Australian Accounting Review
CPA AUSTRALIA

Audit Effort and Market-perceived Risk: Evidence from South Korea

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Auditors incur a loss of credibility and/or status or litigation costs only when investors recognise audit failures. In this respect, auditors may be concerned about an increase in market-perceived risk even though the total amount of audit risk is constant. Consistent with this reasoning, I find that auditors increase audit effort in response to increases in market-perceived information risk. This suggests that the expected costs of audit failures are a function of investors' recognition, and thus increased market-perceived risk causes auditors to become more concerned about their audit failures and to increase audit effort. Further, this study shows that audit effort is effective in reducing market-perceived information risk, suggesting that auditors contribute to the information environment.

The costs associated with audit failures usually come in the form of reputation loss and litigation costs.[1] The important implication of this is that auditors are less likely to incur costs when audit failures are not detected by investors. Accordingly, it may not be audit failures *per se* but the investors' recognition of audit failures that auditors are primarily concerned about. In this respect, auditors are likely to increase their effort in response to an increase in market-perceived information risk even when it does not involve an increase in audit risk. However, prior studies largely focus on whether auditors are responsive to changes in the risk of material misstatement (inherent risk or control risk) when planning audit procedures (Mock and Wright 1999; O'Keefe et al. 1994; Hackenbrack and Knechel 1997; Felix et al. 2001; Hogan and Wilkins 2008; Ruhnke and Schmidt 2014). This study fills this gap by investigating whether auditors increase audit effort when market-perceived information risk increases.

Further, this study explores whether audit effort is effective in reducing market-perceived information risk, which is the implicit assumption of the argument that auditors increase audit effort in response to an increase in market-perceived information risk. Audit effort is likely to reduce information risk because the auditor's job is to determine what is real and what is not and to communicate what is real to the firm's stakeholders. It follows that audit effort increases the quality and quantity of public information, and monitoring by auditors reduces agency costs between firms (managers) and investors. To the extent that information quantity and quality affect the cost of equity capital (hereafter, COE) (e.g., Easley and O'Hara 2004) and investors demand risk premiums to compensate for loss from managerial expropriation (e.g., Bushman and Smith 2001), increased audit effort likely contributes to a reduction in COE.

However, these issues regarding the association between audit effort and market-perceived information risk are unclear. Auditors are required to make audit engagements profitable, audit effort involves significant costs, and there is time-budget pressure on auditors (Coram et al. 2003). It follows that auditors would increase their effort only if the marginal benefit of the reduction in possible future losses (potential losses attributable to future litigation and/or reputational damage) from an additional unit of auditing exceeds the marginal cost of the additional audit investment. In other words, auditors are expected to respond to increased market-perceived information risk only when they cost-effectively reduce it. Audit effort likely increases the quantity and quality of information, but it may not increase them to the extent that it helps to address investors' information needs successfully and provides information incremental to other information that reduces COE. In short, these relationships are empirical issues.[2]

Using data on audit hours available in Korea as a proxy for audit effort, this study has several important findings.[3] First, this study finds that audit hours increase when firms experience an increase in COE in the previous year, suggesting that increased market-perceived information risk causes auditors to become more concerned about their audit failures and thus to increase audit effort. Second, the evidence shows that increases in audit effort lead to decreases in COE, which

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doi: 10.1111/auar.12099

implies that extended audit effort is useful in reducing information risk. Given that corporate governance encompasses a broad spectrum of mechanisms intended to reduce agency problems by providing a higher degree of monitoring of managerial behaviour and reducing the information risk borne by shareholders, this evidence is consistent with the role of the external auditor in corporate governance (Baker 2009). Finally, the effect of audit effort on COE is less pronounced for firms with high analyst coverage. This suggests that audit effort and analyst coverage are substitutes in mitigating information risk.

This study contributes to the literature in several ways. First, it advances the literature on the relation between audit effort and clients' risks (Mock and Wright 1999; O'Keefe et al. 1994; Hackenbrack and Knechel 1997; Felix et al. 2001; Hogan and Wilkins 2008). While the extant literature focuses primarily on the association between audit effort and inherent or control risks, this study predicts and finds that market-perceived information risk is also an important factor that determines the extent of audit effort. Second, it adds to the literature on litigation risk. Prior research documents that litigation risk drives audit quality differences and is an important determinant of audit fees (Palmrose 1986; Simon and Francis 1988; Pratt and Stice 1994; Simunic and Stein 1996; Seetharaman et al. 2002; Venkataraman et al. 2008; Choi et al. 2009; Hammersley 2011; Brown et al. 2013; Badertscher et al. 2014). This study complements and extends the literature by documenting that in planning audit procedures, auditors consider investors' perception of risk factors to assess and address litigation risk. Third, this study contributes to the literature on the role of auditors in the capital market. Lobo and Zhao (2013) provide evidence of a negative association between audit effort and annual report restatements, and Caramanis and Lennox (2008) and Lee et al.(2014) find that audit effort constrains earnings management. However, current understanding is incomplete regarding whether firms actually benefit from audit effort. This study extends the literature by showing that audit effort is effective in reducing COE.

Related Research and Hypothesis Development

Model of audit judgement and decision process

In this section I discuss a framework for explaining how auditor risk judgements enter into the audit pricing decision, provided by Simunic (1980). The following equation (1) identifies elements of the auditor's decision process when accepting an audit client.

$$\mathrm{E(C)} = cq + \mathrm{E}(d)^{*}\mathrm{E}(\phi) \qquad (1)$$

where,

$\mathrm{E}(C)$ = total expected costs or the audit fee;

c = the per-unit factor cost of external audit resources to the auditor, including all opportunity costs and, therefore, including a provision for a normal profit;

q = the quantity of resources utilised by the auditor in performing the audit examination;

$\mathrm{E}(d)$ = expected present value of possible future losses that may arise from auditing this period's financial statements;

$\mathrm{E}(\phi)$ = expected likelihood that the auditor will be held responsible for losses suffered relating to this period's financial statements.

Using this pricing model, Pratt and Stice (1994) summarise an auditor's decision as a three-step process. First, the auditor assesses the amount and likelihood of being held responsible for possible future losses, $\mathrm{E}(d)^{*}\mathrm{E}(\phi)$, that is, potential losses attributable to future litigation and/or reputational damage. Second, the auditor invests in auditing, q, to the point where the marginal benefit of the reduction in $\mathrm{E}(d)^{*}\mathrm{E}(\phi)$ from an additional unit of auditing is equal to the marginal cost of the additional audit investment. Third, the auditor chooses a fee, $\mathrm{E}(c)$, that covers the cost of the audit investment, cq, and the expected value of possible future losses, $\mathrm{E}(d)^{*}\mathrm{E}(\phi)$. Pratt and Stice (1994) emphasise that this process involves an auditor judgement regarding the assessment of $\mathrm{E}(d)^{*}\mathrm{E}(\phi)$ and, based on that judgement, two audit decisions, that is, choosing q and $\mathrm{E}(C)$, follow. They also emphasise that the value of auditing to the auditor can be measured as the extent to which it reduces the auditor's exposure to possible future losses, defined as the losses associated with litigation, either threatened or filed, against the audit firm. In short, litigation risk is a strong incentive for auditors to deliver high-quality audits and an important determinant of audit fees (Palmrose 1986; Simon and Francis 1988; Pratt and Stice 1994; Simunic and Stein 1996; Seetharaman et al. 2002; Venkataraman et al. 2008; Choi et al. 2009; Hammersley 2011; Brown et al. 2013; Badertscher et al. 2014).

