

Audit fee stickiness

Charl De Villiers

University of Auckland - Department of Accounting and Finance

David Hay

University of Auckland - Department of Accounting and Finance

Zhizi (Janice) Zhang

University of Auckland

Abstract

Purpose – This study contributes to our understanding of audit pricing and the competitiveness of the audit fee market by examining audit fee stickiness.

Design/methodology/approach – We explore the price behavior of audit fees in response to changes in the variables that are usually seen as their determinants, such as size, complexity, and risk in order to examine audit fee stickiness and the competitiveness of the market for audit services.

Findings – We find that audit fees are sticky, i.e. audit fees do not immediately or fully adjust to changes in their determinants. Audit fees also respond to changes leading to an increase more quickly than they respond to changes leading to a decrease. The difference between positive and negative fee adjustments declines over periods longer than one year, and is no longer significant when four year periods are considered.

Research limitations/implications – The study is limited to companies in the United States from 2000 to 2008. Future research should examine this issue in other settings and periods.

Practical implications – The results suggest that the audit market is competitive, at least in the medium term.

Originality/value – Our study helps to explain why the audit fee model does not fully explain the level of audit fees; why audit fees are more likely to be too high than too low; and why auditor switches are commonly associated with larger changes in audit fees. Our findings provide evidence that may be useful to managers and audit committees when managing their audit fees, auditors when considering the risks and opportunities associated with changes in the determinants of audit fees, and regulators concerned with the competitiveness of the audit market.

Keywords: *audit fees; audit services market; competition; price behavior; cost stickiness.*

JEL classifications: L41, L89, M41

1 Introduction

In this paper, we focus on audit fee movements. Our examination is informed by the economics literature on stickiness and apart from shedding light on audit fee behavior that may be of practical value to auditors, managers, audit committees, and regulators, our results have important implications for future studies of events that have an impact on the audit market. Sticky prices are prices that do not immediately adjust to changed conditions, such as increased costs. Thus, an audit fee can be described as sticky if it remains constant despite changed conditions or if it changes less than might be expected due to the changed audit conditions.

The pricing and competitiveness of the market for audit services has been a matter of concern for regulatory bodies, as well as researchers and practitioners since the 1970s (e.g., US Senate, 1977). Causholli, De Martinis, Hay, and Knechel (2010) also observe that the nature of auditing as a credence good can lead to over-charging, over-auditing or under-auditing. As the market for audit services has become more concentrated, and as audit failures have drawn attention to issues of audit quality, there have been official enquiries into this issue in the US, UK, and Europe (GAO, 2003; GAO, 2006; Oxera, 2006; GAO, 2008; US Treasury, 2008; European Commission, 2010; House of Lords 2011). While a recent report in the US concluded that “continued concentration in the audit market for large public companies does not call for immediate action” (GAO, 2008), other recent reports have expressed greater concern. The US Treasury (2008) reported that “as the result of mergers and the demise of Arthur Andersen, there are fewer large auditing firms with particular concentration amongst large global public companies. Audit committees and those who engage auditors desire choice and a competitive environment, which stimulates excellence and innovation.” The European Commission (2010) observed that “The market appears to be too concentrated in certain segments and deny clients sufficient choice when deciding on

their auditors.” The House of Lords (2011) also expressed concern over the extent of concentration in the market for audit services. Thus, the pricing of audit services and the extent of competition in the market for audit services continue to be relevant.

Although there is a rich literature on audit fees, the area of fee movements remains under-researched. Issues examined include the determinants of audit fees (Hay, Knechel, and Wong, 2006), the existence of audit fee premiums representing quality (e.g., Simunic, 1980, Craswell, Francis, and Taylor, 1995); auditor specialization (e.g., Craswell et al., 1995; Francis, Reichelt, and Wang, 2005; Basioudis and Francis, 2007; Carson and Fargher, 2007; and Carson, 2009) the impact of corporate governance (e.g., Carcello, Hermanson, Neal and Riley, 2002; Knechel and Willekens, 2006); auditor independence (e.g., Antle, Gordon, Narayanamoorthy, and Zhou, 2006); differences in legal regimes (e.g., Choi, Kim, Liu, and Simunic, 2008; 2009) and the impact of SOX (Huang, Raghunandan, and Rama, 2009). Nevertheless, the cost behavior of audit fees, especially over time, is not well understood and the examination of audit fee behavior over time can improve our understanding of the audit market. Few studies examine audit fee behavior over time (exceptions include Menon and Williams, 2000; Ferguson and Stokes, 2002; Francis and Wang, 2005; and Hay and Knechel, 2010), while studies that compare the differences between upward and downward movements in audit fees are even less frequent (Ferguson, Lennox, and Taylor, 2005; Albring and Keane, 2010). Menon and Williams (2000) examine long term trends in audit fees and their relation to changes in the environment such as auditing standards; Ferguson and Stokes (2002) examine auditor industry specialization premiums over periods of increasing concentration in the market for audit services; and Hay and Knechel (2010) examine changes associated with deregulation. In addition, budget ratcheting in the audit context has been examined by Bedard, Ettredge, and Johnstone (2008) and Ettredge, Bedard, and Johnstone (2008). Francis and Wang (2005) examined audit fees in 2000 and 2001 to investigate the effect of audit fee

disclosure, which they found was followed significantly smaller variances in audit fees as predicted for 2001 compared to the variances in 2000. Causholli et al. (2010) observe that “the limited evidence available suggests that audit fees react to changes in the drivers of audit production but slowly and somewhat unpredictably”, and suggest that the issue is worthy of further research. Our study examines the response of audit fees to changes in the variables that are usually seen as their determinants, such as size, complexity, and risk, and helps to explain:

- Why the audit fee model does not fully explain the level of audit fees;
 - Why audit fees are more likely to be too high than too low;
 - Why lower audit fees suggestive of fee cutting are sometimes observed when clients switch auditors
 - What managers and audit committees should be concerned about regarding audit fees;
- and
- The extent to which the market for audit services is competitive.

Research on stickiness is well-established in management accounting, and we adapt the methods used in previous studies. The management accounting research studies show that the relation between sales and categories of expenditure (such as selling, general, and administrative costs) is not symmetric for volume increases and decreases. Costs increase more quickly than they decrease (e.g., Anderson, Banker, and Janakiram, 2003). We adapt the Anderson et al. (2003) model¹ to examine audit fee movements in a large sample of US firms for the period from 2000 to 2008. We use a standard audit fee model to estimate

¹ Anderson et al. (2003) show that, when sales decrease, selling, general, and administrative (SG&A) costs decrease by a smaller percentage (0.35 percent when sales decrease by 1 percent) than they increase when there is an increase in sales (0.55 percent when sales increase by 1 percent). They label this phenomenon cost stickiness. Anderson et al. (2003) use sales as a cost driver to explain changes in SG&A costs. In this way, they move away from the usual assumption that costs move proportionately with changes in activities to a model where manager choice in committing to costs (cutting costs) is emphasized. Anderson et al. (2003) also find evidence that stickiness reverses in subsequent periods and that stickiness reduces over longer periods of time (longer than one year).

expected audit fees for each firm-year. Using this audit fee model (with high predictive power shown by R^2 above 0.74) provides a much more accurate estimate of the audit fee expense compared to models in the stickiness literature which rely solely on one variable, sales, to predict expenses, e.g., Anderson et al. (2003). We then compare actual audit fee movements from year to year with the expected movements predicted by the model, initially considering all movements together and then distinguishing between upward and downward movements. Thus the market for audit services allows us to conduct a more fully developed model of stickiness, because we are able to include more of the determinants of audit fees.

It is important to distinguish between cost stickiness (as examined in the management accounting literature) and price stickiness (as examined in the economics literature). Cost stickiness refers to movements in the total of expenses, which are under the control of the managers in the purchasing firm; whereas price stickiness or audit fee stickiness refers to the price of a single item (in this case the audit fee), which is negotiated between the managers of the firm being audited and the auditor. Therefore, we use the economics-based literature and arguments in our hypotheses development.

