A Dynamic Partial Adjustment Model of Audit Pricing

Meng-Chun Kao
Department of Finance
Yuanpei University of Science and Technology

Edward Chien-Ting Lin*
Graduate Institute of Finance
National Taiwan University of Science and Technology
Taipei Taiwan
And
University of Adelaide Business School
Adelaide SA Australia
Ed.lin@mail.ntust.edu.tw
Tel: +886-2-2730-1095
Fax: +886-2-2730-3614

Bang-Han Chiu
Department of Finance
Yuan-Ze University

*Corresponding Author

A Dynamic Partial Adjustment Model of Audit Pricing

Abstract

We model audit pricing behavior in a dynamic partial adjustment process whereby audit fees are partially adjusted to target fees over time. The model extends the one-period static model of Simunic (1980) which assumes that audit fees as a function of audit risk and complexity can be immediately and fully adjusted within a single period. Our empirical results show that prior audit fees are an important factor for audit pricing decisions after controlling for well known audit risk and complexity factors. The average adjustment of audit fees appear to be small as prior audit fees account for large variability in audit pricing. Fee adjustment also appears to be asymmetric. The magnitude of an audit fee increase is on average larger than that of an audit fee decline. Audit fees therefore tend to be stickier when auditors lower their fees than when they raise their fees.

***Keywords**:* Audit pricing, partial adjustment, audit fees, audit risk, and audit complexity
JEL Classification: M42

1. Introduction

Audit fees are generally presumed to reflect the value brought to clients by auditors who perform relevant audit activities for a profit that is subject to an acceptable level of audit risk. However, actual audit fees may not reach immediately to the auditor's target fees but rather partially adjust towards them over time. This behavior of auditing pricing may be described by DeAngelo (1981a) as quasi-rents extracted by auditors over the expected duration of an auditor-client relationship. Incumbent auditors capture quasi-rents because client-specific start-up costs and switching auditor costs borne by clients are significant.

Standard economic theory also contends that price tends to be sticky in a market of imperfect competition and information (see Blinder et al. 1998). As audit services market tends to be oligopolistic (Chan (1999), and Hackenbrack and Hogan (2005)), Ferguson et al. (2005) suggest that such imperfect competition underlies rigidity in audit fees.

While auditors may impose economic power over clients in the pricing of audit services due to imperfect market, each party in reality can impose real costs on the other by termination. Auditors may risk losing clients when making a large positive price adjustment. Audit fees however are also less likely to make large downward as the

probability of auditors facing losses increases. Furthermore, since Securities Exchange Commissions (SEC) imposes mandatory disclosures in 2000, France and Wang (2005) suggest that auditors and clients may readily compare fees for similar audit engagements and subsequently renegotiate prices based on new information. Therefore, although differential bargaining power may lead to different outcomes of subsequent price adjustment, the nature of the audit-client relationship in a bilateral monopoly ultimately causes audit fees to be sticky.

Against this backdrop, prior audit fees may arguably provide an anchor for audit pricing decisions. To price audit activities for a new engagement, auditors, whether acting as incumbents or competitors, would refer to prior audit fees as an important input to their pricing decisions. Taking prior audit fees into account is also arguably a good practice as it may facilitate auditors in evaluating client-related risks and therefore possible losses due to potential future litigation and underestimated audit effort. Auditors can also effectively accumulate information about financial conditions of their clients from prior audit fees.

Few prior audit pricing studies to our knowledge have addressed if and the extent to which prior audit fees affect audit pricing in the current and following periods. For example, Francis and Simon (1987, 1988), O'keefe et al. (1994), Simunic and Stein

(1996), Bell et al. (2001), Seetharaman et al. (2002), Ferguson and Stoke (2002), Lyon and Maher (2005), Huang et al. (2007), Choi et al. (2008) and Huang et al. (2009) analyze various audit fee-related issues using cross sectional data but do not take into account the time-series effect of prior audit fees. Their empirical investigations are largely built on the one-period static audit pricing framework of Simunic (1980).

Coupled with the lack of audit fee data due to client-auditor confidentiality and earlier non-disclosure rules, prior studies may encounter difficulty in examining if prior audit fees play an important role in audit pricing.[1] In an attempt to overcome these limitations, Anderson and Zeghal (1994) and Seetharaman et al. (2002) control for time fixed effect using a dummy variable for each specific year, and Chou and Lee (2003, 2005) construct panel data that consists of ten companies from 1984 to 1998. However, none of these studies address the effect of time-dependent explanatory variables such as those of prior audit fees.

In this study, we propose a dynamic partial adjustment process for audit pricing by incorporating prior audit fees as a lagged explanatory variable along with client size, auditor size, industry specialization, audit complexity-related, and audit risk-related factors. The model explicates that actual price adjustment is incremental within each

[1] After Securities and Exchange Commission's mandated fee disclosure requirements (SEC, 2000), auditors can obtain more information about prior audit fees with the publicly available information without paying high search cost.

period that causes a difference between actual price adjustments and expected ones. Based on the adjustment framework, the extent of adjustment can then be estimated.

We test the partial adjustment model using a sample of 6,688 firm-year observations of U.S. firms from 2000 to 2005. We pool the data and include prior audit fees as time-dependent explanatory variables. Our empirical analysis shows that the relation between consecutive audit fees is positive and prior audit fees play an important role in explaining current audit fees in the presence of other well known audit pricing determinants. Prior audit fees appear to be the most robust factor irrespective to how we modify the dynamic audit pricing model. The findings suggest that auditor pricing behavior can be characterized by a partial adjustment process of prior audit fees.

The remainder of this study is organized as follows. Section 2 reviews prior audit pricing studies in the literature. Section 3 introduces the dynamic model of audit pricing. Section 4 discusses the sample and its summary statistics while section 5 presents the empirical results of the model. We conclude the paper in section 6.