Hypothesis development

The literature has found that auditors are responsive to changes in clients' risks (Mock and Wright 1999; O'Keefe et al. 1994; Hackenbrack and Knechel 1997; Felix et al. 2001; Hogan and Wilkins 2008; Ruhnke and Schmidt 2014). Specifically, the evidence indicates that auditors increase audit effort in response to an increase in the risk of material misstatement, that is, inherent risk or control risk, which increases audit fees to cover the cost of acquiring this additional evidence. The reason for this response is that the failure to tailor audit procedures based on risk assessment results in an audit failure, which would certainly increase the likelihood that the audit firm would be deemed responsible for capital providers' losses, that is, ϕ in equation (1). In other words, this indicates that the ultimate reason for auditors' responses to clients' risks is to reduce their exposure to possible future litigation losses; the costs auditors incur from issuing an unqualified opinion on a misstated financial report usually come in the form of litigation costs.

Litigation against auditors typically begins with investors alleging a misstatement, that is, it involves investors' recognition of audit failures and the expected value of possible future losses, $E(d)*E(\phi)$, may approach zero when investors are not aware of the audit failures. It follows, combined with the above discussion, that the expected costs of audit failure are likely to be a function of investors' recognition of audit failures. Namely, auditors are less likely to incur costs when audit failures are not detected by investors, and therefore, it may not be audit failure *per se* but rather the investors' recognition of audit failure that is of primary concern to auditors. In this respect, auditors are likely to increase their effort in response to an increase in market-perceived information risk even when it does not involve an increase in audit risk.

To test this conjecture, I use the COE as a proxy for market-perceived information risk. COE is the rate of return that the market implicitly uses to discount the expected future cash flows of firms as a compensation for bearing the risks of the firms (Gebhardt et al. 2001). To the extent that information risk affects COE (Easley and O'Hara 2004) and audit failures contribute to an increase in information risk, auditors are likely to be concerned about an increase in COE. Based on this reasoning, this study hypothesises that auditors will increase their effort in response to an increase in COE. Using audit hours as a proxy for audit effort, the first hypothesis is as follows:

H1: The past change in COE is positively associated with the future change in audit hours.

Easley and O'Hara (2004) develop the multiple-asset and multiple-signal rational expectations equilibrium model and show that the distribution of information (i.e., the relative amounts of public versus private information) and the quantity of public information affect the cost of capital. Specifically, they demonstrate that COE increases in the fraction of private information in the information set about the firm value and decreases in the quantity and quality of both public and private information. This suggests that uninformed investors' portfolios always include too many stocks with bad news, and too few stocks with good news, relative to portfolios of informed investors; thus, the uninformed require compensation for bearing information risk. This information risk is systematic in the sense that holding more stocks does not eliminate this risk (Easley and O'Hara 2004).

The above discussion implies that auditors may affect COE. External auditors play a crucial role in enhancing the information environment. They lend credibility to accounting information by providing independent verification of manager-provided financial statements (e.g., Simunic and Stein 1987), thereby improving the quality and quantity of firms' financial information and lowering information risk. Consistent with this conjecture, there is substantial evidence on the association between auditor characteristics and COE. Krishnan et al. (2013) document that firms audited by industry experts have a lower COE, which supports the view that industry experts provide higher earnings quality than non-experts. Iatridis and Senftlechner (2014) document that firms that report goodwill and are audited by a Big 4 auditor enjoy lower cost of capital. Boone et al. (2008) provide evidence that COE decreases in the early years of audit firm tenure but then increases in the later years of tenure. This can be interpreted as suggesting that, in one respect, audit quality improves with tenure because of auditor learning and, in the other respect, audit quality decreases beyond some length of tenure because of impaired auditor independence. Azizkhani et al. (2012) show that partner tenure has a non-linear relation with COE for non-Big 4 engagements, and that partner rotation is associated with increased COE. This suggests that learning effect and economic dependence (reduced independence) are more pronounced for non-Big 4 auditors than for Big 4 auditors, who have more resources and larger client bases. Overall, this body of research largely addresses the issue of how auditor characteristics affect COE but does not focus on the effect of audit effort on COE.

There is a great deal of evidence to suggest that auditor effort contributes to increases in information quantity and quality. Caramanis and Lennox (2008) find that audit effort constrains earnings management; Lobo and Zhao (2013) provide evidence of a negative association between audit effort and annual report restatements; and Lee et al. (2014) show that audit effort is negatively associated with interim and annual discretionary accruals. If increases in their effort lead to increases in the fraction of public information, or increases in information quantity and quality, theory would predict a decrease in COE with the level of audit effort. The effect of audit effort on COE, however, is unclear and depends on the extent to which audit effort affects these information attributes. It is possible that audit effort may not increase the quantity and quality of information to the extent that it helps to address investors' information needs successfully and that audit effort may not contribute to the provision of information incremental to other information that affects COE. This possibility raises the importance of directly investigating the effect of audit effort on COE. The second hypothesis is as follows:

H2: The past change in audit hours is negatively associated with the future change in COE.

Analysts, who serve as information intermediaries, gather information from various sources both internal and external to a firm, and provide their assessment of its investment potential to external parties (e.g., Hong et al. 2000; Ayers and Freeman 2003). During this process, analysts may alter the fraction of public information along with the quantity and quality of information and, thereby, are likely to affect COE. Consistent with this notion, prior studies find that analyst coverage reduces COE (e.g., Bowen et al. 2008; Kelly and Ljungqvist 2012; Derrien and Kecskés 2013). Further, Yu (2008) provides evidence that analysts constrain earnings management. Given that deterring earnings management is a primary duty of auditors, this evidence suggests that auditors and analysts are competing entities. In this respect, the marginal impact of audit hours on COE may be smaller when analyst coverage is high. This leads to the third hypothesis.

H3: The effect of audit hours on COE is small for firms with high analyst coverage.

Sample and Methodology

Sample description

I extract accounting and stock return data from the Korea Information Service (KIS) Value database and analysts' earnings forecasts data from the Fn-Guide database.[4] As of June of each year, I select firm-years that satisfy the following criteria: (1) financial statement data, which are required for the computation of the main variables, and industry identification codes are available from KisValue; (2) stock price and means of one-year-ahead and two-year-ahead analysts' earnings forecasts are available from Fn-Guide; (3) non-financial firms; (4) fiscal year-end is December; (5) book value of equity is positive. In addition, I eliminate all observations for first-year engagements, because data for the change in audit hours are not available. This process yields a final sample of 1919 firm-year observations for testing Hypothesis 1 and 1096 firm-year observations for testing Hypotheses 2 and 3. Table 1, Panel A (for H1) and Panel B (for H2 and H3) show the industry distributions. The sample period begins in 2001, because 2000 is the first year in which the Fn-Guide database is available. I perform a change analysis, which ends in 2008.