Our findings show that, when changes occur to the determinants of audit fees, then audit fees do not change immediately, or symmetrically, to the extent suggested by audit fee models. In particular, upward adjustments are much larger than downward adjustments. This difference between upward and downward adjustments gradually reduces when we examine changes over longer periods of time until the difference becomes insignificant when four year periods are considered. The observation that the upward/downward difference reverses and disappears over time provides evidence that audit markets are competitive in spite of switching costs. Upward adjustments of audit fees are also smaller than expected, suggesting that auditors fail to recognize upward changes soon enough, and thus implying a risk of under-auditing. We find that when clients switch auditors, their audit fees revert more fully to

the levels suggested by an audit fee model. These results are all consistent with stickiness that lasts for several periods, but eventually reverses.

The results highlight that managers and audit committees need to apply extra care in managing their audit fees during periods of downturn, because audit fees generally take longer to reduce than to increase. Therefore, our results show the importance for audit committees of initiating audit fee negotiations as soon as firm forecasts indicate a downturn. In addition, auditors need to be aware of the risks and opportunities associated with changes in the determinants of audit fees, because our results point towards clear opportunities for auditors to increase audit fees sooner, decrease audit fees later, or reduce audit work sooner. The evidence regarding the competitiveness of the audit market will be of interest to regulators. The audit research community will be interested in the fact that audit fee models can be improved by including the impact of movements in audit fee determinants (by taking account of the previous year's fee). Current audit fee models are based on an implicit assumption that the audit fee is based on audit fee determinants at a point in time, and do not take account of any rigidities or stickiness that influence the level of fees.

The price behavior and stickiness of audit fees are also important for another reason. Recent papers have examined the effects of events that affect auditors on changes in audit fees. Doogar, Sivadasan, and Solomon (2010) examine the effect over time of changes in the auditing standards (from AS2 to AS5) by comparing actual fees to the fees predicted using a model based on the previous years' fees. Ettredge, Li and Emeigh (2011) determine fee pressure by comparing client audit fees in 2008, the center of the recession, to the estimated benchmark audit fees the companies would have paid in 2008 based on the previous year's audit fee model. Both of these papers examine audit fee behavior over short periods of time, when there is reason to expect change. However, they do not take into account how sticky fees are, i.e. how much fees may be expected to react in general when there are no specific

event to examine, in upwards or in downwards directions. Our study provides an indication of the extent to which audit fees can be expected to be sticky, and the differences between upward and downwards changes, that should be useful in further developing studies like Doogar et al. (2010) and Ettredge et al. (2011).

The rest of the paper is organized as follows: In the next section we develop hypotheses, and this is followed by sections where we introduce our regression models; data and results; and conclusion.

2 Hypotheses

Economic theory predicts price stickiness, among other circumstances, when sellers do not fully understand market conditions. Price stickiness is important in macroeconomics, because it helps to explain why changes in monetary policy take time to have an effect (Ball and Mankiw, 1994). It has been investigated using catalogues, surveys, and interview studies. Reasons for stickiness include “menu costs” of implementing new prices. Further investigation shows that menu costs in a literal sense are very small, while management costs are substantial, e.g., deciding on new prices, and convincing customers that they are fair (Ball and Mankiw, 1994, 25; Zbaracki et al., 2004, 514). Larger increases impose larger costs. Even price decreases are costly, as they open a “Pandora’s box” of customer queries about prices (Zbaracki et al. 2004, 524). Under conditions of incomplete understanding of market conditions, sellers do not want to risk upsetting buyers with frequent or major price adjustments (Rotemberg, 2002; Zbaracki, Ritson, Levy, Dutta and Bergen, 2004). Bhaduri and Falkinger (1990) also show that a seller who has imperfect market information will base his/her pricing on cost, and adjust pricing gradually and infrequently. We argue that auditors do not fully understand how clients will react to audit fee changes, i.e. if or when clients will consider switching auditors, and know that fee changes can be costly. Therefore, auditors will

base their audit fees on cost and adjust audit fees gradually and infrequently. Audit fee stickiness can therefore be predicted.

Considerable empirical evidence in the economics literature supports the notion of price stickiness (e.g., Carlton, 1986; Levy and Young, 2004). In the audit fee literature, Ghosh and Lustgarten (2006) show that the explanatory power (or R^2) of a standard audit fee model is high when levels are considered, but low when year-on-year differences are used. This result suggests that audit fees do not change in every year by as much as the model would predict. In a working paper, Ferguson, Lennox and Taylor (2005) also show evidence of stickiness in a sample of UK and Australian audit fees. We test for overall stickiness by examining the extent to which changes in actual audit fees are consistent with predicted changes.

HYPOTHESIS 1. Audit fees do not immediately adjust to the levels suggested by an audit fee model.

In the economics literature, where quality cannot be discerned, price is often used as a proxy for quality (Shapiro, 1983). This is also the case in the audit fee literature where audit fees are used as a proxy for audit quality (e.g., Craswell et al., 1995). This appears to be a reasonable assumption given the fact that the Big x audit firms are generally known to charge more and assumed to provide higher quality audits. If clients see higher audit fees as a mark of quality, clients may resist fee increases less than expected and, when fee decreases are appropriate, clients may demand decreases less than expected (Ferguson et al., 2005). Furthermore, SOX caused additional risk to client managers, who had to start signing off on the adequacy of controls. Thus, during the period of SOX implementation, clients were likely to be more focused on assuring that adequate audit work was performed than on audit fee management. SOX is one example of a general ratcheting effect of audit regulation over time. Additional regulation means that audit fees are more likely to increase than to decrease. Anderson et al. (2003) advanced three reasons for the difference between positive and

negative changes in costs, namely cost lumpiness, adjustment costs, and agency cost.

However, it can be argued that these reasons do not apply as strongly to the audit setting.²

Given that audit fees are broadly determined by effort and risk, when the audit effort and/or risk for a given client reduces, auditors may not recognize this before they have already committed a planned number of hours to the (interim) audit. By contrast, a larger required audit can, at least to some extent, be adjusted for and accommodated at a later stage in the audit. Therefore, late recognition of a change in the profile of the audit client during a given year will result in audit fee stickiness. This is a short-term effect which can be corrected in time for the next year's audit.

Even when auditors recognize the need for a reduced audit early, cognizant of the cost to the client to switch auditors and the extended timeframe required to do so, auditors can opportunistically reduce the audit fee by a smaller amount. This can be achieved by over-auditing (reducing the audit less than is warranted) or by over-charging (reducing the audit sufficiently, but charging more). Over-auditing and over-charging under conditions that call for a reduction in the extent of auditing will result in a different level of adjustment of audit fees in an upwards direction compared to downwards adjustments, i.e., stickiness.

We further argue that audit risk is greater for clients that are decreasing in size (or in the other factors that determine audit fees), than for those that are growing. Firms that are decreasing in size may have risk factors such as impaired assets or reduced viability, which would require more audit work. Growing firms may have an increase in risk but not to the same extent.

² Cost lumpiness should not be an issue in audit fees, because auditors do not need large investments in heavy equipment typically associated with cost lumpiness. Although salary costs are fixed, audit staff can to some extent be reassigned to other clients, or even other offices of the firm. Adjustment costs can be a factor in replacing auditors, although the cost will be associated with increased effort by managers, and will not be included in audit fees. Agency cost (empire-building) should also not be an issue, because manager status is not likely to be affected by the size of the audit fee they pay.

Audit fees are often contracted between client and auditor before the commencement of the audit. However, it is customary to have ‘escape’ clauses that would allow the auditor to perform extra work and to charge for the extra work in case of unforeseen circumstances, e.g., the existence of going concern issues, or other audit risk factors. Audit contracts do not customarily provide for contingencies that would allow the audit fee to be reduced (Palmrose, 1989; Corporate Executive Board, 2005). These contractual arrangements and the other forces discussed above such as menu costs would cause audit fee increases to be more common than audit fee decreases. We examine the relative magnitude of predicted increases and predicted decreases.

HYPOTHESIS 2. Audit fees decrease less (when a decrease is expected) than they increase (when an increase is expected).

Although we anticipate audit fee stickiness, it is not likely that it will continue indefinitely. Competitive markets force pricing to revert to the norm, i.e. a seller cannot (indefinitely) extract a premium price from a buyer. Market frictions (e.g. incomplete information) cause stickiness (i.e. prices do not change instantaneously), but competition forces the sellers to reduce higher than average prices over time. Alternatively, buyers will switch to less expensive sellers. Either way, the observed transaction price reverts to the norm over time. Specifically, Martin (1993) shows that prices are less sticky if there are more sellers and less collusion between sellers, implying that prices revert to the norm and prices are less sticky in more competitive markets. Several empirical studies support the notion that prices are less sticky (i.e. adjust quicker) in more competitive markets (Carlton, 1986; Weiss, 1993; Hall, Walsh and Yates, 2000).