2. Literature Review

2.1 The Basic Audit Pricing Model

Simunic (1980) first develops a one-period audit fee model which relates audit fees to factor costs and audit risk. When the market for audits is competitive, an auditor's minimum cost of supply per unit of quantity of resources in performing an audit is its marginal cost. Furthermore, an auditor incurs risk for performing an audit with some expected future loss. Therefore, at different levels of audit quantity, the minimum audit fees should equal to the incremental expected total cost,

$$E(C) = cq + E(d)E(\theta) \tag{1}$$

where c is the per-unit factor cost of external audit resources which include all opportunity costs and a provision for a normal profit, q is the quantity of resources utilized by the auditor in performing the audit examination, $E(d)$ is the expected present value of possible future losses which may arise from this period's audited financial statements, and $E(\theta)$ is the likelihood that the auditor will have to pay for the losses for this period's audited financial statements.

According to the model, an auditor's total cost function consists of a resource cost component, cq, that increases with the level of audit effort and an expected liability loss component, $E(d)\ E(\theta)$, that tends to decrease with audit effort. Algebraically,

$E(d) = f(cq)$ where $f_{cq} < 0$. The auditor's assessment of the loss function should also be influenced by client-specific factors. For a given legal regime, client-specific characteristics that might affect the assessment of the loss function include firm size, complexity of operations, asset structure, and if the client is a publicly held firm.

2.2 Determinants of Auditing Pricing

Since the seminal work of Simunic (1980) on audit pricing, there have been numerous studies exploring determinants of audit fees based on the structural framework. They can generally be categorized into measures of client size, audit complexity, audit risk and auditor size. Client size is related to audit fees as larger firms tend to require more audit effort due to its size and complexity. Proxies for audit complexity however may also include the number of subsidiaries, the proportion of foreign sales, and the asset composition (See Francis and Simon (1987, 1988), Turpen (1990), Seetharaman et al. (2002), Gul et al. 2003), Abbott et al. (2003), Chou and Lee (2003), Lyon and Maher (2005)).

For audit risk, Francis and Stokes (1986) and Craswell et al. (1995) find that financial leverage is correlated with audit fees when a qualified opinion is received. Simunic and Stein (1996) suggest that financial leverage serves as a good proxy for

litigation risk and document that audit fees increase with firms of higher leverage. Operating profit or loss reported by Turpen (1990) is another important factor for audit pricing. Bell et al. (2001) show that audit fees are correlated with perceived business risk of clients proxied by earnings. Other studies such as Ferguson and Stokes (2002), France and Wang (2005), Choi et al. (2008), and Huang et al. (2009) also include gains or losses, return on assets, and leverage to measure client-specific risks borne by auditors.

Finally, Anderson and Zeghal (1994) identify that audit fees are aligned with the value of Big eight reputation. Craswell et al. (1995), DeFond et al. (2000), and Asbbaugh et al. (2003) further document that Big auditors earn higher audit fees than non-Big auditors due to different audit quality. Choi et al. (2008) suggest that fee premium is increasing as the difference between the legal liabilities of Big and non-Big auditors becomes larger.[2]

3. A Partial Adjustment Model of Audit Pricing

Economic behavior often involves in lags of adjustment towards the expected level. Due to market frictions, the gap between the actual and desired levels cannot be

[2] Huang et al. (2009) find that "low balling" is less likely in the post Sarbane-Oxley period for Big 4 auditors.

closed immediately. In the context of audit pricing, an auditor may price audit services based partially on prior audit fees and current information of relevant factors. Incorporating prior audit fees in addition to other determinants may therefore improve the performance of audit pricing models. To this end, we develop a partial adjustment model that relates inter-temporal audit fees with static audit pricing models in a dynamic form.

First, the target level of audit fee p_t^* can be expressed as

$$p_t^* = \alpha + \sum_{i=1}^{n} \beta_i x_{i,t} + \varepsilon_t \tag{1}$$

where p_t^* is the target value of audit pricing at time t, $x_{i,t}$ is the explanatory variable i at time t, and ε_t is the error term a time t. Since audit fees are adjusted partially towards the target level within a given period, the adjustment process can be modeled as follows,

$$\begin{aligned} p_t - p_{t-1} &= (1-\lambda)(p_t^* - p_{t-1}) \\ &= (1-\lambda) p_t^* - (1-\lambda) p_{t-1} \end{aligned} \tag{2}$$

where $(1-\lambda)$ is the adjustment coefficient and $1/(1-\lambda)$ is the speed of adjustment.

Simplifying equation 2 leads to,

$$p_t = (1-\lambda)p_t^* + \lambda p_{t-1} \tag{3}$$

Substituting p_t^* from equation 1 yields,

$$\begin{aligned} p_t &= \alpha(1-\lambda) + (1-\lambda)\sum_{i=1}^{n}\beta_i x_{i,t} + \lambda p_{t-1} + (1-\lambda)\varepsilon_t \\ &= \alpha' + \sum_{t=1}^{n}\beta_i' x_{i,t} + \lambda p_{t-1} + \varepsilon' \end{aligned} \tag{4}$$

where $\alpha' = \alpha(1-\lambda), \beta' = \beta(1-\lambda)$, and $\varepsilon' = \varepsilon(1-\lambda)$. It is important to note that when $\lambda = 0$, equation 4 is reduced to the Simunic's (1980) one-period audit pricing model. It indicates that auditors are free to adjust audit fees to the expected level within a given period. In contrast, when $\lambda > 0$, audit fees not only incorporate the current information of clients but also adjust from prior audit fees. It implies that auditors cannot adjust audit fees arbitrarily.