Variable definitions and empirical models

Measurement of implied cost of equity capital

I use the discount rate implied from variations on the Ohlson (1995) residual income valuation model (hereafter RIV model) to estimate the *ex-ante* cost of equity capital. Ahn et al. (2008) find that the COE measure based on the RIV model outperforms that based on the Ohlson and Juettner-Nauroth (2005) model in terms of the overall association (i.e., the adjusted R^2 of the regressions) with risk proxies in Korea.

Following Frankel and Lee (1998), Lee et al. (1999), Liu et al. (2002) and Ali et al. (2003), my first residual income valuation (RIV) model assumes that the residual income is constant beyond year t+3 (hereafter RIVC model). In the RIVC model, the current price per share is as follows:

$$P_t = B_t + \sum_{i=1}^{3} \frac{FROE_{t+i} - r_{RIVC}}{(1 + r_{RIVC})^i} B_{t+i-1} + \frac{FROE_{t+3} - r_{RIVC}}{r_{RIVC}(1 + r_{RIVC})^3} B_{t+2}$$

where:

P_t = price per share of common stock in June of year t;

B_t = book value at the beginning of the year divided by the number of common shares outstanding in June of year t;

$FEPS_{t+i}$ = forecasted earnings per share for year t+i. $FEPS_1$ and $FEPS_2$ are equal to the one- and two-year-ahead consensus EPS forecasts in June of year t. $FEPS_3$ is equal to the three-year-ahead consensus EPS forecast when available, and $FEPS_2 \cdot (1 + LTG)$ when not available. LTG is the composite growth rate implicit in $FEPS_1$ and $FEPS_2$;

DPS_0 = dividends per share paid during year t-1;

EPS_0 = actual earnings per share for year t-1;

k = expected dividend payout ratio, calculated as DPS_0/EPS_0. If $EPS_0 \leqq 0$, then k is calculated as $DPS_0/FEPS_1$;[5]

$FROE_{t+i}$ = forecasted return on equity (ROE) for period t+i. For years one through three, this variable is equal to $FEPS_{t+i}/B_{t+i-1}$;

$B_{t+i} = B_{t+i-1}(1 + FROE_{t+i} \cdot (1 - k))$.[6]

The second RIV model (RIVI) assumes that the return on equity (ROE) trends linearly to the industry median ROE by the 12th year and that thereafter the residual incomes remain constant in perpetuity (e.g., Gebhardt et al. 2001). In the RIVI model, the current price per share is as follows:

$$P_t = B_t + \frac{FROE_{t+1} - r_{RIVI}}{(1 + r_{RIVI})} B_t + \frac{FROE_{t+2} - r_{RIVI}}{(1 + r_{RIVI})^2} B_{t+1} + TV$$

$$TV = \sum_{i=3}^{T-1} \frac{FROE_{t+i} - r_{RIVI}}{(1 + r_{RIVI})^i} B_{t+i-1} + \frac{FROE_{t+T} - r_{RIVI}}{r_{RIVI}(1 + r_{RIVI})^{T-1}} B_{t+T-1}$$

where:

P_t = price per share of common stock in June of year t;

B_t = book value at the beginning of the year divided by the number of common shares outstanding in June of year *t*;

$FEPS_{t+i}$ = forecasted earnings per share for year *t*+i. $FEPS_1$ and $FEPS_2$ are equal to the one- and two-year-ahead consensus EPS forecasts in June of year *t*. $FEPS_3$ is equal to the three-year-ahead consensus EPS forecast when available, and $FEPS_2 \cdot (1 + LTG)$ when not available. LTG is the composite growth rate implicit in $FEPS_1$ and $FEPS_2$;

DPS_0 = dividends per share paid during year *t*-1;

EPS_0 = actual earnings per share for year *t*-1;

k = expected dividend payout ratio, calculated as DPS_0/EPS_0. If $EPS_0 \leqq 0$, then k is calculated as $DPS_0/FEPS_1$;

$FROE_{t+i}$ = forecasted ROE for period *t*+i. For years one through three, this variable is equal to $FEPS_{t+i}/B_{t+i-1}$. Beyond year three, $FROE_{t+i}$ is a linear interpolation to the industry median ROE. Industry median ROE is defined as the moving median ROE for the prior five years for the firm's industry (excluding loss firm-years);

$B_{t+i} = B_{t+i-1}(1 + FROE_{t+i} \cdot (1 - k))$;

T = forecast horizon. T = 12.

I solve for COE by searching over the range of 0% to 100% for a value of COE that minimises the difference between the stock price and the intrinsic value estimate. To reduce measurement error in the estimates, I use the average of these two measures (e.g., Boone et al. 2005; Hail and Leuz 2006).[7]

Past cost of equity capital and current-year audit hour

I employ change specifications to test the hypotheses. The hypotheses in this study predict that the change in COE in the previous year is positively associated with the change in audit hours in the current year, and the change in audit hours in the current year is negatively associated with the change in COE in the next year. To the extent that this is the case, level specifications fail to capture these relations. In addition, change specifications provide a stronger test of causal relations than do level specifications, even though correlations in changes do not necessarily imply causality (O'Brien and Bhushan 1990). Further, they partially address potential correlated omitted variable concerns.[8] Specifically, I estimate the following equation (2) to test Hypothesis 1. I adjust the standard errors for heteroscedasticity, serial-, and cross-sectional correlation using a two-dimensional cluster at the firm and year levels (Petersen 2009).

$$\begin{aligned}\Delta AuditHR_{i,t} = {} & \beta_0 + \beta_1 \Delta COE_{i,t} + \beta_2 \Delta lnTA_{i,t} + \beta_3 \Delta SEG_{i,t} \\ & + \beta_4 \Delta INVREC_{i,t} + \beta_5 \Delta EXPT_{i,t} + \beta_6 \Delta ISSUE_{i,t} \\ & + \beta_7 \Delta LIQ_{i,t} + \beta_8 \Delta LEV_{i,t} + \beta_9 \Delta ROA_{i,t} + \beta_{10} \Delta LOSS_{i,t} \\ & + \beta_{11} \Delta GRW_{i,t} + \beta_{12} \Delta LARGE_{i,t} + \beta_{13} \Delta FOREIGN_{i,t} \\ & + \beta_{14} \Delta NAS_{i,t} + \beta_{15} \text{Mkt Indicator} + \beta_{16} \Delta IndA_{i,t} \\ & + \beta_{17} \Delta IndB_{i,t} + \beta_{18} \Delta Inst_{i,t} + \text{Year and Industry Indicators} + \varepsilon_{i,t}\end{aligned} \quad (2)$$

Where *lnTA* is the natural logarithm of total assets. *LEV* is the ratio of total liabilities to total assets. *LIQ* is the ratio of current assets to current liabilities. *ROA* is measured as net income divided by total assets. *LOSS* is a loss indicator variable. *EXPT* is the ratio of foreign to total sales. *AuditHR* is audit hours. *COE* is the cost of equity capital.[9] *SEG* is measured by the natural logarithm of the number of business segments. *INVREC* is the ratio of current assets to total assets. *ISSUE* is the ratio of equity and debt issued to total assets. *GRW* refers to sales growth. *LARGE* is the stock ownership of large shareholders. *FOREIGN* is the stock ownership of foreign investors. *NAS* is the ratio of non-audit fee to total fee. *Mkt* is a market indicator variable. *IndA* is a dummy variable that takes a value of one if the audit committee is composed of 100% independent (outside) directors, and zero otherwise. *IndB* is the ratio of independent (outside) directors on the board. *Inst* is institutional shareholdings as a percentage of firm shares.

