

**Discretionary Accruals, Audit-Firm Tenure and Auditor Tenure:
An Empirical Case in Taiwan***

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ABSTRACT: In this paper, we examine how audit tenure affects earnings quality via investigating the effect of audit tenure on the level of discretionary accruals. Specifically, we distinguish two kinds of auditor-client relationship, *auditor tenure* and *audit-firm tenure*, to represent the rotation effect “within” and “between” audit firms by Taiwan data. We have three major findings. First, either from the view of audit-firm tenure or auditor tenure, familiarity is helpful in auditing process to produce higher earnings quality, but excessive familiarity results in lower earnings quality. Second, Big 5 auditors are superior in obtaining learning experience in the initial period of engagement and hence improve earnings quality. It implies that the negative effect on earnings quality is more serious in the clients of non-Big 5 auditors if mandatory auditor rotation of audit firms were put into practice. Finally, when we jointly incorporate audit-firm tenure and auditor tenure into analysis, the results show that audit-firm tenure plays the key role in the transition of learning experience. We regard the empirical results as valuable reference to the regulator even though the results of the analysis origin from a non-mandatory auditor rotation regime.

Keywords: *Audit-Firm Tenure, Auditor Tenure, Earnings Quality, Mandatory Rotation*

Data Availability: *All data used in this study is publicly available.*

JEL Classification: K0; M4.

1. Introduction

Auditor's independence is the cornerstone of audit function; however, the capital market takes suspicious attitude towards the effectiveness of auditing post-Enron. It causes the Congress and regulators in the United States to call for many reforms on auditing professions to waken the diminishing credibility of financial reporting. The major contents of recent reforms to oversee audit function are in three ways, which are to strengthen the functioning of independent audit committee, to restrict the scope of non-audit services, and to require the mandatory auditor rotation. This study is to investigate how audit tenure affects earnings quality concerning the debate on mandatory auditor rotation.

The *Sarbanes-Oxley Act of 2002* (hereafter *the Act*) treats audit services as unlawful if the lead or the coordinating audit partner provides services for five consecutive years of a certain client.¹ Although some research empirically examined the association between audit-firm–client relationship and discretionary accruals (e.g. Johnson et al. 2002; Myers et al. 2003; Ghosh and Moon 2003), these studies defined audit tenure as the length of years that a client has retained its “audit-firm” rather than the lead or the coordinating

¹ See section 203 of *the Act*. In addition, the Public Oversight Board calls for mandatory auditor rotation every seven years in its Final Report (2002).

“auditor” governed by *the Act*. Therefore, we might not be able to assess the effectiveness of *the Act* based on the evidence from prior literature if the measurement of audit-firm tenure differs from the definition in *the Act*. That is, “auditor tenure” is distinct from “audit-firm tenure” on the debate of mandatory auditor rotation. Hence, there is a measurement error on audit tenure if we use the results of previous literature to justify or criticize the provisions on mandatory auditor rotation in *the Act* when the audit-firm tenure is not perfectly correlated to the auditor tenure.

There is a growing body of literature indicating that short audit-firm tenure has negative effect on the quality of financial reporting (Johnson et al. 2002; Myers et al. 2003; Ghosh and Moon 2003). They interpreted the empirical findings as a lack of client-specific knowledge in the early years of an audit and inferred that mandatory auditor rotation between audit firms may result in lower quality of earnings owing to short audit-firm tenure. These empirical findings indicate potential weakness of mandatory auditor rotation of audit firms.² Nonetheless, the loss of learning experience in client-specific knowledge may not take place if the rotation requirement is aimed at the auditors *within* an audit firm. Thus, this study explores the potential effect of mandatory

² Another reason for opponents mentioned against mandatory auditor rotation is that a new engagement needs significant start-up costs as well as firm-specific knowledge.

auditor rotation required by *the Act* on earnings quality in view of auditors' learning experience.

Another research issue is the auditors' incremental learning experience with the passage of time. The trade-off between the incremental effect of learning experience and excessive familiarity has been a cost-benefit consideration on the rotation debate. If the incremental effect of learning experience diminished at certain long-lasting tenure, the excessive familiarity would impair audit quality in a lengthy auditor-client relationship. Accordingly, it is worthwhile to investigate whether the incremental effect of auditors' learning experience diminished with extended audit tenure. We regard it as a main point to the issue whether the learning experience absorption effect exists in "audit-firm-level" tenure or in "auditor-level" tenure, which provides a valuable reference for the legislators.³

Our study contributes to the debate on mandatory auditor rotation since it provides empirical evidence related to *the Act*. As discussed above, the data limitation will be the main concern to evaluate the effectiveness of mandatory auditor rotation *within* an audit firm. We use annual financial reports in Taiwan as our data source to eliminate the data

³ To our knowledge, Ferguson et al. (2003) is the only paper that discriminates firm-wide industry expertise and office-level expertise to examine how auditor industry expertise affects auditing pricing. Nonetheless, it is different from our study that focuses on auditor-client relationship.

constraint because an audit report in Taiwan has to be signed by two audit partners in addition to a signature representative of an audit firm. Consequently, the data in Taiwan provides us with an opportunity to investigate how audit tenure, both auditor tenure and audit-firm tenure, affects earnings quality. We believe that an analysis considering both effects of audit-firm tenure and auditor tenure on earnings quality provides much direct evidence to evaluate the potential impacts of mandatory auditor rotation on the quality of financial reporting.

In this paper, we explore the effect of mandatory auditor rotation from the viewpoint of learning experience. We posit it inefficient to mandate auditor rotation if extended auditor tenure has positive effect on the learning experience. We further examine whether lower earnings quality is along with excessive familiarity in the auditor-client relationship. In addition, we investigate whether the ability of learning experience absorption in Big 5 auditors is better than that of non-Big 5 auditors.⁴ In particular, since auditor tenure is distinct from audit-firm tenure, we analyze how the two audit tenure affect earnings quality.

Our empirical results indicate that, either from the view of auditor tenure or

⁴ The term Big 5 is used throughout this study to indicate the affiliated firms of large international accounting firms.

audit-firm tenure, familiarity indeed helps in auditing process and producing higher quality of earnings, but excessive familiarity also impairs audit quality. The cutoff point of positive and negative effects of familiarity is around five years. Furthermore, we find evidence that the transition of learning experience is better in audit firms when we jointly incorporate the two tenure effects instead of individual effect separately. We also find that Big 5 auditors are prominent in auditing expertise because they learn the client-specific knowledge more quickly. More importantly, when an audit firm has served for its client for a period of time, the learning experience still goes on even if there is an auditor change within the audit firm. These findings imply that the transition of learning experience reveals in both audit firms and auditors, but the major effect exists in audit firms. In addition, the threats of mandatory auditor rotation to impair learning experience in auditing expertise are more serious in non-Big 5 auditors because they are less specialized in building client-specific knowledge compared with Big 5 auditors. Therefore, regulators should pay more attention to the potential negative effect on non-Big 5 auditors if they are going to mandate rotation of audit firms.

Although our findings are based on a real world without mandatory auditor rotation, we believe the evidence still provide insights for policy makers to some extent. We organize the rest of this paper as follows. Section 2 reviews prior literature on auditor

tenure and constructs our hypotheses. Section 3 describes the research method. Section 4 presents our major findings. We conclude this paper in Section 5.

2. Literature Review and Hypothesis Development

Literature Review

There are pros and cons on mandatory auditor rotation. Brody and Moscovice (1998) assert that auditor rotation will enhance greater independence and audit quality through a reduction of clients' inadequate influence on auditors. The inadequate influence might come from the risk of losing clients if the auditors do not agree with managers' financial reporting preferences (Farmer et al. 1987). Further, Knapp (1991) finds that audit committee member perceptions of audit quality are positively correlated with auditor tenure only if the auditor tenure with a given client is 5 years; quite the opposite, the perception becomes negatively correlated with the auditor tenure which is more than 5 years.

In July 2003, International Federation of Accountants (hereafter IFAC) issued a report, *Rebuilding Public Confidence in Financial Reporting*, which treats familiarity as helpful in audit process to produce greater understanding and improved ability to identify and evaluate risks. However, IFAC also recognizes that familiarity is one of the

significant threats to auditor independence. The main concern of IFAC is that excessive familiarity may result in auditors' complacency or hesitancy to challenge appropriately and thereby reduces the level of skepticism necessary for an effective audit (IFAC 2003). Louwers (1998) also finds that the length of auditor-client relationship affects auditors' propensity to issue a going-concern disclosure to a distressed client. Hence, the proponents suggest that rotation could significantly improve the overall quality of an audit and enhance the quality of the financial reporting process (e.g., Imhoff 2003 and Dopuch et al. 2001).