Finally, we include the following well known explanatory variables in equation 4 as discussed in Section 2. Client size is measured by the natural logarithm of total assets which has been documented as an important variable in determining audit fees. Account receivables, inventory, number of subsidiaries and the extents of overseas activities are proxies for client operating complexity. For audit risk, we include debt ratio, quick ratio, audit opinion, losses, and return on assets. Auditor size and client industry classification are also included in the model. A dummy variable is added to control for Big 4 audit firms versus other audit firms. Equation 4 therefore becomes,

$$\begin{aligned} LnFEE_{it} = {} & \alpha + \beta_1 LnASSET_{it} + \beta_2 SUBs_{it} + \beta_3 FROGN_{it} + \beta_4 RECV_{it} + \beta_5 INV_{it} + \\ & \beta_6 ACQDIV_{it} + \beta_7 LOSS_{it} + \beta_8 DE_{it} + \beta_9 ROA_{it} + \beta_{10} QRATIO_{it} + \beta_{11} OPIN_{it} + \beta_{12} TIME_{i_t} \\ & + \beta_{13} DIVERS_{it} + \beta_{14} BIG_{i_t} + \beta_{15} LnFee_{t-1} + e_{it} \end{aligned} \quad (5)$$

where the subscripts i and t denote firm i at time t, $LnFEE_{it}$ is the natural log of audit fee, $LnASSET_{it}$ is the natural log of firm asset, $SUBs_{it}$ is the number of subsidiaries of the audited firm, $FROGN_{it}$ is the ratio of foreign sales to total sales at year-end, $RECV_{it}$ is the ratio of account receivable to total assets, INV_{it} is the ratio of total inventory to total assets, $ACQDIV_{it}$ is a dummy variable that equals to 1 if the firm acquired or sold an associate or a subsidiary and 0 otherwise, $LOSS_{it}$ is a dummy variable that equals to 1 if client incurred loss in any of last three fiscal years and 0

otherwise, DE_{it} is the ratio of long-term debt to total assets, ROA_{it} is the return on assets which is the ratio of net income after interest and taxes to total assets, $QRATIO_{it}$ is the ratio of quick assets to current liabilities, $OPIN_{it}$ is a dummy variable that equals to 1 if a modified opinion is issued and 0 otherwise, $TIME_{it}$ is a dummy variable that equals to 1 if clients change auditors and 0 otherwise, $DIVERS_{it}$ is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, and BIG_{it} is a dummy variable that equals to 1 if auditor is Big 4 and 0 otherwise.

4. Sample and Descriptive Statistics

To provide investors with more information about auditor and client relationship, the Securities and Exchange Commission (SEC, 2000) issued "Final Rule" to request public disclosure of audit, financial information system design and implementation, and other information in proxy statements filed on or after February 5, 2001. Our sampling period therefore begins from the required disclosure of audit fees in 2000 to 2005. We obtain audit fees from the Audit Analytics database. All other financial data is obtained from Compustat. We exclude firms with missing audit fees and relevant financial statement information. Our final sample ranges from 681 in 2000 to 2,118 in 2005 with a total of 6,688 firm-year observations.

Table 1 reports the descriptive statistic of the sample from 2000 to 2005. Panel A shows that the average total assets of in our sample firms are $4,426 million. However, the median assets amount to only $485 million. The large difference between the average and the median total assets indicate that some of our sample firms are much larger than the majority of their counterparts. The average (median) audit fees increase from $1.478 million ($0.464 million) to $1.944 million ($0.694 million) over for a year during the sample period. Again, the much smaller median audit fees may reflect a large difference in firm size.

Both total assets and audit fees show a large variability across the sample firms, suggesting that various factors may play an important role in pricing audit services. One surprising figure is return on assets (ROA) where the average is -3.4 percent. Given that the median ROA is 3.3 percent, there seems to be some large losses among the sample firms. The average (median) firm however carries little debt as shown in the average (median) debt to equity ratio (D/E) of 30 percent (19.8 percent).

Panel B of Table 1 reports the average (median) values for the dummy variables. A small number of firms (15.8 percent) change the number of their subsidiaries. Consistent with a negative average ROA reported earlier, 42 percent of the firms incurred losses at least for a year over the sample period. As expected, a majority of 62

percent of firms received unqualified opinion from their auditors and 90 percent of the firms stay with the same auditors who tend to be a Big 4 auditor (84 percent).

5. Empirical Results

We first investigate the correlations among the explanatory variables. As shown in Table 2, prior audit fees are weekly correlated with all audit pricing determinants except with the firm's total assets where the correlation coefficient is 0.403. The correlation result is in line with our preliminary statistics where firm size is closely related to audit fees. If audit fees are serially correlated, firm size and prior audit fees should also be correlated. Across different explanatory variables, the correlations are low. The highest correlation among them is -0.356 between ROA and Loss. To ensure that multicollinearity is not a problem in our regression analysis, we estimate the variance inflation factors (VIF) for all independent variables. We find that all VIFs are well below 5, indicating that no significant collinearity exists among them.

5.1 Regression Results

Next, we examine the effect of prior audit fees and estimate their adjustment coefficients in stages. First, we regress audit fees on its prior audit fees along with

explanatory variables of audit complexity and then with variables of audit risk. Audit complexity factors include number of subsidiaries ($SUBs_{it}$), the ratio of foreign sales to total sales ($FROGN_{it}$), the ratio of account receivable to total assets ($RECV_{it}$), the ratio of total inventory to total assets (INV_{it}), and if audited firm acquired or sold an associate or a subsidiary ($ACQDIV_{it}$). For audit risk factors, they are earning losses ($LOSS_{it}$), the ratio of long-term debt to total assets (DE_{it}), return on assets (ROA_{it}), the ratio of quick assets to current liabilities ($QRATIO_{it}$), audited opinion ($OPIN_{it}$), and changed auditors ($TIME_{it}$). We further control for the diversification of audited firms ($DIVERS_{it}$) with the number of two-digit Standard Industrial Classification (SIC) codes in which the audited firms operate. The diversification measure can be treated as a factor for both audit complexity and audit risk since a more diversified firm is more complex but is also with less diversifiable risk. We also control for the type of auditors in terms of Big 4 versus non-Big 4 auditors (BIG_{it}).

Table 4 shows the regression results of audit complexity factors and audit risk factors separately from 2001 to 2005. Prior audit fees ($LnFEE_{it-1}$) are significant for each year in the presence of audit complexity factors (first column under each year). It seems audit fees are sticky as the coefficients range between 0.646 and 0.789 with the exception in 2002 when the Enron scandal caused Arthur Andersen to collapse. As a

result, the low coefficient of 0.064 for $LnFEE_{it-1}$ in 2002 may be driven by the 'low balling' effect since other auditors tend to scramble to win over former Arthur Andersen clients. Therefore, prior audit fees are less influential to audit pricing and the adjustment process of audit fees is perhaps distorted. Correspondingly, the lower adjusted R^2 in 2002 may reflect the lack of explanatory power of prior audit fees. Nevertheless, the overall results over the years suggest that partial adjustment of prior audit fees to the expected level is small (i.e. with large λ).