I measure auditors' responsiveness as the change in audit hours (Δ*AuditHR*). The main variable of interest, *COE*, is the *ex-ante* cost of equity capital. I use as a proxy for *COE* the average of the two measures from the Ohlson (1995) residual income valuation model. This is intended to minimise potential estimation errors (Hail and Leuz 2006; Dhaliwal et al. 2006, 2011). A positive coefficient on Δ*COE* implies that increases in *COE* induce more audit effort, which is consistent with Hypothesis 1. Following Simunic and Stein (1996), the model of audit hours includes auditee size (*lnTA*), complexity (*SEG*, *EXPT*), riskiness (*INVREC, LEV, LIQ, ROA, LOSS)*, growth opportunities (*GRW*), external capital need (*ISSUE*), corporate governance (*LARGE, FOREIGN, IndA, IndA,* and *Inst*) and non-audit fee (*NAS*). I also include market, industry and year indicator variables (*Mkt, Industry,* and *Year*) to control for market, industry (including litigation risk) and year effects.[10]

Effect of audit hour on the future cost of equity capital

The regression model for testing Hypotheses 2 and 3, is as follows (Dhaliwal et al. 2011):

$$\begin{aligned}\Delta COE_{i,t+1} = {} & \beta_0 + \beta_1 \Delta AuditHR_{i,t} + \beta_2 r\_AF_{i,t+1} + \beta_3 \Delta AuditHR_{i,t} * r\_AF_{i,t+1} \\ & + \beta_4 \Delta SIZE_{i,t} + \beta_5 \Delta BETA_{i,t+1} + \beta_6 \Delta LEV_{i,t} + \beta_7 \Delta MB_{i,t} + \beta_8 \Delta LTG_{i,t+1} \\ & + \beta_9 \Delta LNDISP_{i,t+1} + \beta_{10} \Delta IDRISK_{i,t+1} + \beta_{11} \Delta IndA_{i,t} \\ & + \beta_{12} \Delta IndB_{i,t} + \beta_{13} \Delta Inst_{i,t} + \text{Year and Industry Indicators} + \varepsilon_{i,t}\end{aligned} \quad (3)$$

Where *COE* is the cost of equity capital. *AuditHR* is audit hours. *r_AF* denotes the residuals from the regression of analyst coverage on firm size, year and industry indicator variables.[11] *SIZE* is the natural logarithm of market value of equity. *BETA* is the systematic risk, estimated using daily data for each year. *LEV* is the ratio of total liabilities to total assets. *MB* is the ratio of market-to-book equity. *LTG* is measured as the difference between the two-year-ahead consensus *EPS* forecast and the one-year-ahead consensus *EPS* forecast scaled by the one-year-ahead consensus *EPS* forecast. *LNDISP* is calculated as the logarithm of the standard deviation of analyst *EPS* forecasts divided by the consensus forecast. *IDRISK* is the variance of the residuals from the market model regressions. *IndA* is a dummy variable that takes a value of one if the audit committee is composed of 100% independent (outside) directors, and zero otherwise. *IndB* is the ratio of independent (outside) directors on the board. *Inst* is institutional shareholdings as a percentage of firm shares.[12]

A negative coefficient on $\Delta AuditHR$ and a positive coefficient on $\Delta AuditHR * r\_AF$ suggest that audit effort reduces *COE*, and the effect of audit effort on *COE* is relatively small for firms with high analyst coverage, which is consistent with Hypotheses 2 and 3.

A number of control variables are also included in the model. Fama and French (1992) find that expected returns are negatively associated with firm size and positively associated with the book-to-market ratio. Hence, I include firm size (*SIZE*) and the market-to-book ratio (*MB*). The market model *BETA*, which is estimated using daily data for each year, is included to control for systematic risk. Gebhardt et al. (2001) and Gode and Mohanram (2003) find that the implied cost of equity capital is positively associated with long-term growth rate. I therefore include an empirical proxy of long-term growth rate based on analyst EPS forecasts (*LTG*), which is measured as the difference between the two-year-ahead consensus EPS forecast and the one-year-ahead consensus EPS forecast scaled by the one-year-ahead consensus EPS forecast. Gebhardt et al. (2001) and Dhaliwal et al. (2005) find that analyst forecast dispersion is negatively associated with the implied cost of equity capital. Thus, I include analyst forecast dispersion (*LNDISP*), which is calculated as the logarithm of the standard deviation of analyst EPS forecasts divided by the consensus forecast. I include leverage (*LEV*), because Fama and French (1992) suggest that the cost of equity capital increases as the degree of leverage increases. I include industry indicators, because Gebhardt et al. (2001) show that the cost of equity capital is a function of its industry membership. Finally, I include corporate governance variables (*IndA*, *IndA*, and *Inst*) and market and year indicators to control for corporate governance, market and year effects.

Table 1 Sample distribution

Industry	Freq	Percent	Cum
Panel A: Distribution by industry for H1			
Manufacturing	1269	66.1%	66.1%
Electric, gas and sanitary services	44	2.3%	68.4%
Construction	96	5.0%	73.4%
Retail	128	6.7%	80.1%
Transportation	32	1.7%	81.8%
Electronic equipment	108	5.6%	87.4%
Scientific instruments	183	9.5%	96.9%
Business services	22	1.1%	98.1%
Education services	13	0.7%	98.7%
Entertainment services	10	0.5%	99.3%
All others	14	0.7%	100.0%
Total	1919		
Panel B: Distribution by industry for H2 and H3			
Manufacturing	710	64.8%	64.8%
Electric, gas and sanitary services	35	3.2%	68.0%
Construction	61	5.6%	73.5%
Retail	64	5.8%	79.4%
Transportation	20	1.8%	81.2%
Electronic equipment	45	4.1%	85.3%
Scientific instruments	130	11.9%	97.2%
All others	31	2.8%	100.0%
Total	1096		

Results

Descriptive statistics

Panel A of Table 2 provides descriptive statistics for the regression variables.[13] The first (r_{RIVC}) and second *COE* measures (r_{RIVI}) have means (medians) of 0.150 (0.138) and 0.137 (0.132), respectively. r_{RIVC} is more volatile than r_{RIVI}, which is consistent with Ahn et al. (2008). *COE*, the average of these two *COE* measures, has a mean and median of 0.143 and 0.135, respectively. Audit hour (*AuditHR*) has a mean and median of 6.713 and 6.675, respectively. The Pearson correlation matrixes for the regression variables in Equation (2) are presented in Panel B. In Panel B, the past change in *COE* (ΔCOE) is significantly and positively associated with the future change in audit hours ($\Delta AuditHR$), providing initial support for Hypothesis 1. The Pearson correlation matrixes for the regression variables in Equation (3) are presented in Panels C (high analyst coverage) and D (low analyst coverage). The past change in audit hours (ΔAuditHR) is significantly and negatively associated with the future change in COE (ΔCOE) only for firms with low analyst coverage (in Panel D), providing support for Hypothesis 3.[14,15]

Past cost of equity capital and current-year audit hour

The expected costs of audit failures are a function of the market's recognition of audit failures, because the