However, an especially challenging audit job comes from a new engagement because auditors have less information about these firms (AICPA 1992). The view of auditor expertise suggests that auditors gain more experience and build client-specific assets from the ongoing relationship and in turn have a greater ability to detect accounting irregularities (Arrunada and Paz-Ares 1997). Geiger and Raghunanda (2002) also demonstrate that there were significantly more audit failures in the earlier years of the auditor-client relationship.

Some recent studies regard the association between audit-firm-client relationship and the quality of earnings to assess the potential effectiveness of auditor rotation (e.g., Johnson et al. 2002; Myers et al. 2003; Ghosh and Moon 2003). Their empirical evidence

supports that short audit tenure leads to lower earnings quality which proxied by discretionary accruals.⁵

Prevailing accounting studies have taken discretionary accruals as the convincing variable to be a proxy for earnings quality since *Jones Model* (Jones 1991) introduced the concept (e.g., Defond and Jiambalvo 1994; Subramanyam 1996; Defond and Subramanyam 1998; Becker et al. 1998; Teoh et al. 1998a, b; Klein 2002; Matsumoto 2002; Nelson et al. 2002). The calculations of discretionary accruals presented in diversified ways such as the *modified Jones model* (Tech et al. 1998a, b), *revised modified Jones models* (Dechow et al. 2003), or the performance-matched discretionary accruals model (Kothari et al. 2002). In fact, numerous prior studies on audit quality also adopted discretionary accruals to explore how other factors (e.g., Big 5 and non-Big 5; board of directors; audit services and non-audit services) affect audit quality (e.g., Becker et al. 1998; Klein 2002; Nelson 2002).

Hypothesis Development

Although general knowledge and industry knowledge are important factors for auditors to detect accounting irregularities, a great deal of client-specific experience or

⁵ In addition to discretionary accruals, there are some other proxies used to examine the relation between audit-firm tenure and earnings quality such as the persistency of accruals into future earnings (Johnson et al. 2002), current accruals (Myers et al. 2003), special items and market-based measures like earnings response coefficients (Ghosh and Moon 2003).

knowledge is more critical to produce a report with higher audit quality. Arrunada and Paz-Ares (1997) pointed out that knowledge and experience obtained from different clients might not be perfect substitutes. In addition, some empirical studies found that earnings quality is worse at the initial stage of new audit engagement because of a lack of client-specific knowledge (Johnson et al. 2002; Myers et al. 2003). Therefore, we postulate the following hypothesis in the alternative form.

H1 (Learning Effect Hypothesis): *Earnings quality is an increasing function of audit tenure in the initial period of an audit engagement.*

Regarding potential problems in the lengthy auditor-client relationship, IFAC (2003) mentioned that excessive familiarity leads to auditors' complacency or hesitancy to challenge appropriately and hence reduces the level of skepticism. If the concern is valid and the *incremental* learning effect disappears with the passage of time, we anticipate an inverse result of hypothesis 1 to happen after certain audit tenure. It leads to our second hypothesis that audit tenure is inversely related to earnings quality in the later stage of audit tenure.

H2 (Excessive-Familiarity Effect Hypothesis): *Earnings quality is a decreasing function of audit tenure after learning effect diminished.*

Because prior literature indicates that Big 5 auditors have more auditing and industrial expertise, we expect that they are able to go through the learning effects more quickly than non Big 5 auditors. It constitutes our third hypothesis to test whether Big 5 auditors expedite learning effect.

H3 (Learning Differentiation Hypothesis): *The quickness of learning effect via tenure is better in Big 5 auditors.*

We use audit-firm tenure and auditor tenure as measurements to test our hypotheses.

3. Methodology and Sample Description

Dependent Variable

We use discretionary accruals (*DAC*) as a proxy for earnings quality similar to Johnson et al. (2002) and Myers et al. (2003) to examine the effect of audit tenure on the quality of financial reporting. The measurement of *DAC* is based on the *forward-looking model* proposed by Dechow et al. (2003) in that accruals may be positively related to

sales growth.⁶

We measure *DAC* in the following sequence. First, because Hribar and Collins (2002) show that the errors in estimated accruals using the balance-sheet approach is correlated with firms' economic characteristics, we use the cash-flow statement approach and follow Phillips et al. (2003) to calculate the total accruals (*TAC*) of a firm by subtracting operating cash flows from net income:

$$TAC_{it} = EBEI_{it} - (CFO_{it} - EIDO_{it}) \quad (1)$$

where

TAC_{it} = firm *i*'s total accruals in year *t*;

$EBEI_{it}$ = firm *i*'s income before extraordinary items in year *t*;

CFO_{it} = firm *i*'s cash flows from operations in year *t*;

$EIDO_{it}$ = firm *i*'s extraordinary items and discontinued operations from the statement of cash flows in year *t*.

Second, scale all variables by beginning-of-year total assets to estimate the following regression for each industry and each year classified by Taiwan Stock Exchange Corporation and each year-grouping,

⁶ Dechow et al. (2003) proposed three *revised cross-sectional modified Jones models*, namely “adopted”, “lagged”, and “forward-looking” models. Our findings are not sensitive to the *original cross-sectional modified Jones model* and all of the three revised models.

$$\Delta\text{REC}_{it} = \alpha_t + k_t \cdot \Delta\text{Sales}_{it} + \varepsilon_{it} \quad (2)$$

where

ΔREC_{it} = the change in firm i 's accounts receivable from year $t-1$ to t , scaled by beginning-of-year assets;

ΔSales_{it} = the change in firm i 's sales from year $t-1$ to t , scaled by beginning-of-year assets;

ε_{it} = the error term.

Finally, derive discretionary accruals from the *forward-looking model* proposed by

Dechow et al. (2003), which is:

$$\begin{aligned} \text{TAC}_{it} = & \alpha + \beta_1[(1 + k_t)\Delta\text{Sales}_{it} - \Delta\text{REC}_{it}] + \beta_2\text{PPE}_{it} + \beta_3\text{TAC}_{it-1} \\ & + \beta_4\text{GR_Sales}_{it+1} + \varepsilon_{it} \end{aligned} \quad (3)$$

where

TAC_{it} = firm i 's total accruals in the year t scaled by year $t-1$ total assets;

TAC_{it-1} = firm i 's total accruals in the year $t-1$ scaled by year $t-2$ total assets;

PPE_{it} = firm i 's year t gross property, plant, and equipment (land excluded);

GR_Sales_{it+1} = the growth rate of firm i 's sales from year t to $t+1$;

ε_{it} = the error term.

Following prior work such as Johnson et al. (2002), we also perform our tests using

the absolute value of *DAC* for another estimate of earnings quality.

Measurement of audit tenure

For the primary variable of interest, audit tenure, we calculate it by two

measurements to test our hypotheses, including the rotation effect *within* an audit firm and *between* audit firms. We define *TenureF* as the length of years which an audit firm has provided audit services for a certain client and *TenureA* as the length of longer years for which either incumbent auditor who has attested an engagement.⁷ For instance, define the vector $(x, y)_t$ as auditors x and y attest to a financial report in year t . A series of attested auditor $(x, y)_t, (x, y)_{t-1}, (x, z)_{t-2}, (y, z)_{t-3}, \dots$, shows that *TenureA* equals 3.⁸ We consider the definition of *TenureA* representative of rotation effect *within* an audit firm. The variable *TenureF* is used to investigate the rotation effect *between* audit firms so as to compare with the effect *within* an audit firm we addressed.

In the following analysis, we broadly define the variable *Tenure* as the length of auditor-client relationship regarding both rotation effects (i.e., the *within* and *between* auditor rotation effects) to simplify our explanation. We consider two measurements of *Tenure* mention above to examine the association between auditor-client relationship and

⁷ For the merge of accounting firms, we regard the original two firms as the same firm to compute audit-firm tenure in our study.

⁸ Since an audit report has to be attested by two audit partners along with a signature representative of an audit firm in Taiwan, it happens at times when one auditor remains in the engagement but the other one quits, or both auditors quits the engagement but the successive auditors are both in the same audit firm. In fact, we once calculated another measurement of audit tenure, which is the length of “shorter” years for which either incumbent auditor has attested an engagement. However, it does not support our hypotheses since the ability to gain learning experience should attribute to the incumbent auditor who has attested for “longer” years. We believe the measurement *TenureA* in the text is appropriate for testing our hypotheses.

discretionary accruals.