Firm size as measured by total assets ($LnASSET_{it}$) is perhaps another important factor in pricing audit services. Larger firms are related to higher audit fees. Big-4 auditors also charge higher fees, *ceteris paribus*. However, while audit complexity factors have correct positive signs (higher audit complexity is related to higher audit pricing), they do not exhibit consistent and significant impact on audit pricing.

We find similar results with audit risk factors (second column under each year). $LnFEE_{it-1}$ remains important in explaining audit pricing for each year although the effect is again less influential in 2002. A comparison of the coefficients of $LnFEE_{it-1}$ between the two sets of explanatory variables (column 1 and 2 of each year) shows that the extent of the impact of prior audit fees is largely unaffected by what types of control variables we add in the regression tests. It suggests that prior audit fees explain

variations in audit pricing that is not captured by either audit complexity factors or audit risk factors. These results also apply to $LnASSET_{it}$ which continues to be important for audit pricing throughout the years. On the contrary, the effect of 6 audit risk factors is year-specific and therefore is not as robust as prior audit fees and firm size.

Sequel to the initial analysis, we include all factors related to audit complexity and audit risk in the regressions. Table 4 shows that the effect of $LnFEE_{it-1}$ on audit pricing mirrors those reported in Table 3. Its coefficients vary from 0.646 to 0.786 except in 2002 when the coefficient drops to 0.059. Our results therefore confirm that prior audit fees are the most influential factor in pricing audits the way in which auditors adjust their audit fees towards the target level in a dynamic but slow manner.

Consistent with earlier results, firm size plays an important role in pricing audit services. Our results further show that while prior audit fees and firm size are both important, they tend to complement each other's impact on audit pricing. Relative to 2002, the economic significance of prior audit fees are larger in all the other years when the significance of firm size is smaller. It implies that when prior audit fees could not serve as a reference for pricing audits as in the case of 2002, firm size becomes a more important reference for audit pricing.

Other notable pricing factors include Big-4 auditors who tend to charge higher audit fees. Firms operating in more industries ($DIVERS_{it}$), with higher proportion of account receivables ($RECV_{it}$), or after modified opinion is issued also incur higher audit fees in 2 or 3 out of 5 years. In contrast, profitable firms (ROA_{it}) which imply lower audit risk pay lower audit fees. Based on our results, a parsimonious model that includes prior audit fees, firm size, auditor type, firm diversification, percentage of account receivables, and return on assets is sufficient to explain the behavior of audit pricing.

5.2 The asymmetric effect of prior audit fees

Following our results that prior audit fees are an influential factor in pricing audit services, we examine if the extent of the impact varies with the direction of audit fee adjustment. We introduce a dummy variable *D* that indicates one if audit fees increase from prior fees and zero otherwise. An interaction term of the dummy variable with each of the explanatory variables is also added. We further modify the audit pricing model in equation 5 into a more parsimonious model based on our regression results reported in Table 4,

$$LnFEE_{it} = \alpha + \beta_1 LnFee_{t-1} + \beta_2 LnASSET_{it} + \beta_3 DIVERS_{it} + \beta_4 RECV_{it} + \beta_5 ROA_{it} + \beta_6 BIG_{it} + \beta_7 D_{it} + \beta_8 D_{it} * LnFee_{t-1} + \beta_9 D_{it} * LnASSET_{it} + \beta_{10} D_{it} * DIVERS + \beta_{11} D_{it} * RECV_{it} + \beta_{12} D_{it} * ROA_{it} + \beta_{13} D_{it} * BIG_{it} + e_{it} \quad (6)$$

where *D* is the dummy variable that equals to one if audit fees increase from prior fees and zero otherwise. Other variables are defined as in equation 5.

Table 5 reports the regression results according to equation 6. In addition to the importance of prior audit fees ($LnFEE_{it-1}$), their impact on audit pricing appears to be asymmetric. Except for 2001, the interaction term $D_{it} * LnFEE_{it-1}$ is negative and significant. It shows that adjustment coefficient ($1-\lambda$) is larger for upward adjustment than for downward adjustment. Auditors may therefore be more willing to deviate from prior audit fees when increasing their current audit fees but less so when it comes to reducing audit fees.

Our results are in line with Dye (1991) who contends that lower fees are a signal of lower audit quality and hence auditors are reluctant to cut audit fees. Furthermore, an audit pricing constraint may be imposed by the audit's marginal cost. A price floor therefore limits the extent of reduction in audit pricing from prior audit fees. As such, partial downward price adjustments tend to be less than partial upward adjustments. In any case, both price adjustments are partial that do not fully reflect market conditions and differential bargaining power of auditors and clients. Our findings also support the

audit-client relationship in a bilateral monopoly suggested by DeAngelo (1981b) that imposes rigidity in audit fee adjustment.

On the contrary, we do not find other determinants exhibit strong asymmetric impact on audit pricing. The effect of return on assets (ROA) is limited to three out of five years. Higher ROA is related to lower audit fees to a greater extent than lower ROA to higher audit fees. Auditors seem to fully price audit risk and tend to reduce more fees when audit risk is perceived to decline than raising fees when risk increases. Firm diversification ($DIVERS_{it}$) and account receivables ($RECV_{it}$) in audit complexity measures however show little relation with audit fees.

6. Conclusion

We develop a dynamic partial adjustment structure of audit pricing that incorporates prior audit fees as an explanatory variable for an auditor's pricing behavior. In particular, audit pricing follows a partial adjustment process that moves towards target fees over time. Such depiction of audit pricing behavior is more realistic than the one-period static model of Simunic (1980) as auditors are not free to adjust audit fees immediately and fully to target fees based on audit risk and audit complexity. The one-period static model can therefore been seen as a special case of our multi-period

dynamic partial adjustment model. Our theoretical approach in developing the model is also consistent with audit pricing rigidity behavior suggested by DeAngelo (1981b) in a bilateral monopoly setting. Each party can impose a real cost on the other by termination. Subsequent audit fees therefore tend to be sticky over the expected duration of an audit-client relationship. Furthermore, audit pricing anchored by prior audit fees is intuitive because auditors often refer to prior fees as a crucial input to their pricing decisions.

