 2014, and their shipbuilding subsidiaries also selected the same auditors as Samjung KPMG LLC. The Financial Supervisory Service in Korea reformed the Korean Auditing Standards in 2012 in accordance with the IFRS, which was implemented in 2011. The revised Korean Auditing Standard 600 allocates complete audit responsibility to the principal auditor starting from 2014. In response, the Hyundai Heavy Industries Group planned to utilize the services of the same auditors in the controlling firm and its subsidiaries. Fierce competition was expected between the controlling firm's auditors, Samjung KPMG LLC, and other auditors, such as Samil PwC LLC. As a result, the Hyundai Heavy Industries Group decided to choose Samjung KPMG LLC as their auditors for the controlling firm, as well as Hyundai Mipo Dockyard and Hyundai Samho Heavy Industries Co., Ltd. Therefore, Samjung KPMG LLC expects to perform a more structured group audit for the Hyundai Heavy Industries Group going forward (Invest Chosun 2014.2.28.).
5. An investment company controls an investee company under the following conditions: when an investment company is exposed to an investee company's profit fluctuations to the extent that the investment company has influence over operating and financial affairs of the investee company, when an investment company has rights over profit fluctuations of the investee company or when an investment company has direct influence over an investee company's profit fluctuations (Korea IFRS Article No. 1110, "Consolidated Financial Statements", Article 6).
6. Financial analysts use not only public information but also private information obtained from management in forecasting earnings. They tend to announce optimistically biased forecasts to obtain private information based on favorable relationships with management (Francis and Philbrick, 1993). In addition, Das *et al.* (1998) report that an increase in optimistic bias may occur when earnings predictability is low based on public information and when financial analysts demand more private information. Therefore, greater dependence on the work of other auditors increases information asymmetry and decreases financial statement reliability, which causes financial analysts to rely more on private information than public information. Thus, we conjecture that more dependence on the work of other auditors in auditing consolidated financial statements provides incentive for financial analysts to obtain more private information, which increases optimistically biased forecasts, and, in turn, error in analysts' earnings forecasts increases. However, Regulation Fair Disclosure may weaken the assumption that financial analysts announce optimistically biased forecasts to obtain private information from management (Duru and Reeb, 2002). Regulation Fair Disclosure was adopted in Korea in November 1992; it prohibits management from disclosing material information to financial analysts. Despite Regulation Fair Disclosure, forecasts may be biased, as nonmaterial, nonpublic information provided by management to financial analysts may provide new material information when such information is combined with analysts' insights (Ke and Yu, 2006).
7. In cases of high dependence on the work of other auditors, we expect a decrease in the magnitude of analysts' optimistic bias and less demand for private information as long as the principal auditor's audit quality is high enough to maintain high financial statement reliability. Thus, involvement of Big 4 auditors (Behn *et al.*, 2008) and an audit provided by an industry specialist (Kim *et al.*, 2008) increase accounting information reliability, which in turn increases analysts' earnings forecast

accuracy. We expect that involvement of Big 4 (or industry specialist) auditors may weaken the positive relation between error in analysts' earnings forecasts and dependence on other auditors.

8. The minimum and maximum values of AFE are  $-0.2137$  and  $-0.0006$ , respectively; these values indicate that the samples in this study include only observations with optimistically biased earnings forecasts errors. This is because we use samples from top-level consolidated companies from among those companies that prepared consolidated financial statements during the study period.
9. The effect of dependence on the work of other auditors on error in analysts' earnings forecasts may be due to a lack of forecasting experience after the mandated use of the IFRS in auditing of consolidated financial statements as of 2011. Therefore, we perform an additional analysis using an indicator variable for firms with initial earnings forecast observations in 2012 and firms with earnings forecast observations in both 2011 and 2012. The results are consistent and significant for both OAS and OAT ( $0.030, t = 2.27$  and  $0.039, t = 2.63$ , respectively).
10. There is mixed evidence regarding the correlation between error in earnings forecasts and the MTB ratio. While [Sonu et al. \(2010\)](#) report a positive relation between these two variables, [Koh et al. \(2011\)](#) and [Roh \(2013\)](#) show a negative relation. The results of this study suggest a negative correlation between the MTB ratio and error in earnings forecasts, as in [Roh \(2013\)](#). [Roh \(2013\)](#) documents an increase in the accuracy of financial analysts' earnings forecasts for high-growth firms that draw attention from investors and provide more relevant information. The samples used in this study are limited to top-level consolidated companies, and all errors in analysts' earnings forecasts have an optimistic bias. Thus, we interpret that the magnitude of the error of earnings forecasts with optimistic bias decreases as the MTB ratio increases.
11. The total effect of ABRD on AFE is both direct and indirect ( $ABRD \times OAS$ ). The coefficient of ABRD is negative, which is opposite to our prediction. This is because the characteristics of firms with a high proportion of foreign subsidiaries have not been completely controlled in our study.
12. We divide the samples based on the proportion of overseas subsidiaries to all subsidiaries and perform a regression analysis using equation (2). For firms with a greater proportion of overseas subsidiaries to all subsidiaries ( $ABRD = 1$ ), the coefficients of dependence on the work of other auditors based on sales revenue and total assets are positive and significant ( $0.033, t = 2.40$  and  $0.034, t = 2.00$ , respectively). By contrast, when there is a lower proportion of overseas subsidiaries to all subsidiaries ( $ABRD = 0$ ), the coefficients of dependence on the work of other auditors based on sales revenue and total assets are insignificant ( $0.008, t = 0.70$  and  $0.009, t = 0.72$ , respectively). Thus, the results consistently support *H3*.
13. We perform an analysis using the logged value of the total number of subsidiaries (LOGNS) and an interaction term with LOGNS and dependence on the work of other auditors (OAS). The result shows that the coefficient of  $OAS \times LOGNS$  is insignificant ( $-0.008, t = -1.29$ ). In addition, we consider the effect of both LOGNS and the proportion of foreign subsidiaries to all subsidiaries (ABRD). The coefficient of  $OAS \times ABRD$  is significant ( $.036, t = 2.09$ ), which is consistent with our prediction, but the coefficient of  $OAS \times LOGNS$  is negative and significant at the 10 per cent level ( $-0.012, t = -1.81$ ). The result indicates that dependence on the work of other auditors decreases error in analysts' earnings forecasts with an optimistic bias as the number of subsidiaries increases. A company with a greater number of subsidiaries is more likely to be large; therefore, we conjecture that this result includes a mixed effect of SIZE. In fact, the coefficients of the Pearson and Spearman correlations of SIZE and LOGNS are  $0.766$  ( $p < 0.0001$ ) and  $0.770$  ( $p < 0.0001$ ), respectively.

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