Anderson et al. (2003) ascribe the reversal of stickiness in subsequent periods to slow manager reactions to downturns and to the fact that it can take time to unwind contractual commitments. If managers and audit committees are slow to recognize a downturn and

negotiate their audit fee down, audit fee stickiness will reverse in subsequent periods. It may be that auditors wait to assess whether a change is likely to be permanent. Contractual commitments can also be a factor, because if managers recognize a downturn late, they would not have sufficient time to renegotiate or be able to switch auditors during that period, but might be able to in the subsequent period.

From an auditor point of view, if auditors are late in recognizing the need for a smaller audit, audit fees will be higher in the current period and lower in the subsequent period. Thus, stickiness would reverse in the subsequent period. Alternatively, in a competitive audit market, opportunistic auditors would have to reverse their opportunistic behavior in order to avoid losing the audit. Alternatively, if the auditor does not adjust the audit fee and the client decides to switch auditors for a reduction in audit fees, reversal of audit fee stickiness would also be observed.

Anderson et al. (2003) argue that longer periods of time (more than one year) capture complete adjustment cycles and this explains the fact that stickiness reduces over longer periods of time. With audit fees, clients can be expected to manage audit fees down over longer periods of time. If there is a competitive audit market, then auditors would have to adjust their audit fees over time to revert to the norm.

HYPOTHESIS 3. Variations of audit fees from the levels suggested by audit fee models will reverse over longer periods of time.

We examine this issue by considering two sub-hypotheses:

HYPOTHESIS 3(a). The difference between upward and downward adjustments reverses direction in the following year

HYPOTHESIS 3(b). The difference between upward and downward audit fee adjustments reduces when time periods longer than one year are considered

Stickiness is partly due to imperfect information, including the seller not fully understanding how the buyer will react to a change in price, i.e. what would cause the buyer to consider switching to a different seller. When a buyer approaches a new seller, the level of uncertainty is reduced, because it is now known that the buyer is considering a switch. Thus one of the sources of market friction that cause price stickiness is removed and the price can thus be expected to more fully revert to the expected level. In evidence, Johnstone, Bedard, and Ettredge (2004, p. 25) find that “in competitive bidding situations there are stronger associations between cost drivers and planned engagement effort”, and that in competitive bidding situations higher planned engagement effort is higher and audit fees are lower. Therefore, it is expected that audit fees will more fully adjust to the norm, i.e. to the levels predicted by an audit fee model, when clients switch auditor. Two aspects specific to the audit market may mitigate this general expectation in different directions. One aspect is the fact that a new client initially requires additional audit work to ensure full knowledge of all audit risks. The other aspect is the possibility that audit firms bid aggressively to acquire a new client (low-balling; e.g., DeAngelo, 1981) with the expectation of being able to raise audit fees gradually later. Because these aspects could influence audit fees of new clients in different directions, we stand by our original (general) expectation, i.e. that audit fees of new clients would more fully adjust to normal levels.

HYPOTHESIS 4. When new auditors are appointed, the audit fee adjusts more fully to levels suggested by the audit fee model.

3 Regression models

Following previous audit fee research (Simunic, 1980; Craswell et al., 1995; Ferguson, Francis and Stokes, 2003; Hay et al., 2006; Carson, 2009; Choi et al., 2009; Huang et al. 2009), we estimate the following audit fee model separately for each year to calculate the predicted audit fees for each firm for each year.

$$LAF = f(LTA, LBS, CATA, QUICK, DE, ROI, FORDUM, LOSS) \quad (1)$$

Variables are defined in Table 1.

Insert Table 1

We use the general cost stickiness model, following Anderson et al. (2003) and others, but modified for the purpose of measuring the stickiness of audit fees. Specifically, we substitute the cost driver in the general stickiness model with the natural log of the change in the estimated audit fees (derived from model 1 above). We use a simplified configuration, i.e. one that does not distinguish between positive and negative changes, followed by one that does make this distinction. That is, first:

$$\text{Log} (AF_t/AF_{t-1}) = \beta_0 + \beta_1 \text{Log} (EAF_t/EAF_{t-1}) + \varepsilon \quad (2)$$

(where AF represents audit fee and EAF is estimated audit fee, and the measures used are defined as current audit fee divided by previous year's audit fee). We then estimate the normal configuration used in stickiness models, that distinguishes between positive and negative changes (where *Decrease_Dummy* is a dummy variable representing an expected decrease in audit fee):

$$\text{Log} (AF_t/AF_{t-1}) = \beta_0 + \beta_1 \text{Log} (EAF_t/EAF_{t-1}) + \beta_2 \text{Decrease_Dummy} * \text{Log} (EAF_t/EAF_{t-1}) + \varepsilon \quad (3)$$

Interpretation:

β_1 = the proportion of the expected audit fee adjustment that actual audit fees adjust (for expected upward adjustments)

$\beta_1 + \beta_2$ = the proportion of the expected audit fee adjustment that actual audit fees adjust (for expected downward adjustments)

We also use an expanded model, again derived from Anderson et al. (2003), to examine whether the difference between positive and negative changes starts to reverse in the following year.

$$\text{Log} (AF_t/AF_{t-1}) = \beta_0 + \beta_1 \text{Log} (EAF_t/EAF_{t-1}) + \beta_2 \text{Decrease_Dummy} * \text{Log} (EAF_t/EAF_{t-1}) + \beta_3 \text{Log} (EAF_{t-1}/EAF_{t-2}) + \beta_4 \text{Decrease_Dummy}_{t-1} * \text{Log} (EAF_{t-1}/EAF_{t-2}) + \varepsilon \quad (4)$$

Variables are defined in Table 1.

We use these models to test the hypotheses as follows:

- H1: Using model (2), we predict β_1 to be less than 1 (showing that audit fees adjust by less than 100 percent of the predicted adjustment)
- H2: Using model (3), we predict β_2 to be significant (showing that negative adjustments are smaller than positive adjustments)
- H3: Using model (4), we predict β_4 to be positive and significant (showing reversal of the positive/negative difference); and
Using model (3), we predict the coefficient for β_2 to become smaller for longer periods when considered over two, three, and four year periods (showing that positive/negative difference reduces over time)
- H4: Using model (3), we predict that the effects will be less when considered for firms that switched auditors (fees more fully adjust for switching clients)

4 Sample, descriptive statistics, and description of audit fee movements

We obtain annual report data of US firms from *Compustat* and audit fee data from *Audit Analytics* for the period 2000-2008. After excluding firms in the financial sector (SIC 6000-6999) and firms with missing data, the sample size is 30,298 firm-year observations representing 5,568 firms. Table 2 shows descriptive statistics for our audit fee model variables. The mean natural log of audit fee is 12.909, which translates to approximately \$400,000³, and the mean natural log of total assets is 5.375, which translates to about \$200 million. The variables appear to be as expected.

Insert Table 2

Table 3 reports the pair-wise Pearson correlations between the variables in our audit fee estimation model. Overall, all the pair-wise correlations among independent variables are relatively small, and not large enough to cause concern (smaller than 0.7), except the largest Pearson correlation coefficient (0.834) between *LAF* and *LTA*. This statistic shows, as expected, that the natural log of audit fees and the natural log of total assets are highly correlated with each other. The independent variables are all significantly correlated with the

³ The mean of audit fees is \$1,176,061, higher than the mean natural log of audit fees would suggest, because of the exaggerated effect of higher audit fees on the mean of actual audit fees.

dependent variable (*LAF*). We also calculate variance inflation factors (VIFs) (untabulated) and these are all less than two, leading us to conclude that multi-collinearity is not a concern.⁴

Insert Table 3

Audit fee estimation results

Table 4 shows the regression results for our audit fee model. The first column of figures shows the results for the entire period taken together, with subsequent columns showing the results for each year taken separately. The estimated coefficients of all independent variables carry the predicted signs, and are mostly highly significant ($p < 0.0001$). We use these coefficient estimates to calculate an estimated audit fee for each firm-year observation. The separate year estimates are used in our main stickiness analysis, whereas the overall estimate is used in robustness checks. As an example, the following equation is used to calculate a firm's expected audit fee for the year 2000:

$$\text{Estimated Audit Fee} = \text{Exp}(9.514 + 0.445*LTA + 0.151*LBS + 0.610*CATA - 0.055*QUICK + 0.027*DE - 0.364*ROI + 0.399*FORDUM + 0.065*LOSS)$$

(based on equation 1)

Insert Table 4

5 Audit fee stickiness and hypotheses testing results

Our first test examines Hypothesis 1, which proposes that audit fees do not immediately adjust to the levels suggested by an audit fee model. Table 5, Column A shows the main results, that audit fees do not fully adjust to the levels suggested by audit fee models. Specifically, audit fees, on average, adjust less than predicted (only 67.8 percent of the predicted change). We therefore find support for hypothesis 1 that audit fees do not fully adjust to levels suggested by a standard audit fee model.