Our empirical results support the partial adjustment process in audit pricing. Prior audit fees are consistently the most influential factor in capturing variability in audit fees. The importance of prior audit fees remains robust in the presence of well known audit risk and complexity factors. With the exception of 2002 when Arthur Andersen collapsed, the adjustment towards target fees tends to be small as prior audit fees account for a large portion of current audit fees. For other explanatory variables, only client size is consistently important for pricing audit services.

Our results further show that audit fee adjustment is asymmetric. Audit fees tend to be less sticky when auditors raise audit fees than when they reduce audit fees. The magnitude of average fee increase is larger than that of average fee decline. It implies that auditors are less willing to reduce audit fees than to increase audit fees. Hence, our

findings support the notion that audit fees behave like quasi-rents extracted by auditors in an auditor-client relationship over a number of periods.

References

Abbott, L.J., S. Parker, G.F. Peters, and K. Raghunandan (2003), "The association between audit committee characteristics and audit fees", *Auditing: A Journal of Practice and Theory*, Vol. 22, No. 2, p. 17-32.

Anderson, T., and D. Zeghal (1994), "The pricing of audit services: further evidence from the Canadian market", *Accounting and Business Research*, Vol. 24, No. 95, p. 195-207.

Asbbaugh, H., R. LaFond, and B. Mayhew (2003), "Do non-audit services compromise auditor independence? further evidence", *The Accounting Review*, Vol. 78, No. 3, p. 611-39.

Bell, T. B., W. R. Landsman, and D. A. Shackelford (2001), "Auditor's perceived business risk and audit fees: analysis and evidence", *Journal of Accounting Research*, Vol. 39, No. 1, p. 35-43.

Blinder, A.S., E. R. D. Canetti, D. E. Lebow, and J. B. Rudd, (1998) *Asking about prices: a new approach to understanding price stickiness*, New York: Russell Sage Foundation.

Chan, D. K. (1999), ""Low-balling" and efficiency in a two-period specialization model of auditing competition", *Contemporary Accounting Research*, Vol. 16, No. 4, p. 609–642.

Choi, J. H., J. B. Kim, X. H. Liu, and D. A. Simunic (2008), "Audit pricing, legal liability regimes, and Big 4 premiums: theory and cross-country evidence", *Contemporary Accounting Research*, Vol. 25, No. 1, p. 55-99.

Chou, W. L., and D. S. Y. Lee (2003), "Cointegration Analysis of Audit Pricing Model: A Panel Unit Root Test Approach", *Journal of Business Finance and Accounting*, Vol. 30, Iss. 7, p. 1141-1164.

Chou, W. L., and D. S. Y. Lee (2005), "Panel cointegration analysis of audit pricing model", *Review of Quantitative Finance and Accounting*, Vol. 24, p. 423-439.

Craswell, A. T., J. R. Francis, and S. L. Taylor (1995), "Auditor brand name reputations and industry specializations", *Journal of Accounting and Economics,* Vol. 20, p. 297-322.

DeAngelo, L. E. (1981a), "Auditor Independence, "Low-balling," and Disclosure Regulation", *Journal of Accounting and Economics,* Vol. 3, p. 113-127.

DeAngelo, L. E. (1981b), "Auditor size and audit quality", *Journal of Accounting and Economics,* Vol. 3, p. 183-199.

DeFond, M. L., F. R. Francis, and T. J. Wong (2000), "Auditor industry specialization and market segmentation: evidence from Hong Kong", *Auditing: A Journal of Practice &Theory,* Vol. 19, No. 1, p. 49-66.

Dye, R. A. (1991), "Informationally motivation auditor replacement", *Journal of Accounting and Economics,* Vol. 14, p. 347-374.

Ferguson, A. and D. Stokes (2002), "Brand name audit pricing, industry specialization, and leadership premiums post-Big 8 and Big 6 mergers", *Contemporary Accounting Research,* Vol. 19, No. 1, p. 77-110.

Ferguson, A., C. Lennox, and S. Taylor (2005) 'Audit fee adjustments in the presence of nominal rigidities: evidence and explanations', *Working Paper*, University of New South Wales.

Francis, J. R., and D. Wang (2005), "Impact of the sec's public fee disclosure requirement on subsequent period fees and implications for market efficiency", *Auditing: A Journal of Practice & Theory*, Vol. 24, Supplement, p. 145-160.

Francis, J. R., and D. J. Stokes (1986), "Audit prices, product differentiation, and scale economies: further evidence from the Australian market", *Journal of Accounting Research*, Vol. 24, No. 2, p. 383-393.

Francis, J. R., and D. T. Simon (1987), "A test of audit pricing in the small-client segment of the U.S. audit market", *The Accounting Review*, Vol. 62, No. 1, p. 145-157.

Gul, F. A., C. J. P. Chen, and J. S. L. Tsui (2003), "Discretionary accounting accruals, managers' incentives, and audit fees", *Contemporary Accounting Research*, Vol. 20, No. 3, p. 441-464.

Hackenbrack, K., and C. Hogan (2005), "Client retention and engagement–level pricing", *Auditing: A Journal of Practice & Theory*, Vol. 24, No. 1, p. 7–20.

Huang, H. W., L. L. Liu, K. Raghunnandan, and D. V. Rama (2007) "Auditor industry specialization, client bargaining power, and audit pricing", *Auditing: A Journal of Practice & Theory*, Vol. 26, No. 1, p. 147-158.

Huang, H. W., K. Raghunnandan, and D. Rama (2009), "Audit fees for initial audit engagements before and after SOX", *Auditing: A Journal of Practice & Theory*, Vol. 28, No. 1, p. 171-190.

Lyon, J. D. and M. W. Maher (2005), "The importance of business risk in setting audit fees: evidence from cases of client misconduct", *Journal of Accounting Research*, Vol. 43, No. 1, p. 133-151.

O'keefe, T., D. A. Simunic and M. T. Stein (1994), "The production of audit services: evidence from a major public accounting firm", *Journal of Accounting Research*, Vol. 32, No. 2, p. 241-261.