Table 2 **Descriptive statistics**

Panel A: Summary statistics

Variable	*N*	Mean	Median	Std. dev	Minimum	Maximum
r_{RIVC}	1919	0.150	0.138	0.068	0.031	0.367
r_{RIVI}	1919	0.137	0.132	0.042	0.055	0.281
COE	1919	0.143	0.135	0.053	0.051	0.301
AuditHR	1919	6.713	6.675	1.059	4.382	9.181
lnTA	1919	19.690	19.405	1.617	16.866	23.985
SEG	1919	1.176	1.099	1.246	0	4.663
INVREC	1919	0.277	0.259	0.156	0	0.700
EXPT	1919	0.353	0.271	0.336	0	1.000
ISSUE	1919	0.047	0	0.122	0	0.462
LIQ	1919	2.426	1.501	3.275	0.243	15.567
LEV	1919	0.422	0.424	0.210	0.053	0.895
ROA	1919	0.050	0.055	0.114	−0.394	0.298
LOSS	1919	0.153	0	0.360	0	1.000
GRW	1919	0.104	0.076	0.331	−0.669	1.180
LARGE	1919	0.316	0.313	0.164	0	0.700
FOREIGN	1919	0.156	0.100	0.167	0	0.667
NAS	1919	0.108	0	0.190	0	0.752
r_AF	1919	1.548	1.073	4.521	−6.926	13.167
SIZE	1919	12.757	12.457	1.604	10.052	16.915
BETA	1919	1.095	1.073	0.470	0.123	2.275
MB	1919	1.529	1.132	1.451	0.155	7.648
LTG	1919	0.345	0.175	1.106	−0.242	3.761
LNDISP	1919	−1.917	−1.970	0.976	−4.000	1.043
IDRISK	1919	0.026	0.025	0.007	0.013	0.050
IndA	1919	0.213	0.000	0.410	0.000	1.000
IndB	1919	0.244	0.222	0.178	0.000	0.667
Inst	1919	0.095	0.000	0.168	0.000	0.679
AuditFee	1919	11.676	11.513	0.841	10.166	13.911

(*Continued*)

Table 2 Continued

Panel B: Pearson correlation for the variables in equation (2)

	ΔAuditH	ΔCOE	ΔlnTA	ΔSEG	ΔINVRE	ΔEXPT	ΔISSUE	ΔLIQ	ΔLEV	ΔROA	ΔLOSS	ΔGRW	ΔLARGE	ΔFOREI	ΔNAS	ΔIndA	ΔIndB
ΔCOE	0.083																
	<0.001																
ΔlnTA	0.026	−0.069															
	0.252	0.003															
ΔSEG	0.084	−0.026	0.115														
	<0.001	0.255	<0.001														
ΔINVRE	0.041	−0.036	0.002	−0.049													
	0.07	0.113	0.937	0.031													
ΔEXPT	0.009	0.008	0.053	0.025	−0.018												
	0.698	0.718	0.021	0.276	0.423												
ΔISSUE	−0.009	−0.125	0.104	0.042	−0.061	0.019											
	0.708	<0.001	<0.001	0.065	0.008	0.399											
ΔLIQ	−0.006	−0.048	−0.067	−0.063	−0.131	0.01	0.057										
	0.81	0.035	0.003	0.006	<0.001	0.677	0.012										
ΔLEV	−0.006	0.088	0.241	0.027	0.169	−0.003	−0.086	−0.4									
	0.801	<0.001	<0.001	0.234	<0.001	0.896	<0.001	<0.001									
ΔROA	0.018	−0.133	0.176	0	0.05	0.038	0.285	0.054	−0.374								
	0.435	<0.001	<0.001	0.997	0.029	0.1	<0.001	0.017	<0.001								
ΔLOSS	−0.024	0.051	−0.105	0.043	−0.103	−0.005	−0.099	−0.081	0.226	−0.531							
	0.285	0.026	<0.001	0.059	<0.001	0.813	<0.001	<0.001	<0.001	<0.001							
ΔGRW	−0.013	−0.045	0.163	0.023	0.177	0.031	0.194	−0.125	0.061	0.375	−0.174						
	0.584	0.05	<0.001	0.316	<0.001	0.172	<0.001	<0.001	0.008	<0.001	<0.001						
ΔLARGE	<0.001	0.006	−0.071	−0.066	−0.068	−0.03	0.048	0.059	−0.039	0.054	−0.004	0.006					
	0.999	0.786	0.002	0.004	0.003	0.193	0.037	0.01	0.09	0.018	0.852	0.786					
ΔFOREI	0.098	−0.089	0.025	−0.014	0.046	0.008	−0.009	0.053	−0.116	0.123	−0.078	0.06	−0.045				
	<0.001	<0.001	0.267	0.531	0.044	0.743	0.706	0.02	<0.001	<0.001	<0.001	0.008	0.047				
ΔFOREI	−0.007	0.003	0.031	−0.032	−0.031	−0.014	0.044	0.022	0.01	0.022	0.013	0	−0.012	0.018			
	0.77	0.889	0.173	0.158	0.174	0.541	0.053	0.34	0.671	0.344	0.56	0.991	0.596	0.445			
ΔIndA	0.024	−0.014	−0.001	0.025	0.001	−0.013	−0.016	−0.019	−0.015	0.004	0.011	0.017	0.009	0.001	0.011		
	0.301	0.527	0.953	0.274	0.962	0.557	0.477	0.408	0.511	0.874	0.632	0.471	0.702	0.962	0.629		
ΔIndB	0.013	−0.014	0.035	0.037	−0.011	0.022	−0.038	0.032	−0.031	0.023	−0.011	−0.014	−0.027	0.033	<0.001	0.314	
	0.58	0.551	0.124	0.103	0.643	0.339	0.097	0.163	0.179	0.321	0.634	0.548	0.235	0.153	0.975	<0.001	
ΔInst	−0.113	−0.105	0.016	−0.01	−0.037	−0.018	−0.053	−0.023	0.054	−0.072	0.036	−0.048	0.005	−0.172	0.006	−0.024	−0.001
	<0.001	<0.001	0.496	0.649	0.109	0.429	0.02	0.322	0.019	0.002	0.12	0.035	0.825	<0.001	0.78	0.299	0.957

(*Continued*)

Table 2 Continued

Panel C: Pearson correlation for the variables in equation (3) with high analyst coverage