⁴ Multicollinearity is technically not critical here, because we use the audit fee model as a predictive model.

Insert Table 5

Hypothesis 2 examines whether audit fees decrease less (when a decrease is expected) than they increase (when an increase is expected). Table 5, Column B shows the relevant results for the purpose of considering Hypothesis 2, that audit fees reduce less than they increase for equal predicted changes. Table 5 shows the $Decrease_Dummy * Ln(EAF_t/EAF_{t-1})$ variable to be significant and therefore provide evidence that audit fees reduce less than they increase. We therefore accept Hypothesis 2. Table 5, Column B shows that audit fees reduce, on average, by only 27.8 percent (0.770–0.492) of the decrease predicted by our audit fee model. Note that we show this decrease proportion (0.278) in this and in subsequent tables in a separate line item to ease comparison. This is a small percentage considered along with the fact that our audit fee model, in general, predicts between 74.6 percent and 83.0 percent (the adjusted R² reported in Table 4) of the variation in audit fees. Note that upward adjustments also fall short of full adjustment to expected levels (at 77.0 percent).

Hypothesis 3 examines whether variations of audit fees from the levels suggested by audit fee models reverse over longer periods of time. We examine this issue by considering firstly whether the difference between upward and downward adjustments reverses direction in the following year, and then by examining whether the differences between positive and negative differences reduces over time. Table 5, Column C shows the results of the extended stickiness model with the additional variables, $Ln(EAF_{t-1}/EAF_{t-2})$ representing upward changes in estimated audit fees one year earlier than $Ln(EAF_t/EAF_{t-1})$, and $Decrease_Dummy_{t-1} * Ln(EAF_{t-1}/EAF_{t-2})$ representing decreased estimated audit fees one year earlier. The independent variables are all highly significant, providing evidence that changes in estimated audit fees predict changes in audit fees ($Ln(EAF_t/EAF_{t-1})$), that upward and downward adjustments are different sizes ($Decrease_Dummy * Ln(EAF_t/EAF_{t-1})$), that changes in estimated audit fees one year previously provides additional information relevant

for predicting changes in audit fees ($\ln(EAF_{t-1}/EAF_{t-2})$), and that the difference between upward and downward adjustments in audit fees reverses in the following year ($Decrease_Dummy_{t-1} * \ln(EAF_{t-1}/EAF_{t-2})$). The latter provides the evidence in support of Hypothesis 3.

We further examine H3 by considering whether the difference between positive and negative audit fee adjustments reduces when periods longer than one year are considered in aggregate. Table 5, Columns D-F show the results of the basic stickiness model, but instead of considering changes in audit fees over a one year period, we aggregate two years (Column D), three years (Column E) and four years (Column F). When two years are aggregated, the stickiness parameter is still highly significant, even though the difference between upward and downward movements in audit fees reduces in the following year (see Hypothesis 3(a) above). However, the size of the stickiness effect is different. On average, audit fees reduce by more, namely 49.9 percent (0.830–0.331, refer to Column D) of the expected reduction over a two year period, compared to 27.8 percent (0.770–0.492, refer to Column B) over a one year period. The size of the difference between the upward and downward adjustment of audit fees reduces when adjustments are assessed over a two-year period.

Over three year periods, the differences between upward and downward adjustments are also highly significant. However, audit fees reduce by 61.1 percent (0.847–0.236, refer to Column E) of their estimated reduction over three years, compared to 49.9 percent over two years and 27.8 percent over one year. Over a four year period, the difference between upward and downward adjustments parameter ($Decrease_Dummy * \ln(EAF_t/EAF_{t-1})$) is not significant and the audit fee reduction increases to 79.8 percent (0.864–0.066, refer to Column F) of the estimated reduction. The t -statistic of the up/down parameter ($Decrease_Dummy * \ln(EAF_t/EAF_{t-1})$) in the regressions in Table 5, Columns B and D to F show a gradual reduction from –10.303 over one year, –6.552 over two year periods, –3.777

over three year periods, to -0.771 (and not significant) over four year periods. These same columns also show that audit fee increases are, on average, only 77 percent of the audit fee model prediction over one year, 83 percent over two year periods, 85 percent over three year periods, and 86 percent over 4 year periods.

Taken together, these results provide evidence that audit fee stickiness reduces over time. Therefore, we find evidence in support of Hypothesis 3(b). These results can be interpreted as evidence that the audit market is competitive over the medium term and that auditors cannot maintain a situation where they over-audit or over-charge for more than a few years.

Our fourth hypothesis examines whether, when new auditors are appointed, the audit fee adjusts more fully to levels suggested by the audit fee model. We identify clients that switch auditors. With the demise of Arthur Andersen, Andersen clients were forced to switch to other auditors. Initially, therefore we exclude these forced switches and examine only non-Andersen clients that switched auditors. Refer to Table 5, Column G. The results show less stickiness, with increases averaging 97.7 percent (suggesting a lack of stickiness) and decreases averaging 50.9 percent of the expectation, i.e. less sticky than the general result of 27.8 percent in Table 5, Column B. Our results show that increases are larger when clients switch auditor and thus, on average, we do not find evidence consistent with fee cutting or low-balling in circumstances when audit fees are expected to increase. Our results show that decreases are larger when clients switch auditors, consistent with fees readjusting when there is a switch. This phenomenon is also suggestive of fee cutting or low balling and may be the cause of some common beliefs that fee-cutting and low-balling occur. The results lend weight to our overall argument that the audit market is competitive, albeit that there are client switching costs. Cognizant of this, auditors may change their audit fees more slowly than warranted when auditors judge that their clients are not considering a change.

Robustness

We conducted robustness tests examining the effects on our results of different periods (discussed in this paragraph), and other issues that could affect the results (in the subsequent paragraph). There is reason to believe that there may be changes in the audit market over time, including in the period we examine, particularly due to the impact of the Sarbanes-Oxley Act (SOX). SOX has had a major impact on audit fees, particularly during the 2003 and 2004 years. SOX dramatically increased risks to directors; therefore, during the early years of SOX implementation, the focus of audit committees might have been more on ensuring adequate audit procedures to address the risks than on managing audit fees. Therefore, during the years while SOX was being implemented, audit fee stickiness may have behaved differently. The period we investigate also covers sub-periods of economic expansion and of recession. Audit fees may reduce more readily during recessions than during expansions. To examine these issues, Table 6 shows stickiness results for each year separately and also for the pre-SOX period (2000-2002) and the post-SOX period (2005-2008). The results show audit fee stickiness in the upward direction in each period, with upward adjustments varying from 44.7 percent (2000-2001) to 79.1 percent (2005-2006) of the expected. However, there are no significant differences between the upward and downward adjustments in the years 2000-2003, i.e. the pre-SOX period and 2003. The pre-SOX period coincided with a recession and we suspect that this may have influenced the results. In addition, during the pre-SOX period audit firms were providing extensive non-audit services, and this may have allowed them to adjust their audit fees to a greater extent than normally occurs. Each of the years after 2003 and the post-SOX period of 2005-2008, show a significant difference between upward and downward adjustments. Downward adjustments are as low as 2.3 percent (2005-2006) of the expected figure and as high as 37.0

percent during this period. Overall, Table 6 shows the downward adjustment percentage in the post-SOX period to be 24.6 percent (0.749–0.503), close to the downward adjustment in the full period (27.8 percent, see Table 5, Column B). Note that increases in the post-SOX period are also similar at 74.9 percent of the expected increase, compared to 77.0 percent for the full period. Whether audit fee stickiness applies in other periods than those that we have examined is an interesting question for future research.