Seetharaman, A., F. A. Gul, and S. G. Lynn (2002), "Litigation risk and audit fees: evidence from U.K. firms cross-listed on U.S. markets", *Journal of Accounting & Economics*, Vol. 33, Iss. 1, p. 91-115.

Simon, D.T., and J.R. Francis (1988), "The effects of auditor change on audit fees: tests of price cutting and price recovery", *The Accounting Review*, Vol. 63, No. 2, p. 255-269.

Simunic, D. A. (1980), "The pricing of audit services: theory and evidence", *Journal of Accounting Research*, Vol. 18, No. 1, p. 161-190.

Simunic, D. A., and M. T. Stein (1996), "The impact of litigation risk on audit pricing: a review of the economics and the evidence", *Auditing: A Journal of Practice & Theory*, Vol. 15, Supplement, p. 119-134.

Turpen, R. A. (1990), "Differential pricing on audit initial engagements: further evidence", *Auditing: A Journal of Practice & Theory*, Vol. 9, Iss. 2, p. 60-76.

Table 1

Descriptive Statistics of the Sample

This table reports the descriptive statistics of 2,118 sample firms. *LnFEE* is the natural logarithm of total audit fees; *SUBs* is the number of subsidiaries, *DIVERS* is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, *FROGN* is the ratio of foreign sales to total sales at year-end, *RECV* is the ratio of account receivable to total assets, *INV* is the ratio of total inventory to total assets, *DE* is the ratio of long-term debt to total assets, *ROA* is the ratio of net income after interest and taxes to total assets, *QRATIO* is the ratio of quick assets to current liabilities, *ACQDIV* is the dummy variable that takes the value of 1 if the firm has acquired or sold an associate or subsidiary and 0 otherwise, *LOSS* is the dummy variable that takes the value of 1 if client incurred loss in a year over the sample period and 0 otherwise, *OPIN* is the dummy variable that takes the value of 1 if a modified opinion is issued, and 0 otherwise, *TIME* is the dummy variable that takes the value of 1 if clients change auditors and 0 otherwise, *ASSET* is the natural logarithm of total assets, *BIG* is the dummy variable that takes the value of 1 if the auditor is a Big 4 and 0 otherwise.

Panel A: Descriptive Statistics for Continuous Variables

Variables	Mean	Median	Std. dev
$TOTALFEE_t$ (in $000s)	1,944.562	694.000	4,144.362
$TOTALFEE_{t-1}$ (in $000s)	1,478.114	464.631	3,440.021
ASSET($Million)	4,426.736	485.300	16,591.866
SUBs	2.562	2.000	1.738
DIVERS	42.067	36.000	18.187
FROGN	0.403	0.353	0.297
RECV	0.159	0.143	0.103
INV	0.114	0.091	0.109
DE	0.305	0.198	1.473
ROA	-0.034	0.033	0.357
QRATIO	2.188	1.355	2.665

Panel B: Mean, Median, and Frequencies of Dummy Variables

Variables	Number of Firms with the dummy variable equals to 1	Number of Firms with the dummy variable equals to 0	Percentage of firms with the dummy variable equals to 1	Percentage of firms with the dummy variable equals to 0
ACQDIV	1,062	5,626	15.88%	84.12%
LOSS	2,808	3,880	41.99%	58.01%
OPIN	2,524	4,164	37.74%	62.26%
TIME	727	5,961	10.87%	89.13%
BIG	5,605	1,083	83.81%	16.19%

Table 2: The Correlation Matrix

This table presents Pearson's correlations between the explanatory variables. $LnFEE_{t-1}$ is the natural log of audit fees in prior year, $LnAsset$ is the natural log of total assets, $SUBs$ is the number of subsidiaries of the audited firm, $DIVERS_{it}$ is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, $FROGN_{it}$ is the ratio of foreign sales to total sales at year-end, $RECV_{it}$ is the ratio of account receivable to total assets, INV_{it} is the ratio of total inventory to total assets, $ACQDIV_{it}$ is a dummy variable that equals to 1 if the firm acquired or sold an associate or a subsidiary and 0 otherwise, $LOSS_{it}$ is a dummy variable that equals to 1 if client incurred loss in any of last three fiscal years and 0 otherwise, DE_{it} is the ratio of long-term debt to total assets, ROA_{it} is the return on assets which is the ratio of net income after interest and taxes to total assets, $QRATIO_{it}$ is the ratio of quick assets to current liabilities, $OPIN_{it}$ is a dummy variable that equals to 1 if a modified opinion is issued and 0 otherwise, $TIME_{it}$ is a dummy variable that equals to 1 if clients change auditors and 0 otherwise, and BIG_{it} is a dummy variable that equals to 1 if auditor is Big 4 and 0 otherwise.

	$LnFEE_{t-1}$	$LnAsset$	$SUBs$	$DIVERS$	$FROGN$	$RECV$	INV	$ACQDIV$	$LOSS$	DE	ROA	$QRATIO$	$OPIN$	$TIME$	BIG
$LnFEE_{t-1}$	1	0.403	0.141	0.018	0.064	-0.015	-0.076	0.021	0.089	-0.028	0.117	-0.101	-0.131	-0.070	0.079
$LnAsset$		1	0.151	-0.054	0.006	-0.067	-0.021	0.022	-0.034	0.024	0.059	-0.096	-0.122	-0.024	0.078
$SUBs$			1	-0.088	-0.047	0.036	-0.014	0.276	-0.149	0.033	0.113	-0.222	0.152	-0.054	0.118
$DIVERS$				1	-0.114	0.126	-0.271	0.028	0.080	-0.029	-0.071	0.039	-0.035	0.043	-0.047
$FROGN$					1	-0.032	-0.087	0.013	0.052	-0.005	-0.012	0.069	-0.040	0.019	-0.008
$RECV$						1	0.270	-0.014	-0.050	-0.005	0.054	-0.214	-0.029	0.036	-0.128
INV							1	-0.047	-0.063	0.007	0.042	-0.204	-0.026	0.004	-0.094
$ACQDIV$								1	0.027	0.007	-0.011	-0.058	0.051	-0.022	0.016
$LOSS$									1	0.019	-0.356	0.104	-0.023	0.048	-0.122
DE										1	0.001	-0.070	0.066	0.002	0.012
ROA											1	-0.012	-0.022	-0.044	0.073
$QRATIO$												1	-0.153	0.008	-0.005
$OPIN$													1	-0.024	0.133
$TIME$														1	-0.255
BIG															1