	ΔCOE	ΔAuditHR	ΔSIZE	ΔBETA	ΔLEV	ΔMB	ΔLTG	ΔLNDISP	ΔIDRISK	ΔIndA	ΔIndB	ΔInst
ΔAuditHR	−0.046											
	0.285											
ΔSIZE	−0.611	−0.014										
	<0.001	0.746										
ΔBETA	0.151	−0.024	−0.058									
	0.000	0.577	0.178									
ΔLEV	0.018	0.034	0.015	0.043								
	0.669	0.425	0.734	0.313								
ΔMB	−0.242	−0.045	0.178	−0.069	−0.111							
	<0.001	0.293	<0.001	0.109	0.009							
ΔLTG	0.012	−0.014	−0.114	−0.030	0.066	−0.026						
	0.772	0.742	0.007	0.487	0.122	0.552						
ΔLNDISP	−0.061	−0.020	−0.241	−0.033	0.012	0.015	0.414					
	0.152	0.643	<0.001	0.448	0.773	0.735	<0.001					
ΔIDRISK	−0.027	−0.018	0.125	0.293	0.070	−0.138	0.004	0.074				
	0.526	0.680	0.003	<0.001	0.101	0.001	0.933	0.086				
ΔIndA	0.006	0.056	−0.025	−0.037	0.043	0.003	0.014	0.043	−0.097			
	0.882	0.195	0.553	0.384	0.315	0.950	0.753	0.311	0.023			
ΔIndB	0.004	0.010	−0.020	−0.039	−0.029	−0.009	0.043	0.038	−0.072	0.352		
	0.923	0.823	0.638	0.365	0.496	0.827	0.317	0.369	0.095	<0.001		
ΔInst	−0.241	−0.222	0.090	−0.203	0.045	0.131	0.025	0.029	0.030	−0.005	0.033	
	<0.001	<0.001	0.036	<0.001	0.293	0.002	0.556	0.506	0.477	0.902	0.443	
ΔAuditfee	−0.034	0.223	0.049	−0.086	0.121	−0.064	−0.001	0.022	−0.022	0.061	−0.011	0.011
	0.421	<0.001	0.254	0.044	0.005	0.133	0.979	0.616	0.612	0.151	0.790	0.800

(Continued)

Table 2 Continued

Panel D: Pearson correlation for the variables in equation (3) with low analyst coverage

	ΔCOE	ΔAuditHR	ΔSIZE	ΔBETA	ΔLEV	ΔMB	ΔLTG	ΔLNDISP	ΔIDRISK	ΔIndA	ΔIndB	ΔInst
ΔAuditHR	−0.051											
	0.029											
ΔSIZE	−0.598	0.013										
	<0.001	0.759										
ΔBETA	0.071	−0.003	−0.025									
	0.096	0.946	0.560									
ΔLEV	0.065	0.033	−0.101	0.041								
	0.129	0.447	0.018	0.334								
ΔMB	−0.187	−0.078	0.250	0.020	−0.050							
	<0.001	0.070	<0.001	0.634	0.244							
ΔLTG	0.034	0.001	−0.139	0.025	0.028	−0.073						
	0.424	0.986	0.001	0.553	0.514	0.090						
ΔLNDISP	−0.023	0.016	−0.093	0.045	0.063	0.012	0.364					
	0.590	0.716	0.029	0.298	0.140	0.777	<0.001					
ΔIDRISK	−0.033	0.049	0.208	0.333	0.053	−0.043	−0.014	0.002				
	0.447	0.253	<0.001	<0.001	0.220	0.315	0.747	0.967				
ΔIndA	−0.068	−0.003	0.100	0.047	−0.108	−0.049	−0.010	−0.033	0.024			
	0.112	0.947	0.019	0.270	0.012	0.254	0.815	0.439	0.581			
ΔIndB	−0.066	−0.005	0.031	0.025	−0.004	−0.029	0.063	0.011	−0.050	0.290		
	0.120	0.906	0.475	0.553	0.928	0.499	0.141	0.805	0.247	<0.001		
ΔInst	−0.119	−0.221	0.075	−0.165	0.113	0.034	−0.048	−0.012	−0.031	−0.074	−0.000	
	0.005	<0.001	0.081	<0.001	0.008	0.426	0.263	0.782	0.464	0.083	0.994	
ΔAuditfee	−0.002	0.148	−0.038	−0.023	0.028	−0.152	−0.034	0.030	−0.078	0.036	0.065	−0.021
	0.957	<0.001	0.373	0.590	0.519	<0.001	0.426	0.483	0.068	0.404	0.129	0.624

COE is the implied cost of equity capital, calculated as the average of the two measures from the Ohlson (1995) residual income valuation model. r_{RIVC} and r_{RIVI} are the implied COE measures from the RIVC and RIVI models, respectively. **AuditHR** is the natural logarithm of audit hours. **lnTA** is the natural logarithm of total assets. **SEG** is the natural logarithm of the number of business segments. ***INVREC*** is measured by the ratio of current assets to total assets. **EXPT** is the ratio of foreign to total sales. ***ISSUE*** is measured as the ratio of equity and debt issued to total assets. ***LIQ*** is the ratio of current assets to current liabilities. ***LEV*** is the ratio of total liabilities to total assets. ***ROA*** is measured as net income divided by total assets. ***LOSS*** is a loss indicator variable. ***GRW*** denotes sales growth. ***LARGE*** and ***FOREIGN*** are the stock ownership of large shareholders and foreign investors, respectively. ***NAS*** is the ratio of nonaudit fee to total fee. **r_AF** denotes the residuals from the regression of analyst coverage on firm size, year and industry indicator variables. ***SIZE*** is the natural logarithm of market value of equity. ***BETA*** is the systematic risk, estimated using daily data for each year. ***MB*** is the ratio of market-to-book equity. ***LTG*** is measured as the difference between the two-year-ahead consensus EPS forecast and the one-year-ahead consensus EPS forecast scaled by the one-year-ahead consensus EPS forecast. ***LNDISP*** is calculated as the logarithm of the standard deviation of analyst EPS forecasts divided by the consensus forecast. ***IDRISK*** is the variance of residuals from the market model regressions. ***IndA*** is a dummy variable that takes a value of one if the audit committee is composed of 100% independent (outside) directors, and zero otherwise. ***IndB*** is the ratio of independent (outside) directors on the board. **Inst** is institutional shareholdings as a percentage of firm shares. ***AuditFee*** is the natural logarithm of audit fee.

Table 3 The effect of the change in COE on the change in audit hours (Regression results for H1)

$$\begin{aligned}\Delta \mathrm{AuditHR}_{i,t} = {} & \beta_0 + \beta_1 \Delta \mathrm{COE}_{i,t} + \beta_2 \Delta \mathrm{lnTA}_{i,t} + \beta_3 \Delta \mathrm{SEG}_{i,t} + \beta_4 \Delta \mathrm{INVREC}_{i,t} \\ & + \beta_5 \Delta \mathrm{EXPT}_{i,t} + \beta_6 \Delta \mathrm{ISSUE}_{i,t} + \beta_7 \Delta \mathrm{LIQ}_{i,t} + \beta_8 \Delta \mathrm{LEV}_{i,t} \\ & + \beta_9 \Delta \mathrm{ROA}_{i,t} + \beta_{10} \Delta \mathrm{LOSS}_{i,t} + \beta_{11} \Delta \mathrm{GRW}_{i,t} + \beta_{12} \Delta \mathrm{LARGE}_{i,t} + \beta_{13} \Delta \mathrm{FOREIGN}_{i,t} \\ & + \beta_{14} \Delta \mathrm{NAS}_{i,t} + \beta_{15} \mathrm{Mkt\ Indicator} + \beta_{16} \Delta \mathrm{IndA}_{i,t} + \beta_{17} \Delta \mathrm{IndB}_{i,t} \\ & + \beta_{18} \Delta \mathrm{Inst}_{i,t} + \mathrm{Year\ and\ Industry\ Indicators} + \varepsilon_{i,t}\end{aligned}$$