Insert Table 6

We perform several other robustness tests and report the results in columns in Tables 7 to 9. Table 8 shows robustness tests that examine data excluding small audit fee adjustments (under 5 percent); Big 4 clients only; data excluding companies for which data is not available for the entire period; data excluding clients who switch auditors; and switching clients including forced switches by ex-Andersen clients. In the first five columns, we use the original, full-sample audit fee estimation models reported in Table 4 and in the last four columns we use re-estimated audit fee model results based on the exclusions in the robustness check. We show these re-estimated audit fee model results in Table 7.

Insert Table 7

Insert Table 8

The results of these robustness tests are generally qualitatively similar to our main results, i.e. upward adjustments are smaller than expected; downward adjustments are smaller as a percentage of the expected change than upward adjustments; and adjustments are bigger for clients that switch auditors. The results excluding small adjustments show that our results are not primarily driven by large numbers of small audit fee adjustments. Further analysis also shows that Big4 audit fees are sticky; and that our results are not driven by firms that cease operations during the period (and that may have unique characteristics).

Finally, Table 9 (Columns A and B) shows results when the stickiness model is based on an audit fee model estimated over the entire period instead of year-by-year. The results are generally consistent with and qualitatively similar to our main results. We also report different specifications of the stickiness model (Columns C to F), using untransformed values of AF_t/AF_{t-1} and using AF_t . The results are again consistent and qualitatively similar. Note column F where we use the normal stickiness model with the *Decrease_dummy* added, thereby effectively allowing reductions in estimated audit fees to find their own intercept ($0.041+0.011=0.052$). This result is also qualitatively similar.⁵

Insert Table 9

Heteroscedasticity

To ensure that heteroscedasticity does not confound our results, we re-estimate our main stickiness analysis (i.e. the result tabulated in Table 5, Column B) using White's correction. The results are qualitatively similar, i.e. audit fees do not fully adjust in the upward direction and adjust less in the downward than in the upward direction. We also use White's test with and without cross-products and do not find evidence of heteroscedasticity or misspecification.

6 Conclusion

We find evidence that audit fees are sticky, i.e. they do not fully adjust to the levels predicted by a standard audit fee model. Audit fees also go up more quickly than they come down. We further observe that increases in audit fees are not as much as expected and appear to stabilize around 86 percent of the expected increase over a four year observation period.

⁵ We also examine the effects of inflation on the reported results. When audit fees are adjusted for changes in the CPI, the results are qualitatively similar, i.e. audit fees do not fully adjust in the upward direction; adjust less in the downward direction than in the upward direction; and the differences between upward and downward adjustments become less and less significant as two, three, and four year periods are aggregated. The differences between upward and downward adjustments continue to be significant for one, two, and three year periods but not for four-year periods.

We also find that the difference between upward and downward audit fee adjustments reduces in the second year and when longer periods of time are aggregated. This can be explained as follows: if year one and year two is considered together, upward and downward adjustments are still different, but to a lesser extent. The difference between upward and downward adjustments disappears when four year periods are examined. Audit fees of clients switching auditors adjust to levels closer to our audit fee model prediction than audit fees of non-switching clients. We show our results to be generally robust, including when considering the post-SOX period (after 2004). The only exception is that we do not find significant differences between upward and downward audit fee movements during the period from 2000-2003, a period when the audit fee market was particularly competitive (Palepu and Healy, 2003) and which was a recessionary period. However, this result suggests that further testing of other periods and other audit fee markets will be of value.

These findings suggest that auditors may be strategic in their pricing or may not recognize reductions in audit requirements as easily or quickly as they recognize increased requirements. The findings that the difference between upward and downward fee movements becomes smaller in the following period, and gradually disappears (at four years) when longer periods of time are aggregated, suggest that the audit market is competitive, because auditors are not able to maintain strategic pricing over the medium term. The finding that the audit fees of clients switching auditors more fully adjust to the audit fee levels predicted by the audit fee model provides further evidence of the competitiveness of the audit market (and the absence of wide-spread low-balling).

Our study helps to explain why the audit fee model does not fully explain the level of audit fees, because it does not take account of fee stickiness and the influence of previous

fees.⁶ It examines why audit fees are more likely to be too high than too low, which occurs because there is greater stickiness creating resistance to reductions in fees than there is creating resistance to increases. We examine why fee cutting is sometimes observed when clients switch auditors. The commonly-observed occurrence of reduced fees when clients switch auditors might be partly due to a reduction in stickiness at the time of the switch due to a reduction in market friction related to the auditor's uncertainty regarding the client's reaction to audit pricing at that time (of switching), and not necessarily low-balling. We observe evidence of fee cutting only when audit fees are expected to reduce, according to our audit fee model, and not when audit fees are expected to increase. We conclude that the market for audit services is competitive, because over periods of time longer than one year, the difference between upward and downwards adjustments in audit fees eventually becomes insignificant over four year periods. Our study helps to highlight these issues, which managers and audit committees should be concerned about regarding audit fees. Our findings add to understanding in the areas of competitiveness of the audit fee market; helping managers and auditors understand how audit fees change, and the extent to which they react to changing circumstances; and extending the stickiness literature to a single item of expense. In addition, our findings will be important to consider in future studies of events that have an impact on auditing, as researchers will be able to consider how quickly audit fees react to changes. Our results are robust to a range of exclusions and persist under all conditions we tested, including in cases where clients change auditors.

Our findings provide evidence useful to managers and audit committees when managing their audit fees, auditors when considering the risks and opportunities associated with changes in the determinants of audit fees, and regulators concerned with the

⁶ We estimate an audit fee model similar to our model (1), but with the addition of the prior year audit fee as an additional independent variable. This model can only be used as a predictive model due to multicollinearity concerns. The R^2 of this new model was 0.856 as against 0.747 without the prior year audit fee (see the first column of Table 4).

competitiveness of the audit market. The stickiness of audit fees is also relevant to researchers examining the effect over time of changes in auditing standards or economic conditions. Such studies need to take into account whether audit fees are sticky, and how long it takes for changes to be reflected in audit fees.

We only consider the US market for audit services for the period 2000-2008. Further research in other markets and considering different time periods may shed further light on the generalizability of our results. Further research could also investigate the potential for our stickiness approach to improve existing audit fee models, examine increases/decreases in audit market competitiveness, and use different research approaches to examine behavioral aspects around audit fee stickiness. For example, surveys, interviews and case studies could focus on both auditors' and clients' behavior and considerations during the setting of and the negotiation of audit fees.

References

- Abbott, L. J., Parker, S., Peters, G. F. and Raghunandan, K. (2003), "The association between audit committee characteristics and audit fees", *Auditing: A Journal of Practice and Theory*, Vol. 22 No. 2, pp. 17-32.
- Albring, S. M. and Keane, M. J. (2010), "The Effect of Internal Control Weaknesses and their Remediation on Audit Fees", *Paper presented at the American Accounting Association Auditing Section Midyear Meeting*.
- Anderson, M. C., Banker, R. D. and Janakiraman, S. N. (2003), "Are selling, general, and administrative costs "sticky"?", *Journal of Accounting Research*, Vol. 41 No. 1, pp. 47-63.
- Anderson, M. C., Banker, R. D., Huang, R. and Janakiraman, S. N. (2007), "Cost behavior and fundamental analysis of SG&A costs", *Journal of Accounting, Auditing and Finance*, Vol. 22 No. 1, pp. 1-28.
- Antle, R., Gordon, E., Narayanamoorthy, G. and Zhou, L. (2006), "The joint determination of audit fees, non-audit fees and abnormal accruals", *Review of Quantitative Finance and Accounting*, Vol. 27 No. 3, pp. 235-266
- Ball, L. & Mankiw, N. G. (1994), "A Sticky-Price Manifesto", *National Bureau of Economic Research*, Working paper No. 4677.
- Basioudis, I. G. and Francis, J. (2007), "Big 4 audit fee premiums for national and office-level industry leadership in the United Kingdom", *Auditing: A Journal of Practice and Theory*, Vol. 26 No. 2, pp. 143-146.
- Bedard, J. C., Ettredge, M. L. and Johnstone, K. M. (2008), "Fee pressure and the longitudinal dynamics of audit engagement budgeting and reporting", *Advances in Accounting*, Vol. 24, pp. 32-40.
- Bhaduri, A. and Falkinger, J. (1990), "Optimal price adjustment under imperfect information", *European Economic Review*, Vol. 34, pp. 941-52.
- Carcello, J., Hermanson, D., Neal, T. and Riley, R. (2002), "Board characteristics and audit fees", *Contemporary Accounting Research*, Vol. 19, pp. 365-385.
- Carlton, D. W. (1986), "The rigidity of prices", *American Economic Review*, Vol. 76, pp. 637-58.
- Carson, E. (2009), "Industry specialization by global audit firm networks", *The Accounting Review*, Vol. 84 No. 2, pp. 355-382.
- Carson, E. and Fargher, N. (2007), "Note on audit fee premiums to client size and industry specialization", *Accounting and Finance*, Vol. 47 No. 3, pp. 423-446.
- Causholli, M., De Martinis, M., Hay, D. and Knechel, W. R. (2010), "Audit Markets, Fees and Production: Towards an Integrated View of Empirical Audit Research", *Journal of Accounting Literature*, Vol. 29, pp. 167-215.
- Choi, J. H., Kim, J. B., Liu, X. and Simunic, D. A. (2008), "Audit pricing, legal liability regimes, and Big-4 premiums: Theory and cross-country evidence", *Contemporary Accounting Research*, Vol. 25 No. 1, pp. 55-99.
- Choi, J. H., Kim, J. B., Liu, X. and Simunic, D. A. (2009), "Cross-listing audit fee premiums: Theory and evidence", *The Accounting Review*, Vol. 84 No. 5, pp. 1429-1463.