Table 3. Regression Results of Audit Pricing on Audit Complexity and Audit Risk Factors

This table presents the results of regressions of audit fees on prior year's audit fees with either audit complexity factors or audit risk factors. $LnFEE_{t-1}$ is the natural log of audit fees in prior year, $LnAsset$ is the natural log of total assets, $SUBs$ is the number of subsidiaries of the audited firm, $DIVERS_{it}$ is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, $FROGN_{it}$ is the ratio of foreign sales to total sales at year-end, $RECV_{it}$ is the ratio of account receivable to total assets, INV_{it} is the ratio of total inventory to total assets, $ACQDIV_{it}$ is a dummy variable that equals to 1 if the firm acquired or sold an associate or a subsidiary and 0 otherwise, $LOSS_{it}$ is a dummy variable that equals to 1 if client incurred loss in any of last three fiscal years and 0 otherwise, DE_{it} is the ratio of long-term debt to total assets, ROA_{it} is the return on assets which is the ratio of net income after interest and taxes to total assets, $QRATIO_{it}$ is the ratio of quick assets to current liabilities, $OPIN_{it}$ is a dummy variable that equals to 1 if a modified opinion is issued and 0 otherwise, $TIME_{it}$ is a dummy variable that equals to 1 if clients change auditors and 0 otherwise, and BIG_{it} is a dummy variable that equals to 1 if auditor is Big 4 and 0 otherwise. * and ** denote statistical significant level at the 5 and 1 percent level respectively.

	2001		2002		2003		2004		2005	
Intercept	-1.216** (0.000)	-1.534** (0.000)	-4.340** (0.000)	-4.101** (0.000)	0.358** (0.000)	0.598** (0.000)	-0.381** (0.030)	-0.508** (0.004)	-1.020** (0.000)	-1.019** (0.000)
$LnFEE_{t-1}$	0.717** (0.000)	0.698** (0.000)	0.064** (0.005)	0.062** (0.003)	0.798** (0.000)	0.788** (0.000)	0.800** (0.000)	0.793** (0.000)	0.658** (0.000)	0.656** (0.000)
LnAsset	0.146** (0.000)	0.170** (0.000)	0.464** (0.000)	0.479** (0.000)	0.116** (0.000)	0.110** (0.000)	0.096** (0.000)	0.104** (0.000)	0.162** (0.000)	0.169** (0.000)
SUBs	0.009 (0.325)	--	0.063** (0.001)	--	0.008 (0.270)	--	0.014 (0.072)	--	0.003 (0.609)	--
DIVERS	0.001 (0.693)	0.001 (0.411)	0.005** (0.001)	0.004** (0.001)	0.001** (0.049)	0.002** (0.002)	0.001 (0.142)	0.001 (0.427)	0.002** (0.002)	0.002** (0.001)
FROGN	0.056 (0.417)	--	0.226* (0.019)	--	0.042 (0.320)	--	0.085* (0.038)	--	-0.014 (0.677)	--
RECV	0.035 (0.819)	--	0.972** (0.000)	--	0.179 (0.174)	--	0.136 (0.316)	--	0.374** (0.001)	--
INV	0.110 (0.489)	--	0.394 (0.090)	--	0.187 (0.196)	--	0.099 (0.437)	--	0.019 (0.863)	--
ACQDIV	0.051 (0.286)	--	0.104 (0.158)	--	0.021 (0.528)	--	0.076* (0.035)	--	0.015 (0.586)	--
LOSS	--	0.068* (0.021)	--	0.139** (0.009)	--	0.022 (0.429)	--	0.029 (0.483)	--	0.007 (0.740)
DE	--	0.030 (0.094)	--	0.010 (0.196)	--	0.063* (0.015)	--	0.001 (0.849)	--	-0.130* (0.029)
ROA	--	-0.093* (0.030)	--	-0.226** (0.000)	--	-0.014 (0.583)	--	-0.138 (0.213)	--	-0.185** (0.001)
QRATIO	--	-0.011* (0.014)	--	-0.049** (0.000)	--	-0.005 (0.274)	--	-0.004 (0.419)	--	-0.009 (0.058)
OPIN	--	0.002 (0.948)	--	0.179** (0.000)	--	0.054* (0.026)	--	0.064* (0.018)	--	0.001 (0.961)
TIME	--	-0.037 (0.674)	--	-0.494** (0.000)	--	-0.441** (0.000)	--	-0.059 (0.279)	--	-0.054 (0.202)
BIG	0.099** (0.003)	0.087** (0.006)	0.214 (0.017)*	0.172** (0.040)	0.248** (0.000)	0.126* (0.012)	0.258** (0.000)	0.238** (0.000)	0.235** (0.000)	0.213** (0.000)
$Adj.R^2$	0.80	0.91	0.66	0.70	0.89	0.90	0.88	0.88	0.89	0.89
Prob(F-stats)	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**	0.00**
N	657		889		1,507		1,517		2,118	

Table 4. Dynamic Regression Results from 2001 to 2005

This table presents the results of dynamic regressions of audit fees on prior year's audit fees with both audit complexity and audit risk factors. $LnFEE_{t-1}$ is the natural log of audit fees in prior year, *LnAsset* is the natural log of total assets, *SUBs* is the number of subsidiaries of the audited firm, $DIVERS_{it}$ is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, $FROGN_{it}$ is the ratio of foreign sales to total sales at year-end, $RECV_{it}$ is the ratio of account receivable to total assets, INV_{it} is the ratio of total inventory to total assets, $ACQDIV_{it}$ is a dummy variable that equals to 1 if the firm acquired or sold an associate or a subsidiary and 0 otherwise, $LOSS_{it}$ is a dummy variable that equals to 1 if client incurred loss in any of last three fiscal years and 0 otherwise, DE_{it} is the ratio of long-term debt to total assets, ROA_{it} is the return on assets which is the ratio of net income after interest and taxes to total assets, $QRATIO_{it}$ is the ratio of quick assets to current liabilities, $OPIN_{it}$ is a dummy variable that equals to 1 if a modified opinion is issued and 0 otherwise, $TIME_{it}$ is a dummy variable that equals to 1 if clients change auditors and 0 otherwise, and BIG_{it} is a dummy variable that equals to 1 if auditor is Big 4 and 0 otherwise. * and ** denote statistical significant level at the 5 and 1 percent level respectively.