Control Variables

To control other cross-sectional factors with systematic effects on the distribution of *DAC*, we add several variables into the model to test our hypotheses. In particular, we include *Big5* for it has higher audit quality (Becker et al.1998), *Issue* because the seasoned equity offering companies tend to record larger accruals (Tech et al. 1998b), *Age* to control the variation of accruals during different stages of firm life cycle (Anthony and Ramesh 1992), and *Size* to control the large firms with larger and more stable accruals (Dechow and Dichev 2002). Finally, we also incorporate indicator variables of different years and industries to mitigate the potential confounding effects from different years and across industries.

The Empirical Model

Our hypotheses suggest that there is a curvilinear relation between *DAC* and *Tenure*, where *DAC* first decreases in the early stage and then increases in the later stage. To address such empirical work, in general, three approaches are commonly adopted: the quadratic form approach (e.g., McConnell and Servaes 1990), the dummy variables approach (e.g., Johnson et al. 2002), and the piecewise linear approach (e.g., Morck et al. 1988). We exclude the piecewise linear approach since there are only ten discrete integers

in this sample (i.e., Tenure = 1, 2, ..., or 10)⁹ although this approach is appropriate in Morck et al. (1988) for the highly dispersion of management ownership. We mainly use the quadratic form approach to test the hypotheses in addition to affording the result of the dummy variables approach as robustness. Specifically, we use the following equation to test our hypotheses.

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Tenure_{it}^2 + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it} \quad (4)$$

where

$Big5_{it}$ = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;

$Tenure_{it}$ = the length of the auditor-client relationship calculated by auditor or audit-firm.

$Issue_{it}$ = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;¹⁰

Age_{it} = the number of years since listing date;

$Size_{it}$ = firm size measured by natural log of total assets (in NT dollars).

If our **learning effect hypothesis** is supported, we expect the coefficient β_2 to be

⁹ Following Carcello and Neal (2003), we truncate audit tenure at ten years for reducing the potential effects of outliers (see the description of sample selection).

¹⁰ Similar to Firth (1997) and Johnson et al. (2002), we use the indicator variable *Issue* that a company issued new shares for cash during the year or in the prior two years rather than the amount of new shares as a proxy for the incentive of earnings management due to seasoned equity offering (Teoh et al. 1998b).

negative because it implies that an increase in audit tenure will cause a decrease in discretionary accruals in the initial period of new engagements. For a negative coefficient β_2 , we anticipate β_3 be positive to support our **excessive-familiarity hypothesis**. That is, if a negative coefficient β_3 along with a negative β_2 , it implies that learning effect goes on persistently. Therefore, the evidence to support excessive-familiarity hypothesis while learning effect hypothesis is sustained is that β_3 must be positive.

If the evidence supports the two hypotheses, we can further investigate the **learning differentiation hypothesis**. To test the learning differentiation hypothesis, we calculate the first derivative of Equation (4) with respect to *Tenure* to find the “optimal” audit tenure (denoted by Ω) and partition the sample into “below-optimal” and “above-optimal” sub-samples by the integer nearest to Ω . Then we run the following regression by the two sub-samples separately.

$$\begin{aligned}
 DAC_{it} = & \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Big5_{it} \times Tenure_{it} + \beta_4 Issue_{it} \\
 & + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}
 \end{aligned} \tag{5}$$

If Big 5 auditors are prominent in auditing expertise in the initial period of a new client for their quick-learning experience, we anticipate that the cross-term coefficient β_3 in Equation (5) to be negative in the below-optimal sample. We further explore the *DAC* behavior of the above-optimal sample and leave the corresponding results and

explanations in the next section.

To check the results for robustness, we perform another test on audit tenure similar to Johnson et al. (2002). We define audit tenure as *Short* when the client has retained its auditor or audit firm for three or less years (i.e., *Tenure* = 1, 2, or 3), and define audit tenure as *Long* when the client has retained its auditor or audit firm for eight or more years (i.e., *Tenure* = 8, 9, or 10).¹¹ That is,

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Short_{it} + \beta_3 Long_{it} + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it} \quad (6)$$

where

Short_{it} = a dummy variable equals 1 if *TenureF* or *TenureA* is equal to 1, 2, or 3, and 0 otherwise;

Long_{it} = a dummy variable equals 1 if *TenureF* or *TenureA* is equal to 8, 9, or 10, and 0 otherwise;

We predict a positive β_2 by the learning effect hypothesis and a positive β_3 by the excessive-familiarity hypothesis in Equation (6).

Sample Selection

Our sample consists of all listed firm-years from 1998 to 2001 year-end data available in Taiwan Economics Journal Database. We measured audit tenure as the

¹¹ Since our results (see section 4) demonstrate that the “optimal” audit tenure Ω is close to the fifth year, we define the two variable *Short* and *Long* corresponding to Ω to examine the learning effect hypothesis and the excessive-familiarity hypothesis.

number of consecutive years that the client has retained its auditor. We traced audit tenure up to ten consecutive years inclusive with sufficient data each year to ensure our data covered a reasonable period longer than five years required by *the Act*. Following Carcello and Neal (2003), we also truncate audit tenure at ten years for reducing the potential effects of outliers. We further rule out banking and insurance industries for the unique industry characteristics, and exclude the industries with less than 8 firm-year observations to make a reasonable estimate of *DAC*.¹² We finally gathered 1,337 firm-year observations. The sample selection procedure and its effect on sample size are summarized in Table 1. That is, we collect data from 1989 to 2002 to serve the purposes of calculating variables *Tenure* and *DAC* in the *forward-looking model* proposed by Dechow et al. (2003), and retrieved the data from 1998 to 2001 to conduct our empirical work.

[Insert Table 1]

4. Empirical Results

Univariate Analysis

The descriptive statistics concerning the discretionary accruals and various characteristics of all independent variables are shown in Table 2. We also present these

¹² In Taiwan, the companies of utility industry are state-owned.

descriptive statistics by two groups of auditor types and three groups of audit tenure.

[Insert Table 2]

Panel A shows that, similar to the market share of higher-quality auditors found in Becker et al. (1998) and Frankel et al. (2002), there are majority percentage of listed companies in our Big 5 subsample (*Big5* = 79.51 percent).¹³ For the dependent variable, we find the mean of *DAC* in Big 5 subsample is significantly lower than that of non-Big 5 subsample (the difference of mean equals -0.0120 and $p < 0.1$, shown in the last column). Besides, the mean of *Age* with respect to Big 5 is smaller (the difference of mean is -1.4015 and $p\text{-value} < 0.05$).¹⁴ For the younger-age firms in the Big 5 subsample, it indicates that the new listed companies are prone to choose Big 5 auditors as a signal at the time of initial public offering. It in turn gets the result that *TenureF* and *TenureA* in Big 5 subsample are significantly shorter. In addition, from the percentage of issuing new shares in Big 5 subsample (*Issue* = 51.74 percent) is larger than that in non-Big 5 subsample (*Issue* = 39.42 percent), it shows that the firm that employed a Big 5 auditor

¹³ Becker et al. (1998, 9) gathered the data from 1989 to 1992 and found 10,397 (2,179) observations that firms employed Big 6 (non-Big 6) auditors. The market share of Big 6 is 83 percent in this paper. Frankel et al. (2002, 81) gathered the data of auditor fees disclosed in proxy statement filed between February 5, 2001 and June 15, 2001 and collected 2,780 (294) observations that firms employed Big 5 (non-Big 5) auditors. The market share of Big 5 auditors is 90 percent in this paper.

¹⁴ Because the variable *Age* is truncated by 10 years, the mean or median of *Age* reported in Table 2 is smaller than its real value.

either has a propensity to or is capable of issuing new stocks. Finally, the firm with significant larger *Size* is more likely to employ a Big 5 auditor ($p < 0.05$).

We further partition the sample via audit tenure. For the Short-TenureF (-TenureA) group, the audit-firm (auditor) tenure is equal to 1, 2, or 3; for the Middle-TenureF (-TenureA) group, the audit-firm (auditor) tenure equals 4, 5, or 6; for the Long-TenureF (-TenureA) group, the audit-firm (auditor) tenure equals 7, 8, 9, or 10. The upper part of Panel B in Table 2 shows the descriptive statistics of each group (i.e., Short, Middle, and Long) in each category (i.e., TenureF and TenureA). The lower part of the Panel B demonstrates the difference of the variables via the Middle group as a benchmark. It shows that either Middle-TenureF or Middle-TenureA group has the lowest DAC, which consistent with our research hypotheses. The Long-TenureF (-TenureA) group has the lowest Big 5 market shares and least frequency on issuing new shares. Finally, the firm age and size are both smallest in Short-TenureF (-TenureA) group.