Variables	Pred. sign	Parameter estimate	*t*-statistic
Intercept	+/−	0.156***	2.87
ΔCOE	+	0.479**	2.30
ΔlnTA	+	0.104	1.36
ΔSEG	+	0.058**	2.05
ΔINVREC	+	0.043	0.36
ΔEXPT	+	−0.026	−0.36
ΔISSUE	+	−0.039	−0.54
ΔLIQ	-	−0.003	−0.20
ΔLEV	+	0.099	0.61
ΔROA	+/−	0.027	0.16
ΔLOSS	+	0.003	0.10
ΔGRW	+/−	−0.034	−0.86
ΔLARGE	+/−	0.081	1.19
ΔFOREIGN	+	0.088	0.85
ΔNAS	+/−	−0.017	−0.30
Mkt	+/−	0.005	0.12
ΔIndA	+/−	0.099**	2.09
ΔIndB	+/−	−0.040	−0.55
ΔInst	+/−	0.103	1.49
Year fixed		Included	
Industry fixed		Included	
Number of observations		1919	
Adjusted R^2		0.141	

*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.
Refer to Table 2 for variable definitions.

consequences of audit failures that involve costs are reputation loss or litigation. When audit failures are not detected by external parties, the expected costs are zero. To the extent that this is the case, the market's recognition is an important factor that auditors consider in adapting their effort. Based on this reasoning, Hypothesis 1 predicts that auditors increase their effort in response to increases in market-perceived information risk, which is specified in equation (2). Table 3 shows the regression results from estimating equation (2). The evidence shows that the coefficient on ΔCOE is significantly positive (*coeff.* = 0.479, *t-stat.* = 2.30), suggesting that auditors respond to increases in market-perceived information risk (H1). The results are also economically significant. The difference in $\Delta AuditHR$ between firms with the third- and first-quartile values of ΔCOE is 2.4%, which is about 12% of my sample inter-quartile range of $\Delta AuditHR$.

Effect of audit hour on the future cost of equity capital

Panel A of Table 4 presents the results from estimating equation (3) without the interaction term between Δ*AuditHR* and *r_AF*. The coefficient on Δ*AuditHR* is significantly negative (*coeff.* = −0.003, *t-stat.* = −2.04), consistent with Hypothesis 2 that audit effort is effective in reducing *COE*. Panel B shows the results from testing Hypothesis 3. The coefficient on Δ*AuditHR* is significantly negative (*coeff.* = −0.005, *t-stat.* = −2.39) and the coefficient on the interaction term between Δ*AuditHR* and *r_AF* is significantly positive (*coeff.* = 0.001, *t-stat.* = 2.60). This implies that audit effort can reduce *COE*, but the effect of audit effort on *COE* decreases with analyst coverage, which supports Hypotheses 2 and 3.[16]

Additional analyses

Controlling for the change in audit fee

Hope et al. (2009) find that excess audit fees are positively associated with *COE*. To control for the effect of audit fees, I include the change in audit fees (Δ*Auditfee*) in equation (3). Table 5 shows the results. The results mirror those in Table 4, suggesting that the effect of audit fees does not subsume that of audit hour.

Summary and Conclusions

Prior studies exploring the association between clients' risks and audit fees cannot determine whether auditors

Table 4 The effect of the change in audit hours on the change in COE

$$\Delta COE_{i,t+1} = \beta_0 + \beta_1 \Delta AuditHR_{i,t} + \beta_2 r\_AF_{i,t+1} + \beta_3 \Delta AuditHR_{i,t} * r\_AF_{i,t+1} + \beta_4 \Delta SIZE_{i,t} + \beta_5 \Delta BETA_{i,t+1} + \beta_6 \Delta LEV_{i,t} + \beta_7 \Delta MB_{i,t} + \beta_8 \Delta LTG_{i,t+1} + \beta_9 \Delta LNDISP_{i,t+1} + \beta_{10} \Delta IDRISK_{i,t+1} + \beta_{11} \Delta IndA_{i,t} + \beta_{12} \Delta IndB_{i,t} + \beta_{13} \Delta Inst_{i,t} + \text{Year and Industry Indicators} + \varepsilon_{i,t}$$

		Dependent variable: $\Delta COE_{i,t+1}$	
Variables	Pred. sign	Parameter estimate	t-statistic
Panel A: Regression results for Hypothesis 2			
Intercept	+/−	−0.019***	−3.70
$\Delta AuditHR_{i,t}$	-	−0.003**	−2.04
$\Delta SIZE_{i,t}$	-	−0.039***	−17.16
$\Delta BETA_{i,t+1}$	+	−0.004	−1.09
$\Delta LEV_{i,t}$	+	0.020	0.88
$\Delta MB_{i,t}$	-	−0.001	−1.09
$\Delta LTG_{i,t+1}$	+	0.002	0.94
$\Delta LNDISP_{i,t+1}$	-	−0.005***	−2.95
$\Delta IDRISK_{i,t+1}$	+	0.024	0.09
$\Delta IndA_{i,t}$	-	−0.002	−0.22
$\Delta IndB_{i,t}$	-	−0.000	−0.05
$\Delta Inst_{i,t}$	-	−0.010	−0.76
Year fixed		Included	
Industry fixed		Included	
Number of observations		1096	
Adjusted R^2		0.453	
Panel B: Regression results for Hypothesis 3			
Intercept	+/−	−0.018***	−3.02
$\Delta AuditHR_{i,t}$	-	−0.005**	−2.39
$r\_AF_{i,t+1}$	+/−	0.000	0.62
$\Delta AuditHR_{i,t} * r\_AF_{i,t+1}$	+	0.001***	2.60
$\Delta SIZE_{i,t}$	-	−0.040***	−16.49
$\Delta BETA_{i,t+1}$	+	−0.004	−1.19
$\Delta LEV_{i,t}$	+	0.022	0.92
$\Delta MB_{i,t}$	-	−0.001	−0.97
$\Delta LTG_{i,t+1}$	+	0.002	1.01
$\Delta LNDISP_{i,t+1}$	-	−0.004***	−2.98
$\Delta IDRISK_{i,t+1}$	+	0.036	0.14
$\Delta IndA_{i,t}$	-	−0.002	−0.28
$\Delta IndB_{i,t}$	-	−0.001	−0.07
$\Delta Inst_{i,t}$	-	−0.009	−0.69
Year fixed		Included	
Industry fixed		Included	
Number of observations		1096	
Adjusted R^2		0.455	

*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.
Refer to Table 2 for variable definitions.

adjust audit effort based on changes in clients' risks, which increases audit fees to cover the cost of acquiring this additional evidence, or adjust audit fees – without changing the level of audit effort – to charge clients a type of insurance premium for possible future litigation losses. The audit hour data provided by Korean listed companies allow the examination of this issue.

Using audit hour data, this study documents that the planned audit hours increase as COE increases. This evidence suggests that auditors take into account market-perceived information risk when planning audit procedures. This makes sense in that litigation against auditors begins with investors' recognition of audit failures and thus it is not audit failures *per se* but the investors' recognition of audit failures that auditors are primarily concerned about. In addition, this study provides evidence that audit effort contributes to a reduction in COE.