- Corporate Executive Board. (2005), "14 Ways to Reduce Audit Fees. Obtained 27 May 2011: https://cfo.executiveboard.com/public/documents/CTLR_14_Ways_to_Reduce_External_Audit_Fees.pdf
- Craswell A., Francis, J. and Taylor, S. (1995), "Auditor brand name reputation and industry specialization", *Journal of Accounting and Economics*, Vol. 20, pp. 297-322.
- DeAngelo, L. E. (1981), "Auditor independence, 'low balling,' and disclosure regulation", *Journal of Accounting and Economics*, Vol. 3 No. 2, pp. 113-127.
- Doogar, R., Sivadasan, P. & Solomon, I. (2010), "The regulation of public company auditing: Evidence from the transition to AS5", *Journal of Accounting Research*, Vol. 48 No. 4, pp. 795-814.
- Ettredge, M., Bedard, J. C. & Johnstone, K. M. (2008), "Empirical tests of audit budget dynamics", *Behavioral Research in Accounting*, Vol. 20 No. 2, pp. 1-18.
- Ettredge, M., Li, C. & Emeigh, E. (2011), "Fee Pressure and Audit Quality", *Working paper on SSRN*, <http://ssrn.com/abstract=1903860>.
- European Commission. (2010), *Green paper: Audit policy: Lessons from the crisis*, Brussels, European Commission.
- Ferguson, A. and Stokes, D. J. (2002), "Brand name audit pricing, industry specialization, and leadership premiums post-Big 8 and Big 6 mergers", *Contemporary Accounting Research*, Vol. 19 No. 1, pp. 77-110.
- Ferguson, A., Francis, J. & Stokes, D. (2003), "The effects of firm-wide and office-level industry expertise on audit pricing", *The Accounting Review*, Vol. 78 No. 2, pp. 429-448.
- Ferguson, A., Lennox, C. & Taylor, S. (2005), "Audit Fee Rigidities in the Presence of Market Frictions: Evidence and Explanations", Working paper, University of New South Wales.
- Francis, J. R., Reichelt, K. and Wang, D. (2005), "The pricing of national and city-specific reputations for industry expertise in the US audit market", *The Accounting Review*, Vol. 80 No. 1, pp. 113-136.
- Francis, J.R. and Wang, D. (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), pp. 145-160
- General Accounting Office (GAO). (2003), *Public accounting firms: Mandated study on consolidation and competition*. The report to the Senate Committee on Banking, Housing, and Urban Affairs and the House Committee on Financial Services. <http://www.gao.gov/new.items/d03864.pdf>
- Government Accountability Office (GAO). (2006), *Sarbanes-Oxley Act: Consideration of Key Principles Needed in Addressing Implementation for Smaller Public Companies*, Report to the U.S. Senate Committee on Small Business and Entrepreneurship, Washington, GAO-06-361
- Government Accountability Office (GAO). (2008), *Audits of public companies: Continued concentration in audit market for large public companies does not call for immediate action. Report to Congressional Addressees*. Washington DC: GAO-08-361.
- Ghosh, A. and Lustgarten, S. ((2006), "Pricing of initial audit engagements by large and small audit firms", *Contemporary Accounting Research*, Vol. 23 No. 2, pp. 333-368.

- Hall, S., Walsh, M. and Yates, A. (2000), “Are UK companies’ prices sticky?”, *Oxford Economic Papers*, Vol. 52, pp. 425-46.
- Hay, D., Knechel, W. R. and Wong, N. (2006), “Audit fees: A meta-analysis of the effect of supply and demand attributes”, *Contemporary Accounting Research*, Vol. 23 No. 1, pp. 141-91.
- Hay, D. and Knechel, W. R. (2010), “The Effects of Advertising and Solicitation on Audit Fees”, *Journal of Accounting and Public Policy*, Vol. 29 No. 1, pp. 60-81.
- House of Lords. (2011), *Auditors: Market concentration and their role*. Select Committee on Economic Affairs. 2nd Report of Session 2010–11. Volume I: Report. HL Paper 119–I. London, The Stationery Office Limited.
- Huang, H-W., Raghunandan, K. and Rama, D. (2009), “Audit fees for initial audit engagements before and after SOX”, *Auditing: A Journal of Practice and Theory*, Vol. 28 No. 1, pp. 171–190.
- Johnstone, K. M., Bedard, J. C. and Ettredge, M. L. (2004), “The Effect of Competitive Bidding on Engagement Planning and Pricing”, *Contemporary Accounting Research*, Vol. 21 No. 1, pp. 25–53.
- Knechel, W.R. and Willekens, M. (2006), “The Role of Risk Management and Governance in Determining Audit Demand”, *Journal of Business Finance and Accounting*, Vol. 33 No. 9-10, pp. 1344–1367.
- Levy, D. and Young, A. (2004), “‘The Real Thing’: Nominal price rigidity of the Nickel Coke, 1886-1959”, *Journal of Money, Credit and Banking*, 36, pp. 765-799.
- Martin, C. (1993), “Price adjustment and market structure”, *Economics Letters*, Vol. 41, pp. 139-43.
- Menon, K. and Williams, D. D. (2001), “Long-term trends in audit fees”, *Auditing: A Journal of Practice and Theory*, Vol. 20 No. 1, pp. 115-136.
- Oxera. (2006), *Competition and choice in the UK audit market*. Report prepared for Department of Trade and Industry and Financial Reporting Council. London, Oxera.
- Palepu, K. and Healy, P. (2003), “The Fall of Enron”, *Journal of Economic Perspectives*, Vol. 17, pp. 3-27.
- Palmrose, Z.-V. (1989), “The Relation of Audit Contract Type to Fees and Hours”, *Accounting Review*, Vol. 64 No. 3, pp. 488-499.
- Rotemberg, J. (2005), “Customer anger at price increases, changes in the frequency of price changes and monetary policy”, *Journal of Monetary Economics*, Vol. 52 No. 4, pp. 829-852.
- Shapiro, C. (1983), “Premiums for high quality products as returns to reputations”, *Quarterly Journal of Economics*, Vol. 97, pp. 659-679.
- Simunic, D. (1980), “The pricing of audit services: Theory and evidence”, *Journal of Accounting Research*, Vol. 18 No. 1, pp. 161-90.
- Subramaniam, C. and Weidenmier, M. (2003), “Additional evidence on the sticky behavior costs”, Working paper, Texas Christian University.
- U.S. Treasury. (2008), *Final Report of the Advisory Committee on the Auditing Profession to the U.S. Department of the Treasury*, U.S. Treasury, Washington D.C.

- U.S. Senate. (1977), *Subcommittee on Reports, Accounting and Management of the Commission on Government Operations, The Accounting Establishment: A Staff Study*, Washington DC, Government Printing Office.
- Weiss, C. (1993), "Price inertia and market structure: Empirical evidence from Austrian Manufacturing", *Applied Economics*, Vol. 25, pp. 1175-86.
- Zbaracki, M. J., Ritson, M., Levy, D., Dutta, S. and Bergen, M. (2004), "Managerial and customer costs of price adjustment: Direct evidence from industrial markets", *Review of Economics and Statistics*, Vol. 86, pp. 514-533.