From these univariate results, we portray the relation between audit tenure and discretionary accruals in Figure 1.

[Insert Figure 1]

Panel A and B in Figure 1 shows that there is an upward parabolic relation between *DAC* and *Tenure*. Figure 1 clearly suggests that the coefficients of *Tenure* and *Tenure*² in

Equation (4) (i.e., β_2 and β_3) should be negative and positive, respectively. In other words, *DAC* is decreasing with audit tenure while it is increasing in the later stage of audit tenure. It means that there exists a lowest *DAC* with respect to audit tenure, and the lowest points in both panels are around 5 years.

Table 3 presents Pearson correlation matrix of all variables according to Big 5 and non-Big 5 subsamples. We find that *DAC* has a weak linear relation with *TenureF* and *TenureA* respectively in each subsample. Besides, *TenureF* and *TenureA* are positively correlated.

[Insert Table 3]

Multivariate Analysis

To test our hypotheses, we perform multivariate tests in Equation (4) and Equation (6) including control variables to ensure the results appeared in Figure 1 not subject to some important factors that have systematic effects on the cross-sectional variation in accruals. The regression results on different audit tenure definitions are shown in Table 4. The coefficients of *Big5* in Equation (4) are both negatively significant at $p < 0.05$ ($\beta_1 = -0.0125$ by *TenureF* and $\beta_1 = -0.0138$ by *TenureA*, reported in Panel A). Consistent with Becker et al. (1998) from U.S. data which found that Big 5 auditors provide better service quality than non-Big 5 auditors do, our sample also provides evidence that the audit

quality of Big 5 auditors is still better in Taiwan.

[Insert Table 4]

In addition, we report the results of the nonlinear relationship between *DAC* and *Tenure* in Panel A of Table 4. First, for audit firms, the coefficient of *TenureF* is significantly negative ($\beta_2 = -0.0110$, $p < 0.05$), and the coefficient of *TenureF*² is significantly positive ($\beta_3 = 0.0012$, $p < 0.01$). It means that, *ceteris paribus*, audit tenure initially decrease *DAC* but later increase *DAC* if audit tenure is extended up to a certain year. Specifically, the negative coefficient of *TenureF* supports our **learning effect hypothesis**, and the positive coefficient of *TenureF*² supports our **excessive-familiarity hypothesis**. Besides, the absolute value of β_2 is significantly larger than β_3 ($p < 0.01$, not tabulated) guarantees the decrease of learning effect from an engagement is a concave function. We take the first derivative of *DAC* with respect to *TenureF* and find the “optimal” tenure is 4.6 years.¹⁵ Second, for auditors (i.e., *TenureA*), the coefficients of *Tenure*-related variables weakly support our hypotheses ($\beta_2 = -0.0069$, $p = 0.1115$ not tabulated and $\beta_3 = 0.0007$, $p < 0.05$). The relation between *DAC* and *TenureA* is similar to the findings of *TenureF*, and the “optimal” tenure is equal to 4.6. These findings are

¹⁵ Let $-0.0110 + 2 \times 0.0012 \times \textit{TenureF}$ equals zero, we find $\textit{TenureF} = 4.6$.

consistent with Figure 1.¹⁶

In Panel B of Table 4, we perform our test on Equation (6) and found evidence that the quality of financial reports issued by a company is lower when audit tenure is either short or long. In particular, the *Short* and *Long* dummy variables are both positively related to *DAC* because Panel B shows that the coefficients of *Tenure*-related variables (*Short* and *Long*) β_2 and β_3 in Equation (6) are all positive (all $p < 0.1$). Hence, the *Short* dummy variable supports our **Learning Effect Hypothesis** and the *Long* dummy variable supports our **Excessive-Familiarity Effect Hypothesis**.

Following Johnson et al. (2002), we also use the absolute value of *DAC* to test our hypotheses and report the results in Table 5. Although the sign of all control variables do not vary from Table 4; nonetheless, neither the results of *Big5* nor *Tenure* support our hypothesis. We regard the phenomena of insignificance coefficient of *Big5* as audit conservatism in Big5 auditors when the dependent variable is absolute value of *DAC* instead of the original *DAC*. In other words, the monitoring function of Big 5 auditors is asymmetric (Kim et al. 2003).¹⁷

¹⁶ We will explain why the significance of *TenureF*-related variables is greater than that of *TenureA*-related variables in the subsequent findings reported in Table 7, 8 and 9. Actually, we find that the major effect of *Tenure* on earnings quality is in an audit firm instead of auditors.

¹⁷ We once duplicated the methodology proposed by Kim et al. (2003) to separate the sample according to cash flows (CFO) of a firm compared with other firms in the same industry. The evidence is unclear compared with Kim et al. (2003). However, when we replace the comparative benchmark by CFO of the

[Insert Table 5]

To test the third hypothesis that whether there exists learning effect differences between Big 5 auditors and non-Big 5 auditors, we perform Equation (5) using the two subsamples, *below-optimal sample* and *above-optimal sample*, and report the results in Table 6.

[Insert Table 6]

In Table 6, Panel A and B are the results using the below-optimal sample (i.e., the observations that audit-firm tenure and auditor tenure is at or below 5 years); Panel C and D are the results using the above-optimal sample (i.e., the observations that audit-firm tenure and auditor tenure is above 5 years). Panel A shows the results of excluding the variable *Tenure* in below-optimal sample. Consistent with Table 4 and prior literature, the coefficients of *Big5* are all significantly negative in Panel A ($\beta_1 = -0.0193$, $p < 0.10$ by *TenureF* and $\beta_1 = -0.0227$, $p < 0.05$ by *TenureA*). In Panel B, however, the coefficients of *Big5* are both insignificant ($\beta_1 = 0.0106$ by *TenureF* and $\beta_1 = 0.0140$ by *TenureA*), which

full sample across industries, our findings (not tabulated) are consistent with those in Kim et al. (2003). In addition, we also partitioned the full sample with respect to the sign of DAC (i.e. $DAC > 0$ and $DAC < 0$) and ran the Equation (4) again. We expect the result to be more significant for the $DAC > 0$ sub-sample because both auditors and managers have, in general, more clear incentive to boost reported earnings. The results show that, although there is no apparent difference in the significance level of *TenureF*-related coefficients between the full sample and the $DAC > 0$ sub-sample, the *TenureA*-related variables do become more significant in the $DAC > 0$ sub-sample (not tabulated) compare with that in the full sample.

implies that Big 5 auditors are no better than non-big 5 auditors in enhancing earnings quality for the initial period of engagement. Besides, Panel B of Table 6 shows that the coefficients of *TenureF* and *TenureA* are both insignificant ($\beta_2 = 0.0033$ by *TenureF* and $\beta_2 = 0.0055$ by *TenureA*) while the coefficients of the cross term of *Big5* and *Tenure* are both significantly negative ($\beta_3 = -0.0121$, $p < 0.10$ by *Big5*×*TenureF* and $\beta_3 = -0.0136$, $p < 0.05$ by *Big5*×*TenureA*). These findings indicate that the prominent role of Big 5 auditors attributes to their auditing expertise in a new client rather than a pure Big 5 *brand name effect*. Finally, all the control variables have the same direction as the results of Table 4. Hence, the results support our **learning effect differentiation hypothesis**, which Big 5 auditors are prominent in auditing expertise in the initial period of a new client for their quick-learning experience.

On the other hand, Panel C (Panel D) in Table 6 shows the results of excluding (including) the *Tenure*-related variables in the above-optimal sample. It is interesting to find that the coefficients of *Big5* are all insignificant in both Panel C and Panel D. Besides, the coefficients of *Tenure* and *Big5*×*Tenure* are both insignificant. The results indicate that the major factor to determine audit quality is the Big 5 auditors' auditing expertise in quick learning in the initial period of an audit. However, during the later period of engagement, the prominent audit quality of Big 5 auditors disappears after the

non Big 5 auditors also catch up with the learning effect up to certain tenure.