	2001	2002	2003	2004	2005
Intercept	-1.568** (0.000)	-4.062** (0.000)	0.641** (0.000)	-0.500* (0.012)	-1.268** (0.000)
$LnFEE_{t-1}$	0.687** (0.000)	0.059** (0.004)	0.780** (0.00)	0.786** (0.000)	0.646** (0.000)
LnAsset	0.172** (0.000)	0.482** (0.000)	0.106** (0.00)	0.105** (0.000)	0.180** (0.000)
SUBs	0.009 (0.328)	0.057** (0.001)	0.010 (0.176)	0.013 (0.100)	0.002 (0.669)
DIVERS	-0.001 (0.322)	0.004** (0.004)	0.002* (0.021)	-0.001 (0.194)	0.002** (0.002)
FROGN	0.045 (0.513)	0.172* (0.049)	0.078 (0.062)	-0.080 (0.054)	-0.021 (0.536)
RECV	0.133 (0.355)	1.156** (0.000)	0.081 (0.551)	0.171 (0.198)	0.412** (0.000)
INV	-0.053 (0.734)	0.175 (0.424)	-0.262 (0.064)	-0.090 (0.484)	0.044 (0.683)
ACQDIV	0.045 (0.327)	0.064 (0.370)	0.000 (0.995)	0.073* (0.043)	0.009 (0.729)
LOSS	0.068* (0.024)	0.154** (0.003)	-0.028 (0.341)	0.033 (0.427)	0.013 (0.547)
DE	-0.029 (0.097)	0.010 (0.176)	0.066* (0.012)	0.001 (0.764)	-0.114 (0.054)
ROA	-0.095* (0.024)	-0.261** (0.000)	-0.013 (0.560)	-0.144 (0.199)	-0.220** (0.000)
QRATIO	-0.010* (0.035)	-0.033** (0.000)	-0.008 (0.133)	-0.002 (0.733)	-0.002 (0.633)
OPIN	0.001 (0.997)	0.169** (0.000)	0.053* (0.028)	0.056* (0.039)	0.005 (0.844)
TIME	-0.045 (0.607)	-0.508** (0.000)	-0.446** (0.000)	-0.054 (0.314)	-0.047 (0.260)
BIG	0.092** (0.006)	0.184* (0.029)	0.134** (0.000)	0.245** (0.000)	0.221** (0.000)
Adjusted R^2	0.91	0.71	0.90	0.88	0.89
Prob(F-statistic)	0.00**	0.00**	0.00**	0.00**	0.00**
N	657	889	1,507	1,517	2,118

Table 5. Asymmetric Dynamic Regression Results from 2001 to 2005

This table presents the results of dynamic regressions of audit fees on prior year's audit fees with audit complexity and audit risk factors. $LnFEE_{t-1}$ is the natural log of audit fees in prior year, *LnAsset* is the natural log of total assets, *DIVERS* is the number of two-digit Standard Industrial Classification (SIC) codes in which client operates, *RECV* is the ratio of account receivable to total assets, *ROA* is the return on assets which is the ratio of net income after interest and taxes to total assets, *BIG* is a dummy variable that equals to 1 if auditor is Big 4 and 0 otherwise, and *DDF* is a dummy variable that equals 1 if prior audit fees are less than current audit fees and 0 otherwise. * and ** denote statistical significant level at the 5 and 1 percent level respectively.

	2001	2002	2003	2004	2005
INTERCEPT	-1.066**	-2.102**	-0.645**	-0.697*	-0.985**
	(0.005)	(0.000)	(0.003)	(0.015)	(0.000)
$LnFEE_{t-1}$	0.754**	0.515**	0.861**	0.904**	0.916**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnAsset	0.120**	0.200**	0.033	0.052**	0.058**
	(0.000)	(0.000)	(0.222)	(0.008)	(0.000)
DIVERS	0.003*	0.003	0.003*	0.001	0.000
	(0.015)	(0.106)	(0.026)	(0.439)	(0.772)
RECV	0.437**	0.277	0.345	0.210	0.385**
	(0.005)	(0.416)	(0.214)	(0.292)	(0.000)
ROA	-0.060	-0.114	0.024	-0.096*	-0.071
	(0.169)	(0.677)	(0.220)	(0.025)	(0.119)
BIG	0.039	0.047	0.311**	0.063	0.182**
	(0.399)	(0.104)	(0.001)	(0.209)	(0.000)
DDF	0.011	2.333**	1.290**	0.873**	0.606**
	(0.985)	(0.000)	(0.000)	(0.010)	(0.003)
*DDF * LnFEE*$_{t-1}$	-0.084	-0.310**	-0.089*	-0.043*	-0.159**
	(0.450)	(0.000)	(0.047)	(0.021)	(0.000)
*DDF * LnAsset*	0.040	0.260**	0.032	0.006	0.051**
	(0.504)	(0.000)	(0.294)	(0.814)	(0.002)
*DDF * DIVERS*	0.003	0.001	0.002	0.001	0.002**
	(0.075)	(0.919)	(0.167)	(0.304)	(0.013)
*DDF * RECV*	-0.300	1.082**	0.357	0.244*	-0.210
	(0.251)	(0.010)	(0.247)	(0.013)	(0.147)
*DDF * ROA*	-0.077	-0.206*	-0.082*	-0.238*	-0.075
	(0.263)	(0.045)	(0.033)	(0.013)	(0.340)
*DDF * BIG*	0.012	0.150	0.313**	0.117	-0.002
	(0.857)	(0.291)	(0.002)	(0.088)	(0.972)
Adjusted R^2	0.90	0.78	0.93	0.91	0.93
Prob(F-statistic)	0.00**	0.00**	0.00**	0.00**	0.00**
N	657	889	1,507	1,517	2,118