TABLE 1

Variable definitions

LAF	Natural log of audit fees in dollars
LTA	The natural log of total assets in millions of dollars
LBS	Natural log of the number of unique business segments
CATA	Ratio of current assets to total assets
QUICK	Ratio of current assets (less inventories) to current liabilities
DE	Ratio of long-term debt to total assets
ROI	Ratio of earnings before interest and tax to total assets
FORDUM	Dummy = 1 if income derived from foreign operations, otherwise 0
LOSS	Dummy = 1 if a loss occurred during the current year or any of the previous two years
$L(EAF_t/EAF_{t-1})$	Natural log of (Estimated Audit Fee(t)/ Estimated Audit Fee(t-1))
Decrease_Dummy	1 when $L(EAF_t/EAF_{t-1})$ is negative, otherwise 0
$L(EAF_{t-1}/EAF_{t-2})$	Natural log of (Estimated Audit Fee(t-1)/ Estimated Audit Fee(t-2))
Decrease_Dummy(t-1)	1 when $L(EAF_{t-1}/EAF_{t-2})$ is negative, otherwise 0

TABLE 2

Descriptive statistics of audit fee model variables (N = 30,298)

	Min	Max	Mean	Std Dev	Q1	Media n	Q3
LAF	6.234	17.749	12.909	1.462	11.835	12.853	13.94 2
LTA	-1.814	11.205	5.375	2.407	3.717	5.432	7.041
LBS	0.000	2.197	0.603	0.678	0.000	0.000	1.099
CATA	0.035	0.991	0.506	0.252	0.304	0.505	0.708
QUICK	0.014	21.814	1.991	2.444	0.761	1.243	2.201
DE	0.000	2.403	0.203	0.276	0.002	0.126	0.300
ROI	-7.757	0.480	-0.0872	0.662	-0.041	0.057	0.109
FORDUM	0.000	1.000	0.330	0.472	0.000	0.000	1.000
LOSS	0.000	1.000	0.250	0.431	0.000	0.000	0.000

Variable definitions are given in Table 1. All variables winsorised to plus/minus 3 standard deviations.

TABLE 3

Audit fee model correlations

		LAT	LBS	CATA	QUICK	DE	ROI	FORDUM	LOSS
Pearson Correlation	LAF	0.834	0.395	-0.278	-0.125	0.105	0.287	0.452	-0.081
	LTA		0.398	-0.439	-0.105	0.127	0.445	0.344	-0.119
	LBS			-0.242	-0.153	0.079	0.168	0.221	0.028
	CATA				0.375	-0.325	-0.129	0.032	0.035
	QUICK					-0.205	0.054	-0.015	-0.042
	DE						-0.061	-0.026	0.044
	ROI							0.145	-0.047
	FORDUM								-0.004
Sig. (1-tailed)	LAF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	LTA		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	LBS			0.000	0.000	0.000	0.000	0.000	0.000
	CATA				0.000	0.000	0.000	0.000	0.000
	QUICK					0.000	0.000	0.006	0.000
	DE						0.000	0.000	0.000
	ROI							0.000	0.000
	FORDUM								0.256

Variable definitions are given in Table 1. All variables winsorised to plus/minus 3 standard deviations.

TABLE 4
Audit fee estimation model regression results (model 1)

	2000-08	2000	2001	2002	2003	2004	2005	2006	2007	2008
	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic
	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value
Intercept	9.599	9.514	9.548	9.549	9.574	9.636	9.687	9.738	9.844	9.836
	475.460	155.75	204.405	194.090	208.539	181.321	180.299	177.919	183.344	183.892
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LTA	0.514	0.445	0.449	0.461	0.474	0.533	0.550	0.542	0.528	0.523
	210.054	57.428	78.203	76.441	84.665	82.820	84.819	83.074	81.687	83.170
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LBS	0.125	0.151	0.145	0.153	0.156	0.140	0.124	0.130	0.112	0.119
	18.070	7.391	9.293	8.804	9.427	7.480	6.752	7.108	6.233	6.897
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CATA	0.670	0.610	0.557	0.569	0.605	0.529	0.650	0.732	0.692	0.774
	31.514	9.701	11.205	10.589	12.226	9.358	11.606	13.113	12.595	14.022
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
QUICK	-0.036	-0.055	-0.047	-0.043	-0.038	-0.016	-0.021	-0.023	-0.024	-0.022
	-18.712	-11.661	-12.348	-8.858	-8.011	-3.080	-4.003	-4.623	-4.614	-3.939
	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
DE	0.082	0.027	0.029	0.087	0.180	0.110	0.038	0.073	0.155	0.120
	4.971	0.510	0.664	2.059	5.017	2.655	0.940	1.596	3.751	2.738
	0.000	0.305	0.253	0.020	0.000	0.004	0.174	0.056	0.000	0.003
ROI	-0.226	-0.364	-0.267	-0.247	-0.201	-0.210	-0.228	-0.190	-0.179	-0.170
	-31.264	-11.259	-13.535	-12.691	-12.263	-11.699	-12.054	-11.005	-9.935	-9.701
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FORDUM	0.494	0.399	0.355	0.380	0.436	0.438	0.476	0.460	0.475	0.472
	50.017	13.284	15.858	15.074	18.141	16.352	18.299	17.812	18.658	19.455
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LOSS	0.025	0.065	0.074	0.099	0.098	0.083	0.084	0.114	0.070	0.085
	2.487	2.258	3.491	4.238	4.374	3.147	3.041	3.948	2.438	3.265

	2000-08	2000	2001	2002	2003	2004	2005	2006	2007	2008
	0.007	0.012	0.000	0.000	0.000	0.001	0.001	0.000	0.008	0.000
Adjusted R ²	0.747	0.753	0.780	0.746	0.787	0.784	0.801	0.801	0.811	0.830
N	30,298	2,241	3,339	3,721	3,853	3,779	3,663	3,532	3,276	2,894
Model F-stat	11,181	856	1,477	1,365	1,780	1,714	1,839	1,773	1,760	1,772
Model signif	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Dependent variable: Natural log of audit fees. *P*-values are one-tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.

TABLE 5

Audit fee stickiness (2000-2008) – based on audit fee model for each year separately

Audit fee model for each year	Column A	Column B	Column C	Column D	Column E	Column F	Column G
	Simplified stickiness model	Normal stickiness model	Reversal of stickiness in next period	2 year period aggregated	3 year period aggregated	4 year period aggregated	Auditor changed not from Andersen
Dependent variable	Ln(AF _t /AF _{t-1})	Ln(AF _t /AF _{t-1})	Ln(AF _t /AF _{t-1})	Ln(AF _t /AF _{t-2})	Ln(AF _t /AF _{t-3})	Ln(AF _t /AF _{t-4})	Ln(AF _t /AF _{t-1})
	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value	Coeff. <i>t</i> -statistic <i>P</i> -value
Intercept	0.075 19.617 0.000	0.048 10.347 0.000	0.039 7.481 0.000	0.087 13.181 0.000	0.126 13.456 0.000	0.173 12.936 0.000	-0.117 -4.452 0.000
Ln(EAF _t /EAF _{t-1})	0.678 52.266 0.000	0.770 49.026 0.000	0.752 47.367 0.000				0.977 11.843 0.000
Decrease_Dummy* Ln(EAF _t /EAF _{t-1})		-0.492 -10.303 0.000	-0.505 -10.545 0.000				-0.468 -2.353 0.010
Ln(EAF _{t-1} /EAF _{t-2})			0.095 6.240 0.000				
Decrease_Dummy* * Ln(EAF _{t-1} /EAF _{t-2})			0.217 3.976 0.000				
Ln(EAF _t /EAF _{t-2})				0.830 66.746 0.000			
Decrease_Dummy* Ln(EAF _t /EAF _{t-2})				-0.331 -6.552 0.000			
Ln(EAF _t /EAF _{t-3})					0.847 68.701 0.000		
Decrease_Dummy* Ln(EAF _t /EAF _{t-3})					-0.236 -3.777 0.000		
Ln(EAF _t /EAF _{t-4})						0.864 62.346 0.000	
Decrease_Dummy* Ln(EAF _t /EAF _{t-4})						-0.066 -0.771 0.221	
Decrease proportion		0.278		0.499	0.611	0.798	0.509
Adjusted R ²	0.100	0.104	0.107	0.214	0.266	0.278	0.082
N	24,632	24,632	24,632	19,967	15,597	11,775	2,048
Model F-stat	2,731.702	1,424.760	738.987	2,725.454	2,825.239	2,262.561	93.394
Model signif	0.000	0.000	0.000	0.000	0.000	0.000	0.000

P-values are one tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.