The empirical findings imply that the different ability between Big 5 and non-Big 5 auditors diminished when audit tenure is up to certain long-lasting relationship. Therefore, after the enforcement of *the Act*, whether the opportunities of obtaining learning experience in non-Big 5 auditors still exist is an open issue. This concern is especially important, if the requirement of mandatory rotation focuses on *between* audit firms rather than *within* an audit firm, for that the abilities in reaching client-specific assets are different between audit firm types. In summary, the results indicate that the hurts of earnings quality due to mandatory rotation between audit firms will be smaller for the clients of Big 5 auditors and be more serious for the client of non-Big 5 auditors.

Further Analysis

Since there is a degree of audit-firm effect embedded in the measurement of *TenureA*, we examine audit-firm tenure and auditor-tenure effects jointly by performing Equation (7). Table 7 displays the results.

$$\begin{aligned}
 DAC_{it} = & \beta_0 + \beta_1 Big5_{it} + \beta_2 TenureF_{it} + \beta_3 TenureF_{it}^2 + \beta_4 TenureA_{it} + \beta_5 TenureA_{it}^2 \\
 & + \beta_6 Issue_{it} + \beta_7 Ages_{it} + \beta_8 Sizes + \beta_{9-21} Industry + \beta_{1999-2001} Year + \varepsilon_{it} \quad (7)
 \end{aligned}$$

[Insert Table 7]

The results of Table 7 show that the coefficient of *Big5* remains significantly negative ($\beta_1 = -0.0124$, $p < 0.05$) and the sign of three control variables are all the same as that of Table 4. Besides, the significant results of *TenureF*-related variables and insignificant results of *TenureA*-related variable jointly indicate that the **learning effect** and **excessive-familiarity effect** are mainly from the audit firm rather than the auditors ($\beta_2 = -0.0139$, $p < 0.05$ and $\beta_3 = 0.0014$, $p < 0.01$; $\beta_4 = 0.0033$ and $\beta_5 = -0.0003$, both insignificant). In other words, the “positive” learning effect and the “negative” excessive-familiarity effect we find in the study imply that regulators should pay more attention to the regulation on audit firms. Therefore, the expectation to shift auditors’ behavior towards better audit quality through a “moderate reform” in *the Act*, which requires auditors to rotate within an audit firm, might be over optimistic because the main rotation effect exists in audit firms, rather than auditors. Of course, the insignificant results on the coefficients of *TenureA*-related variables in Table 7 could be related to multicollinearity problem (the correlation between *TenureF* and *TenureA* is 0.873 in Table 3)

For the audit-firm effect embedded in the measurement of *TenureA*, we further use Equation (8) to re-examine the **learning differentiation hypothesis** by “below-optimal” and “above-optimal” samples separately.

$$\begin{aligned}
DAC_{it} = & \beta_0 + \beta_1 Big5_{it} + \beta_2 TenureF_{it} + \beta_3 TenureA_{it} + \beta_4 Big \times TenureF_{it} \\
& + \beta_5 Issue_{it} + \beta_6 Ages_{it} + \beta_7 Sizes + \beta_{8-20} Industry + \beta_{1999-2001} Year + \varepsilon_{it} \quad (8)
\end{aligned}$$

Table 8 reports that the auditing expertise of Big 5 auditors generates a significant coefficient of the cross-term $Big5 \times TenureF$ ($\beta_4 = -0.0120$, $p < 0.10$) in the “below-optimal” sample reported on the left part, which is consistent with the results of Panel B in Table 6. In addition, the insignificant coefficient of the cross-term $Big5 \times TenureF$ ($\beta_4 = 0.0037$) in the “above-optimal” sample reported on the right part shows the result is consistent with the finding in Panel D of Table 6.

[Insert Table 8]

While Table 4 shows that auditor tenure does have certain effect on discretionary accruals, Table 8 presents that the effect of auditor-client relationship on discretionary accruals is mainly on the audit firm instead of the auditors.

Finally, to infer the effectiveness of *the Act*, we simulate a *quasi-auditor-rotation sample* to calculate $TenureA$. Specifically, we gather the data that satisfies (1) for a specific client, both auditors of the client once changed when we trace the observations from the sample year, and (2) before the auditor change, the audit firm has served the client for *exactly* five years. There are 26 observations in the quasi-auditor-rotation sample. Hence, the variable $TenureA$ in the quasi-auditor-rotation sample is closer to the

spirit of *the Act* that requires auditors to rotate within an audit firm.¹⁸

We re-run Equation (4) via the quasi-auditor-rotation sample to examine the effect of auditor change within an audit firm on earnings quality when the same audit firm has provided audit services to the client for five years.

The empirical results in Table 9 reconfirm our hypothesis that Big 5 auditors' prominent auditing expertise arises from their better ability of learning client-specific knowledge. The evidence shows that the coefficient of *Big5* becomes insignificant in the quasi-auditor-rotation sample. It indicates that the audit quality of both auditor types is similar if non-Big 5 auditors have learned client-specific experience in the later period of an engagement. Nonetheless, non-Big 5 auditors do not have the opportunities to obtain the experience if the legislators were going to require audit firms to rotate off rather than partner rotation only.

[Insert Table 9]

Robustness Analysis

To avoid the DAC calculation by the forward-looking model as well as the modified

¹⁸ Because the insignificant results of Table 9 can be attributed to insufficient observations of the *quasi-auditor-rotation* sample, we also gather a data set that satisfies (1) for a specific client, both auditors of the client once changed when we trace the observations from the sample year, and (2) before the auditor change, the audit firm has served the client for *at least* five years. We obtained 90 observations and all results are qualitatively the same as Table 9.

cross-sectional Jones model, the adopted model, and the lagged model (see detailed in footnote 6) proposed by Dechow et al. (2003) are not sufficient to address the issue of earnings quality. We therefore use the following two approaches proposed by Kothari et al. (2002) to compute DAC: (1) performance-included modified Jones model and (2) performance-matched modified Jones model where return on assets (net income divided by lagged total assets, ROA) is the performance index.

Performance-included modified Jones model:

$$TAC_{it} = \delta_0 + \frac{\delta_1}{Assets_{it-1}} + \delta_2 \Delta Sales_{it} + \delta_3 PPE_{it} + \delta_4 ROA_{it} + v_{it} \quad (9)$$

Follow prior studies and Kothari et al. (2002), we estimate the Equation (9) for each year and each industry, obtain the estimated coefficients, and subtract the change in account receivables (ΔREC_{it}) from $\Delta Sales_{it}$ prior to estimate the DAC of the performance-included modified Jones model of a firm. See Subramanyam (1996) as an example.

Performance-matched modified Jones model:

$$TAC_{it} = \beta_0 + \frac{\beta_1}{Assets_{it-1}} + \beta_2 \Delta Sales_{it} + \beta_3 PPE_{it} + \varepsilon_{it} \quad (10)$$

Still follow the similar approach aforementioned to get DAC of the modified Jones model for firm i in year t (DAC_{it}^M). Match each firm-year observation with another from the same year and industry with the closest ROA in the current year. Finally, define the

DAC of the performance-matched modified Jones model for firm i in year t (DAC_{it}^{PMM}) as the firm i 's DAC of the modified Jones model in year t (i.e., DAC_{it}^M) minus the matched firm's DAC of the modified Jones model ($DAC_{it;match}^M$). That is,

$$DAC_{it}^{PMM} = DAC_{it}^M - DAC_{it;match}^M.$$

We re-examine our hypotheses via *DAC* calculated by performance-included modified Jones model and performance-matched modified Jones model and report the result in Table 10. Columns (1) and (4) are the results of the full sample which show that audit quality of Big 5 auditors is better than that of non-Big 5 auditors. Our **learning effect hypothesis** is still supported because either the coefficient of *TenureF* or *TenureA* is significant at the conventional level. Besides, our **excessive-familiarity effect hypothesis** is also valid for the significant result of the coefficients of $TenureF^2$ and $TenureA^2$. Column (2), (3), (5) and (6) are the results of the below-optimal sample (i.e., *TenureF* or *TenureA* is below or at 5 years). While the significant coefficients of *Big5* in column (2) and (5) sustain the Big 5 auditors have better audit quality, the negatively significant results of the coefficients of $Big5 \times TenureF$ in column (3) and $Big5 \times TenureA$ in column (6) in addition to the insignificant results of the coefficients of *Big5* in columns (3) and (6) support our **learning differentiation hypothesis**. Finally, we use the performance-matched modified Jones model to measure *DAC* (not tabulated). Although

all the empirical results are still consistent with our conjectures in terms of the predicted sign of the estimated coefficients, some previous significant results are converted into insignificance. It implies that our finding might be sensitive to the discretionary accruals measurement.