These findings suggest that auditors play their intended role as external monitors. There are two ways to address increased market-perceived information risk. Auditors can react to an increase in market-perceived information risk by increasing audit effort to reduce the risk of audit failure or by charging a risk premium for high expected future litigation costs (Palmrose 1986; Simon and Francis 1988; Pratt and Stice 1994; Simunic

Table 5 Regression results conditioning on audit fee

$$\Delta COE_{i,t+1} = \beta_0 + \beta_1 \Delta AuditHR_{i,t} + \beta_2 r\_AF_{i,t+1} + \beta_3 \Delta AuditHR_{i,t} * r\_AF_{i,t+1} + \beta_4 \Delta SIZE_{i,t} + \beta_5 \Delta BETA_{i,t+1} + \beta_6 \Delta LEV_{i,t} + \beta_7 \Delta MB_{i,t} + \beta_8 \Delta LTG_{i,t+1} + \beta_9 \Delta LNDISP_{i,t+1} + \beta_{10} \Delta IDRISK_{i,t+1} + \beta_{11} \Delta IndA_{i,t} + \beta_{12} \Delta IndB_{i,t} + \beta_{13} \Delta Inst_{i,t} + \beta_{14} \Delta Auditfee_{i,t} + \text{Year and Industry Indicators} + \varepsilon_{i,t}$$

		Dependent variable: $\Delta COE_{i,t+1}$	
Variables	Pred. sign	Parameter estimate	*t*-statistic
Intercept	+/−	−0.019***	−2.62
$\Delta AuditHR_{i,t}$	-	−0.005**	−2.40
$r\_AF_{i,t+1}$	+/−	0.000	0.56
$\Delta AuditHR_{i,t} * r\_AF_{i,t+1}$	+	0.001***	2.66
$\Delta SIZE_{i,t}$	-	−0.040***	−16.52
$\Delta BETA_{i,t+1}$	+	−0.004	−1.17
$\Delta LEV_{i,t}$	+	0.022	0.88
$\Delta MB_{i,t}$	-	−0.001	−0.98
$\Delta LTG_{i,t+1}$	+	0.002	1.03
$\Delta LNDISP_{i,t+1}$	-	−0.005***	−2.93
$\Delta IDRISK_{i,t+1}$	+	0.036	0.14
$\Delta IndA_{i,t}$	-	−0.002	−0.29
$\Delta IndB_{i,t}$	-	−0.001	−0.07
$\Delta Inst_{i,t}$	-	−0.009	−0.70
$\Delta Auditfee_{i,t}$	+	0.002	0.23
Year fixed		Included	
Industry fixed		Included	
Number of observations		1096	
Adjusted R^2		0.455	

*, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.
Refer to Table 2 for variable definitions.

and Stein 1996). As previously discussed, this decision depends on whether the marginal benefit of the reduction in possible future losses from an additional unit of auditing exceeds the marginal cost of the additional audit investment. The evidence that auditors increase effort to address increased market-perceived information risk implies that they believe they can cost-effectively reduce the market-perceived information risk. Consistent with this interpretation, this study finds that increased audit effort contributes to a reduction in COE.

This study provides important implications for auditors. The reported evidence of the significant association between audit effort and market-perceived information risk reflects the average effect and does not mean that all auditors tailor audit procedures based on their assessment of market-perceived information risk. Some auditors may not respond to the change in investors' perception because of either their ignorance of the importance of such responses or their inability to reduce market-perceived information risk. The evidence of this study emphasises that auditors should address market-perceived information risk and, for this, pay careful attention to the change in market-perceived information risk and adjust audit effort based on the change. This would benefit both auditors themselves and clients by reducing possible future litigation losses and the costs of raising capital. In short, this line of thinking encourages auditors and regulators to look at how well auditors perform judgement tasks and thus helps increase the quality of the auditor judgements.

This study is also useful to researchers who investigate the association between clients' risks and auditors' response. Researchers may find that auditors do not consider a risk factor. This may not necessarily imply auditors' failure to make appropriate audit planning decisions, but rather may indicate that auditors have considered it and concluded that the possibility is low for the audit failure to be perceived by investors; the possibility likely varies with the client's particular characteristics such as its financial condition and composition of investor base.

I acknowledge that the results of this study may suffer from endogeneity or omitted variable bias. I address this issue by using the change model and lead-lag approach, and find that this study's results do not seem to be driven by the reverse causality explanation. However, I do not entirely rule out the possibility that the potential bias from endogeneity and omitted correlated variables such as recent corporate governance changes could have contributed to my regression results.

Notes

1 An audit failure occurs when auditors issue an unqualified opinion on a misstated financial report.

2 This study uses *COE* as a proxy for market-perceived information risk. *COE* represents the rate of return that investors demand as compensation for bearing firm risk and thus reflects the firm risk perceived by investors. Combined with Easley and O'Hara's (2004) finding that information risk is a component of systematic risk that affects COE, *COE* is said to be a good proxy for market-perceived information risk.

3 The following is a brief description of the auditing standards of Korea at the time of the sample period. The Act on External Auditing (AEA) was first enacted in 1980, and statutory audits of financial statements are regulated by the AEA. Under the AEA, all listed companies are required to have their annual financial statements audited by independent certified public accountants. This requirement also applies to all limited liability incorporated companies if a company's total assets at the beginning of the fiscal year exceed 7 billion Korean won or if more than 50% of total outstanding shares are held by local governments. Since 2009, the regulatory limit with respect to firm size has been increased from 7 billion to 10 billion Korean won.

4 Fn-Guide was founded in 2000. It gathers and compiles different estimates made by stock analysts regarding future earnings, sales, revenues and so forth, of Korean firms.

5 When I estimate *k* as equal to 6% of the total assets at the beginning of year *t* instead of estimating it as $DPS_0/FEPS_1$, the results are quite similar.

6 I compute future book values of equity using expected dividend payout ratio and analysts' earnings forecasts based on the clean surplus relation.

7 The results are qualitatively the same when I use each of the *COE* measures.

8 Audit hours are sticky, which raises potential correlated omitted variable concerns.

9 In equation (2), time subscript '*t*' of ΔCOE denotes the end of June in the current year and time subscript '*t*' of other variables denotes the end of the current year. Therefore, the model estimates how the past change in *COE* (ΔCOE) affects the future change in audit hours.

10 The Korean stock market is composed of the Korea Exchange and the KOSDAQ (Korea Securities Dealers Automated Quotation).

11 I use size-, industry- and time-adjusted analyst coverage (Hong et al. 2000; Bowen et al. 2008).

12 In equation (3), time subscript '*t*+1' denotes the end of June of year *t*+1 and time subscript '*t*' denotes the end of year *t*. Therefore, the model estimates how the past change in audit hours affects the future change in COE. Δ*SIZE*, Δ*LEV*, Δ*MB*, Δ*IndA*, Δ*IndB*, Δ*Inst* and Δ*Auditfee* are estimated using data at the end of year *t*, and *r_AF*, Δ*BETA*, Δ*LTG*, Δ*LNDISP*, and Δ*IDRISK* are measured at June of year *t*+1.

13 To mitigate the influence of outliers, I winsorise all variables at the 1% and 99% levels.

14 The sample is divided into high and low analyst coverage groups based on the sample median of *r_AF*.

15 I also find evidence consistent with Hypothesis 2 at the univariate level.

16 When I control for the Big 4 auditor indicator variable, the results are quite similar and its coefficient is insignificant.

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