TABLE 6

Stickiness in specific years and pre/post SOX – based on audit fee model for each year separately

Based on audit fee model for each year separately	2001	2002	Pre-SOX 2000-02	2003	2004	Post-SOX 2005-08	2005	2006	2007	2008
Dependent variable: Ln(AF _t /AF _{t-1})	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value
Intercept	0.072 5.991 0.000	0.075 5.637 0.000	0.074 8.025 0.000	0.118 8.163 0.000	0.112 5.094 0.000	0.035 5.890 0.000	0.097 5.634 0.000	0.022 1.978 0.048	0.041 3.882 0.000	0.012 1.267 0.205
Ln(EAF _t /EAF _{t-1})	0.447 6.121 0.000	0.504 7.701 0.000	0.490 10.146 0.000	0.494 9.010 0.000	0.750 16.701 0.000	0.749 31.605 0.000	0.660 12.223 0.000	0.791 17.387 0.000	0.689 14.661 0.000	0.476 8.272 0.000
Decrease_Dummy* Ln(EAF _t /EAF _{t-1})	-0.137 -1.086 0.139	-0.028 -0.200 0.421	-0.104 -1.091 0.138	-0.106 -0.692 0.245	-0.408 -2.100 0.018	-0.503 -7.611 0.000	-0.542 -2.726 0.003	-0.768 -5.455 0.000	-0.319 -2.885 0.002	-0.239 -2.175 0.015
Decrease proportion	0.310	0.476	0.386	0.388	0.342	0.246	0.118	0.023	0.370	0.237
Adjusted R ²	0.033	0.034	0.035	0.031	0.083	0.085	0.045	0.088	0.081	0.033
N	1,977	3,057	5,034	3,465	3,507	12,626	3,411	3,297	3,107	2,811
Model F-stat	34.211	55.144	92.720	57.166	159.088	589.312	80.817	159.297	136.971	48.934
Model significance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

P-values are one-tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.

TABLE 7
 Audit fee estimation model regression results (model 1) – re-estimated for use in
 Table 8 below

	Excluding small (+/-5%) audit fee adjustments	Big 4 auditors only	Survivors only	Same auditor (no switch)
	Coefficient <i>t</i> -statistic <i>P</i> -value	Coefficient <i>t</i> -statistic <i>P</i> -value	Coefficient <i>t</i> -statistic <i>P</i> -value	Coefficient <i>t</i> -statistic <i>P</i> -value
Intercept	9.627 438.988 0.000	9.509 326.666 0.000	9.411 248.065 0.000	9.657 419.522 0.000
LTA	0.510 190.551 0.000	0.519 154.250 0.000	0.547 123.534 0.000	0.516 189.474 0.000
LBS	0.121 15.997 0.000	0.160 20.153 0.000	0.128 11.361 0.000	0.133 17.894 0.000
CATA	0.648 28.116 0.000	0.856 30.931 0.000	0.876 22.399 0.000	0.715 29.972 0.000
QUICK	-0.035 -17.001 0.000	-0.045 -18.853 0.000	-0.053 -15.540 0.000	-0.035 -15.967 0.000
DE	0.073 4.107 0.000	0.120 5.394 0.000	-0.051 -1.419 0.156	0.103 5.418 0.000
ROI	-0.223 -28.619 0.000	-0.406 -21.167 0.000	-0.423 -15.259 0.000	-0.248 -26.900 0.000
FORDUM	0.488 45.306 0.000	0.489 44.320 0.000	0.462 29.576 0.000	0.476 45.057 0.000
LOSS	0.033 3.048 0.002	-0.012 -0.955 0.339	0.077 4.549 0.000	0.007 0.643 0.520
Adjusted R ²	0.735	0.686	0.762	0.761

N	26,219	20,778	9,882	22,710
Model F-stat	9,100.746	5,675.708	3,955.606	9,032.576
Model signif	0.000	0.000	0.000	0.000

Dependent variable: Natural log of audit fees.

P-values are one-tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.

TABLE 8

Robustness tests – based on audit fee model for each year separately

	Based on audit fee model that includes all obs					Based on fee model that includes only relevant obs			
	Excluding small (+/-5%) Audit fee adjustmnts	Big 4 auditors only	Survivors only	Same auditor (no switch)	Auditor changed (incl from Andersen)	Excluding small (+/-5%) Audit fee adjustments	Big 4 auditors only	Survivors only	Same auditor (no switch)
Dependent variable:	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Ln(AF _t /AF _{t-1})	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic	<i>t</i> -statistic
	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value	<i>P</i> -value
Intercept	0.069 12.579 0.000	0.056 11.001 0.000	0.024 3.702 0.000	0.060 13.976 0.000	-0.068 -2.963 0.003	0.186 38.323 0.000	0.180 39.347 0.000	0.140 23.602 0.000	0.163 42.026 0.000
Ln(EAF _t /EAF _{t-1})	0.806 44.666 0.000	0.830 48.262 0.000	0.833 36.167 0.000	0.749 50.848 0.000	0.951 12.353 0.000	0.649 25.743 0.000	0.597 22.826 0.000	0.503 14.425 0.000	0.568 26.696 0.000
Decrease_Dummy*	-0.441 -7.919 0.000	-0.580 -9.282 0.000	-0.609 -7.577 0.000	-0.582 -12.358 0.000	-0.416 -2.244 0.013	-0.165 -3.158 0.002	-0.312 -5.778 0.000	-0.219 -3.212 0.001	-0.287 -6.511 0.000
Decrease prop.	0.365	0.250	0.224	0.167	0.535	0.484	0.285	0.284	0.281
Adjusted R ²	0.106	0.134	0.147	0.118	0.072	0.047	0.038	0.032	0.041
N	20,555	17,286	8,783	22,008	2,624	20,555	17,286	8,783	22,008
Model F-stat	1,215.20	1,337.51	756.19	1473.58	102.36	502.28	338.23	148.10	469.42
Model significance	0.000	0.000	00.000	0.000	0.000	0.000	0.000	0.000	0.000

P-values are one-tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.

TABLE 9
 Audit fee stickiness (2000-2008) – based on audit fee model for the entire period and alternative forms of the model

Dependent variable	Based on audit fee model for the entire period together		Based on audit fee model for each year separately			
	Column A Ln(AF _t /AF _{t-1})	Column B Ln(AF _t /AF _{t-1})	Column C AF _t /AF _{t-1}	Column D AF _t /AF _{t-1}	Column E AF _t	Column F Ln(AF _t /AF _{t-1})
	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value	Coeff. <i>t</i> -stat <i>P</i> -value
Intercept	0.164 49.520 0.000	0.151 36.877 0.000	0.111 0.630 0.529	-0.221 -1.054 0.292	-29,046.918 -3.293 0.001	0.041 7.705 0.000
Ln(EAF _t /EAF _{t-1})	0.538 32.953 0.000	0.611 27.920 0.000				0.785 46.034 0.000
Decrease_Dummy* Ln(EAF _t /EAF _{t-1})		-0.224 -5.019 0.000				-0.447 -8.618 0.000
EAF _t /EAF _{t-1}			1.157 8.270 0.000	1.365 8.705 0.000		
Decrease_Dummy* (EAF _t /EAF _{t-1})				0.431 2.938 0.002		
EAF _t					1.251 275.163 0.000	
Decrease_Dummy						0.024 2.284 0.011
Decrease proportion		0.387				0.338
Adjusted R ²	0.042	0.043	0.003	0.003	0.714	0.104
N	24,632	24,632	24,632	24,632	30,298	24,632
Model F-stat	1,085.886	556.071	68.396	38.526	75,714.699	951.742
Model significance	0.000	0.000	0.000	0.000	0.000	0.000

P-values are one-tailed, except for the intercept where *P*-values are two-tailed.

Variable definitions are given in Table 1.