[Insert Table 10]

5. Conclusion

While most previous empirical papers on the issue of audit tenure investigated the effect of audit firm tenure on discretionary accruals or earnings quality, this study examines the relation between discretionary accruals and auditor tenure in addition to audit-firm tenure. Our work contributes to mandatory auditor rotation literature in that it provides empirical evidence of the rotation effects *within* an audit firm. We select the sample in Taiwan to conform to the provisions of *Sarbane-Oxley Act of 2002* because the legislation requires auditor to rotate within an audit firm while prior empirical studies emphasize on the effect of audit-firm tenure. Our sample released the data constraint in the preceding literature by two measurements of audit tenure, *TenureF* and *TenureA*, representative of “audit-firm tenure” and “auditor tenure” respectively. It provides an opportunity to access the arguments of *Sarbanes-Oxley Act of 2002*.

We postulate three hypotheses: the learning effect hypothesis, the

excessive-familiarity hypothesis, and the learning differentiation hypothesis. Our results support the learning effect hypothesis that the ability of investigating accounting irregularities is a function of audit tenure, either auditor tenure or audit-firm tenure. We also find evidence consistent with the excessive-familiarity hypothesis, which anticipates lower earnings quality to be along with certain lengthy audit tenure. Our empirical results show that the cutoff point of the positive and negative effects of familiarity is nearly five years. For the learning differentiation hypothesis, we obtain evidence to support that Big 5 auditors gain learning experience and build the client-specific assets more quickly than non-Big 5 auditors do. Besides, the variation of audit quality between Big 5 auditors and non-Big 5 auditors diminished with the passage of time. By comparing the relative effect of audit-firm tenure and auditor tenure, we find that audit-firm tenure, rather than auditor tenure, plays a key role on the quality of earnings. Although the evidence in our study as well as prior literature on the effect of audit tenure is found in a non-mandatory auditor rotation regime, we believe that our findings provide the regulator insights to some extent. More specifically, we suggest legislators make more efforts to regulate “audit firms” rather than “auditors” if the final goal is to improve the quality of earnings. In addition, the potential negative effect on non-Big 5 auditors should not be neglected if the mandatory auditor rotation of audit firms were to put into practice.

We believe that our findings provide valuable policy implications since this is the first paper aimed at the role of auditor rotation within an audit firm. Nonetheless, since the earning opacity (Bhattacharya et al. 2003), accounting and auditing practice in corporate governance (Francis et al. 2003), and audit market (Choi and Wong 2002) are different around the world in essence, our findings may not be fully sustained to infer the behavior of auditor tenure effect in other countries. Furthermore, both discretionary accruals and audit tenure are chosen by corporate managers or firms; therefore, the result of this paper is subject to the self-selection bias problem.¹⁹ Finally, our evidence is less powerful when we use the performance-matched modified Jones model.

¹⁹ In theory, we should follow the Heckman's two-stage treatment effect (Heckman 1978) or other simultaneous equation approach. However, either what factors influence the audit tenure or how to divide the audit tenure into two partitions (i.e., relative long and short tenure must be determined in the Heckman's model) makes this paper omit the potential self-selection-bias problem of audit tenure.

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TABLE 1
Sample Selection

Selection Mode (<i>by firm-years</i>)	Number of Companies
Listed companies from year 1998 to 2001	1,968
Banking and Insurance Industries	(300)
Non-calendar year firms	(8)
Audit tenure selection	(140)
Missing data while computing <i>DAC</i>	(51)
Industry with less than 8 firm-years	(89)
Total available data	1,337

TABLE 2
Descriptive Statistics:

Panel A: Categories by Big5 or Non-Big5; Mean (Median) [Standard Deviation]

Variables	Full sample (n=1337)	Big5 (n=1063)	Non-Big5 (n=274)	<i>t</i> -test of Differences Mean (<i>t</i> -statistic)
<i>DAC</i>	-0.0003 (-0.0001) [0.1005]	-0.0028 (-0.0025) [0.1038]	0.0092 (0.0053) [0.0860]	-0.0120 (-1.7668)*
<i>Big5</i>	0.7951 (1.0000) [0.4038]			
<i>TenureF</i>	5.6522 (5.0000) [3.5078]	5.4741 (5.0000) [3.4870]	6.3431 (7.0000) [3.5091]	-0.8689 (-3.6732)***
<i>TenureA</i>	5.1473 (4.0000) [3.2903]	5.0329 (4.0000) [3.2763]	5.5912 (5.0000) [3.3129]	-0.5583 (-2.5094)**
<i>Issue</i>	0.4921 (0.0000) [0.5001]	0.5174 (1.0000) [0.4999]	0.3942 (0.0000) [0.4896]	0.1232 (3.6539)***
<i>Age</i>	9.4368 (7.0000) [9.0832]	9.1496 (6.0000) [9.1044]	10.5511 (8.0000) [8.9295]	-1.4015 (-2.2810)**
<i>Size</i>	15.7910 (15.6816) [1.0796]	15.8283 (15.6920) [1.1234]	15.6466 (15.6431) [0.8764]	0.1817 (2.4886)**

TABLE 2 (Continued)

Panel B: Categories by TenureF and TenureA

Variables (Sample size)	TenureF			TenureA		
	Short (495)	Middle (266)	Long (576)	Short (542)	Middle (322)	Long (473)
<i>DAC</i>	-0.0021	-0.0167	0.0088	-0.0009	-0.0101	0.0071
<i>Big5</i>	0.8384	0.8195	0.7465	0.8267	0.7950	0.7590
<i>Issue</i>	0.6444	0.5639	0.3281	0.6107	0.5124	0.3425
<i>Age</i>	4.1919	6.5602	15.2726	5.1310	8.3665	15.0994
<i>Size</i>	15.3137	15.9093	16.1467	15.3943	15.9190	16.1586

Variables	Difference of TenureF		Difference of TenureA	
	(Short – Middle)	(Long – Middle)	(Short – Middle)	(Long – Middle)
<i>DAC</i>	0.0146 *	0.0255 ***	0.0092	0.0171 ***
<i>Big5</i>	0.1089	-0.0730 **	0.0315	-0.0360
<i>Issue</i>	0.0805 **	-0.2358 ***	0.0983 ***	-0.1700 ***
<i>Age</i>	-2.3683 ***	8.7124 ***	-3.2355 ***	6.7329 ***
<i>Size</i>	-0.5956 ***	0.2374 ***	-0.5247 ***	0.2396 ***

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests.

DAC = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);

Big5 = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;

Tenure = the length of the auditor-client relationship calculated by auditor and audit-firm respectively, defined as:

TenureF = the length of years for which an audit firm has provided audit services,

TenureA = the length of longer years for which either incumbent auditor who has attested an audit,

Issue = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;

Age = the number of years since listing date;

Size = firm size measured by natural log of total assets (in NT dollars);

Grouping

Short = The subsample of TenureF (or TenureA) equals 1, 2, or 3;

Middle = The subsample of TenureF (or TenureA) equals 4, 5, or 6;

Long = The subsample of TenureF (or TenureA) equals 7, 8, 9, or 10.

TABLE 3
Correlation Matrix^a

	<i>DAC</i>	<i>TenureF</i>	<i>TenureA</i>	<i>Issue</i>	<i>Age</i>	<i>Size</i>
<i>DAC</i>		0.029	-0.010	0.110 *	-0.058	0.147 **
<i>TenureF</i>	0.057 *		0.701 ***	-0.326 ***	0.625 ***	0.373 ***
<i>TenureA</i>	0.049	0.873 ***		-0.210 ***	0.416 ***	0.283 ***
<i>Issue</i>	0.027	-0.284 ***	-0.250 ***		-0.144	0.041
<i>Age</i>	0.016	0.592 ***	0.555 ***	-0.249 ***		0.362 ***
<i>Size</i>	0.041	0.366 ***	0.356 ***	0.123 ***	0.366 ***	

^a Lower triangular contains Pearson correlation coefficients for the clients of Big 5 (n = 1,063) while upper triangular belongs to that of non Big 5 (n = 274).

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests.

DAC = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);

Big5 = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;

Tenure = the length of the auditor-client relationship calculated by auditor and audit-firm respectively, defined as:

TenureF = the length of years for which an audit firm has provided audit services,

TenureA = the length of longer years for which either incumbent auditor who has attested an audit,

Issue = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;

Age = the number of years since listing date;

Size = firm size measured by natural logarithm of total assets (in NT dollars).

TABLE 4
Effect of Measurements of Audit Tenure on Discretionary Accruals

Panel A: Repressor Tenure measured by its quantitative value

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Tenure_{it}^2 + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By TenureF (n=1337) Coefficient (t-statistic)	By TenureA (n=1337) Coefficient (t-statistic)
<i>Intercept</i>	-0.0557 (-1.1539)	-0.0609 (-1.2570)
<i>Big5</i>	-0.0125 (-2.0663)**	-0.0138 (-2.2809)**
<i>Tenure</i>	-0.0110 (-2.4284)**	-0.0069 (-1.5924)
<i>Tenure</i> ²	0.0012 (3.1538)***	0.0007 (2.1010)**
<i>Issue</i>	0.0104 (1.8620)*	0.0081 (1.4918)
<i>Age</i>	-0.0008 (-2.5592)**	-0.0004 (-1.4068)
<i>Size</i>	0.0049 (1.4539)	0.0050 (1.4913)

Panel B: Repressor Tenure measured by its qualitative value

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Short_{it} + \beta_3 Long_{it} + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By TenureF (n=1337) Coefficient (t-statistic)	By TenureA (n=1337) Coefficient (t-statistic)
<i>Intercept</i>	-0.0822 (-1.8354)*	-0.0506 (-0.9876)
<i>Big5</i>	-0.0126 (-1.8462)*	-0.0162 (-2.3594)**
<i>Short</i>	0.0122 (1.6594)*	0.0139 (1.7670)*
<i>Long</i>	0.0315 (4.0057)***	0.0258 (3.6582)***
<i>Issue</i>	0.0100 (1.6796)*	0.0161 (2.7637)**
<i>Age</i>	-0.0007 (-1.8790)*	-0.0006 (-1.7738)*
<i>Size</i>	0.0049 (1.6796)*	0.0027 (0.7909)

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic t-statistics based on White (1980) standard errors in parentheses if necessary.

- DAC* = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);
Big5 = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;
Tenure = the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as:
TenureF = the length of years for which an audit firm has provided audit services,
TenureA = the length of longer years for which either incumbent auditor who has attested an audit,
Short = a dummy variable equals 1 if *TenureF* or *TenureA* equals 1, 2, or 3, and 0 otherwise;
Long = a dummy variable equals 1 if *TenureF* or *TenureA* equals 8, 9, or 10, and 0 otherwise;
Issue = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;
Age = the number of years since listing date;
Size = firm size measured by natural log of total assets (in NT dollars).

TABLE 5
Effect of Audit Tenure on the Absolute Value of Discretionary Accruals

$$|DAC_{it}| = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Tenure_{it}^2 + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By <i>TenureF</i> (n=1337)	By <i>TenureA</i> (n=1337)
	Coefficient (<i>t</i> -statistic)	Coefficient (<i>t</i> -statistic)
<i>Intercept</i>	-0.0255 (-0.7291)	-0.0221 (-0.6345)
<i>Big5</i>	0.0055 (1.2746)	0.0062 (1.4465)
<i>Tenure</i>	-0.0024 (-0.7216)	-0.0042 (-1.3319)
<i>Tenure</i> ²	-0.0000 (-0.1140)	0.0002 (0.5824)
<i>Issue</i>	0.0101** (2.5426)	0.0113*** (2.9667)
<i>Age</i>	-0.0010*** (-4.0969)	-0.0011*** (-5.1405)
<i>Size</i>	0.0069*** (2.7933)	0.0068*** (2.7721)

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic *t*-statistics based on White (1980) standard errors in parentheses if necessary.

- |DAC|* = absolute value of discretionary accruals which the raw value of *DAC* is computed according to the *forward-looking model* proposed by Dechow et al. (2003);
- Big5* = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;
- Tenure* = the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as:
- TenureF* = the length of years for which an audit firm has provided audit services,
- TenureA* = the length of longer years for which either incumbent auditor who has attested an audit,
- Issue* = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;
- Age* = the number of years since listing date;
- Size* = firm size measured by natural logarithm of total assets (in NT dollars).

TABLE 6
Marginal Effect of Big5 on Audit Tenure on Discretionary Accruals

Panel A: Below-optimal sample

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By <i>TenureF</i> (n=682)		By <i>TenureA</i> (n=778)	
	Coefficient	(<i>t</i> -statistic)	Coefficient	(<i>t</i> -statistic)
<i>Intercept</i>	-0.0876	(-1.2620)	-0.0327	(-0.4502)
<i>Big5</i>	-0.0193	(-1.7511)*	-0.0227	(-2.4088)**
<i>Issue</i>	0.0151	(1.8322)*	0.0147	(1.9287)*
<i>Age</i>	-0.0012	(-2.1823)**	-0.0003	(-0.6488)
<i>Size</i>	0.0060	(1.3043)	0.0025	(0.5202)

Panel B: Below-optimal sample

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Big5_{it} \times Tenure_{it} + \beta_4 Issue_{it} + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By <i>TenureF</i> (n=682)		By <i>TenureA</i> (n=778)	
	Coefficient	(<i>t</i> -statistic)	Coefficient	(<i>t</i> -statistic)
<i>Intercept</i>	-0.1327	(-1.7411)*	-0.0749	(-1.0043)
<i>Big5</i>	0.0106	(0.4906)	0.0140	(0.6631)
<i>Tenure</i>	0.0033	(0.4781)	0.0055	(0.9414)
<i>Big5</i> × <i>Tenure</i>	-0.0121	(-1.6490)*	-0.0136	(-2.0578)**
<i>Issue</i>	0.0126	(1.5892)	0.0133	(1.7719)*
<i>Age</i>	-0.0010	(-1.8184)*	-0.0000	(-0.1326)
<i>Size</i>	0.0085	(1.6540)*	0.0042	(0.8393)

TABLE 6 (Continued)

Panel C: Above-optimal sample

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Issue_{it} + \beta_3 Age_{it} + \beta_4 Size_{it} \\ + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By <i>TenureF</i> (n=655)		By <i>TenureA</i> (n=559)	
	Coefficient	(<i>t</i> -statistic)	Coefficient	(<i>t</i> -statistic)
<i>Intercept</i>	-0.0084	(-0.1234)	-0.0853	(-1.3632)
<i>Big5</i>	-0.0051	(-0.7799)	-0.0030	(-0.4220)
<i>Issue</i>	0.0025	(0.3434)	0.0004	(0.0557)
<i>Age</i>	0.0001	(0.2295)	-0.0004	(-1.1106)
<i>Size</i>	0.0010	(0.2259)	0.0062	(1.5061)

Panel D: Above-optimal sample

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Big5_{it} \times Tenure_{it} + \beta_4 Issue_{it} \\ + \beta_5 Age_{it} + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	By <i>TenureF</i> (n=655)		By <i>TenureA</i> (n=559)	
	Coefficient	(<i>t</i> -statistic)	Coefficient	(<i>t</i> -statistic)
<i>Intercept</i>	-0.0348	(-0.4084)	-0.0592	(-0.7223)
<i>Big5</i>	-0.0393	(-0.7135)	-0.0581	(-1.1336)
<i>Tenure</i>	0.0035	(0.6487)	-0.0022	(-0.4231)
<i>Big5</i> × <i>Tenure</i>	0.0038	(0.6389)	0.0064	(1.1355)
<i>Issue</i>	0.0060	(0.7703)	0.0017	(0.2158)
<i>Age</i>	-0.0005	(-1.1395)	-0.0006	(-1.5552)
<i>Size</i>	0.0012	(0.2626)	0.0059	(1.4345)

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic t-statistics based on White (1980) standard errors in parentheses if necessary.

DAC = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);

Big5 = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;

Tenure = the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as:

TenureF = the length of years for which an audit firm has provided audit services,

TenureA = the length of longer years for which either incumbent auditor who has attested an audit,

Issue = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;

Age = the number of years since listing date;

Size = firm size measured by natural logarithm of total assets (in NT dollars).

TABLE 7
The Combination Effect of Audit-Firm Tenure and Auditor Tenure Analysis

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 TenureF_{it} + \beta_3 TenureF_{it}^2 + \beta_4 TenureA_{it} + \beta_5 TenureA_{it}^2 + \beta_6 Issue_{it} + \beta_7 Age_{it} + \beta_8 Size_{it} + \beta_{9-21} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	Coefficient (<i>t</i> -statistic) (n=1337)	
<i>Intercept</i>	-0.0568	(-1.1720)
<i>Big5</i>	-0.0124	(-2.0584)**
<i>TenureF</i>	-0.0139	(-2.2680)**
<i>TenureF</i> ²	0.0014	(2.8957)***
<i>TenureA</i>	0.0033	(0.5820)
<i>TenureA</i> ²	-0.0003	(-0.6064)
<i>Issue</i>	0.0104	(1.8615)*
<i>Age</i>	-0.0008	(-2.5788)***
<i>Size</i>	0.0049	(1.4542)

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic t-statistics based on White (1980) standard errors in parentheses if necessary.

<i>DAC</i>	= discretionary accruals computed according to the <i>forward-looking model</i> proposed by Dechow et al. (2003);
<i>Big5</i>	= a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;
<i>Tenure</i>	= the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as: <i>TenureF</i> = the length of years for which an audit firm has provided audit services, <i>TenureA</i> = the length of longer years for which either incumbent auditor who has attested an audit,
<i>Issue</i>	= a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;
<i>Age</i>	= the number of years since listing date;
<i>Size</i>	= firm size measured by natural logarithm of total assets (in NT dollars).

TABLE 8
The Combination Analysis of Audit-Firm Tenure and Auditor Tenure Effects

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 TenureF_{it} + \beta_3 TenureA_{it} + \beta_4 Big5_{it} \times TenureF_{it} \\ + \beta_5 Issue_{it} + \beta_6 Age_{it} + \beta_7 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	Below-optimal sample (n = 778)	Above-optimal sample (n = 559)
	Coefficient (<i>t</i> -statistic)	Coefficient (<i>t</i> -statistic)
<i>Intercept</i>	-0.1315 (-1.7146)*	-0.0348 (-0.4086)
<i>Big5</i>	0.0102 (0.4624)	-0.0384 (-0.7070)
<i>TenureF</i>	0.0039 (0.5746)	0.0034 (0.6334)
<i>TenureA</i>	-0.0008 (-0.3185)	0.0001 (0.1058)
<i>Big5</i> × <i>TenureF</i>	-0.0120 (-1.7141)*	0.0037 (0.6314)
<i>Issue</i>	0.0131 (1.5970)	0.0060 (0.7706)
<i>Age</i>	-0.0009 (-1.5677)	-0.0004 (-1.1214)
<i>Size</i>	0.0084 (1.6941)*	0.0011 (0.2516)

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic t-statistics based on White (1980) standard errors in parentheses if necessary.

<i>DAC</i>	=	discretionary accruals computed according to the <i>forward-looking model</i> proposed by Dechow et al. (2003);
<i>Big5</i>	=	a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;
<i>Tenure</i>	=	the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as:
<i>TenureF</i>	=	the length of years for which an audit firm has provided audit services,
<i>TenureA</i>	=	the length of longer years for which either incumbent auditor who has attested an audit,
<i>Issue</i>	=	a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;
<i>Age</i>	=	the number of years since listing date;
<i>Size</i>	=	firm size measured by natural logarithm of total assets (in NT dollars).

TABLE 9
Further Analysis of Auditor Tenure Effect on Discretionary Accruals by the
Quasi-Auditor-Rotation Sample

$$DAC_{it} = \beta_0 + \beta_1 Big5_{it} + \beta_2 Tenure_{it} + \beta_3 Tenure_{it}^2 + \beta_4 Issue_{it} + \beta_5 Age_{it} \\ + \beta_6 Size_{it} + \beta_{7-19} Industry + \beta_{1999-2001} Year + \varepsilon_{it}$$

Variable	Coefficient	(t-statistic) (n = 26)
<i>Intercept</i>	-0.1939	(-0.7227)
<i>Big5</i>	-0.0046	(-0.1672)
<i>TenureA</i>	-0.0867	(-0.7333)
<i>TenureA</i> ²	0.0092	(0.5817)
<i>Issue</i>	-0.0235	(-0.8283)
<i>Age</i>	0.0027	(1.3333)
<i>Size</i>	0.0225	(1.5614)

The quasi-auditor-rotation sample satisfies (1) for a specific client, both auditors of the client once changed when we trace the observations from the sample year, and (2) before the auditor change, the audit firm has served the client for *exactly* five years.

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests. Fixed effects of years and industries are included but not reported. We report asymptotic t-statistics based on White (1980) standard errors in parentheses if necessary.

- DAC* = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);
- Big5* = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;
- TenureA* = the length of longer years for which either incumbent auditor who has attested an audit,
- Issue* = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;
- Age* = the number of years since listing date;
- Size* = firm size measured by natural log of total assets (in NT dollars).

TABLE 10

Robustness Test – Performance-Included to Calculate DAC as a Dependent Variable

Category	TenureF			TenureA		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Sample size	1337	682	682	1337	778	778
<i>Intercept</i>	0.0400 (1.001)	-0.0135 (-0.213)	-0.0684 (-0.996)	0.0397 (0.9910)	0.0504 (0.847)	0.0081 (0.131)
<i>Big5</i>	-0.0134 (-2.095)*	-0.0193 (-1.722)*	0.0123 (0.629)	-0.0140 (-2.181)**	-0.0179 (-1.795)*	0.0151 (0.709)
<i>Tenure</i>	-0.0109 (-2.834)***		0.0013 (0.211)	-0.0063 (-1.678)*		0.0035 (0.546)
<i>Tenure</i> ²	0.0010 (3.120)***			0.0006 (1.925)*		
<i>Issue</i>	0.0102 (1.823)*	0.0184 (2.063)**	0.0156 (2.0384)**	0.0094 (1.705)*	0.0178 (2.171)**	0.1063 (1.990)**
<i>Age</i>	0.0003 (0.8915)	0.0005 (0.826)	0.0008 (2.001)**	0.0005 (1.544)	0.0007 (1.295)	0.0009 (1.744)*
<i>Size</i>	-0.0017 (-0.632)	0.004 (0.084)	0.0038 (0.822)	-0.0022 (-0.807)	-0.0039 (-0.992)	-0.0018 (-0.454)
<i>Big5</i> × <i>Tenure</i>			-0.0127 (-1.917)*			-0.0123 (-1.755)*

*, ** and *** indicate significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively, on two-tailed tests.

DAC = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);

Big5 = a dummy variable equals 1 if the company employs a Big 5 auditor and 0 otherwise;

Tenure = the length of the auditor-client relationship calculated by auditor and audit-firm respectively, defined as:

TenureF = the length of years for which an audit firm has provided audit services,

TenureA = the length of longer years for which either incumbent auditor who has attested an audit,

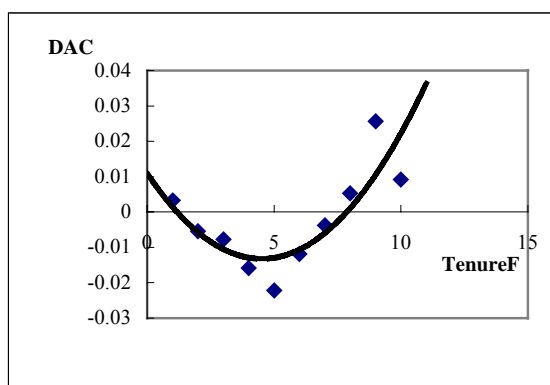
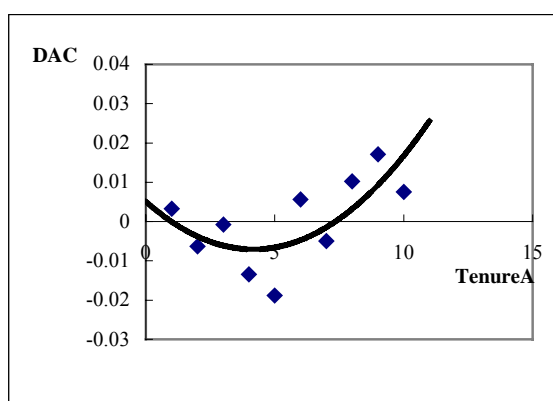
Issue = a dummy variable equals 1 if the company issued new shares for cash during the year or in the previous two years and 0 otherwise;

Age = the number of years since listing date;

Size = firm size measured by natural log of total assets (in NT dollars).

Figure 1

The Quadratic Relation between Audit Tenure and Discretionary Accruals

Panel A: TenureF vs. DAC**Panel B: TenureA vs. DAC**

DAC = discretionary accruals computed according to the *forward-looking model* proposed by Dechow et al. (2003);

Tenure = the length of the auditor-client relationship calculated by auditor tenure and audit-firm tenure respectively, defined as:

TenureF = the length of years for which an audit firm has provided audit services,

TenureA = the length of longer years for which either incumbent auditor who has attested an audit.
