Audit Quality in Initial Audit Engagements: A Quantile Regression Approach

Felicia Partadinata
School of Accounting, University of New South Wales

Elizabeth Carson
School of Accounting, University of New South Wales

Per Christen Tronnes
Corresponding Author:
School of Accounting, University of New South Wales
UNSW Sydney 2052, AUSTRALIA
Email: p.tronnes@unsw.edu.au
Phone: +61 2 9385 5823

Leon Wong
School of Accounting, University of New South Wales

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ABSTRACT

In this study, we investigate audit quality in the first year of audit firm engagements. Audit quality in the first year of engagement is particularly important because any introduction of mandatory audit firm rotation as currently is being considered in a number of audit markets would increase the incidence of first-year audits. We also consider the effect of the reason for auditor change on audit quality in the first year of an engagement. Across non-financial US firms in the post-Sarbanes-Oxley era, we find that audit quality in the first year of an engagement is significantly higher than that of subsequent years for client-firms with low audit quality. Moreover, auditors are shown to provide significantly higher audit quality in the first year of an engagement for firms from which the predecessor auditor has resigned, and this relationship is stronger for client-firms with low audit quality. We provide evidence that audit firm change is beneficial for client-firms with low audit quality. This is consistent with the claims of those who support an introduction of a mandatory audit firm rotation scheme.

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1. Introduction

This study examines audit quality in the first year of audit firm engagements. Understanding the key factors impacting audit quality in the initial year of an engagement is important because one consequence of adopting mandatory audit firm rotation is an increased incidence of first-year audits. Mandatory audit firm rotation has been proposed as a method for improving audit quality and is currently being considered for adoption by regulators around the world (European Commission 2011; Public Company Accounting Oversight Board 2011; European Parliament Committee on Legal Affairs 2013). As such, regulators are calling for comments regarding the consequences of the implementation of a mandatory audit firm rotation policy on audit quality. For example, the Public Company Accounting Oversight Board (2011, 3) stated that "... the Board is soliciting comment on these issues, including, in particular, the advantages and disadvantages of mandatory audit firm rotation".

Proponents of mandatory audit firm rotation suggest that the periodic change of audit firms would improve auditor independence. By rotating audit firms periodically, audit quality would therefore increase as a result of the improvement of auditor independence arising from audit firm change. However, the opponents of mandatory audit firm rotation claim that adopting the policy may also lead to an adverse effect on auditors' client-specific knowledge and therefore audit quality. The higher potential risk of audit failures resulting from the lack of client-specific knowledge introduced by an audit firm change is the main concern voiced by the profession regarding the potential implementation of mandatory audit firm rotation (American Institute of Certified Public Accountants (AICPA) 2011; BDO 2011; Center for Audit Quality 2011; Ernst and Young 2011).

The potential impact of an audit firm change on audit quality is arguably more prominent in the initial year of an engagement because of the lack of a previous auditor-client relationship. Despite the potential differences in audit quality in this year, prior audit firm tenure studies have tended to either exclude the first year from the studies altogether or to generally assume that the audit quality in the first year of an engagement is similar with that of the second and third year of the engagement.

Furthermore, the effect of the first year of engagement on audit quality would be dependent to some extent on the reason for the auditor change. Specifically, a change of audit firm as a result of client dismissal would arguably moderate the improvement of auditor independence in the first year of an engagement because of the potential of opinion-shopping as the reason for an audit firm change. In the event that an audit firm change is caused by auditor resignation, any specific effect of the first year of an engagement on an auditor's independence is potentially stronger because of the higher risk posed to the auditor. This study, therefore, mainly examines two main questions; the audit quality in the first year of an audit engagement and the influence of the reason for auditor change to the audit quality in the first year of an audit engagement. This study also investigates whether the aforementioned effects are uniform across the audit quality distribution.

Our sample consists of 7,385 firm-year observations of non-financial firms in the US after the enactment of the Sarbanes-Oxley Act (SOX) covering the years 2004 to 2011, with 443 first-year audit observations. We focus on the period after the SOX because prior studies which specifically examine initial audit engagements were mostly conducted before the passage of the SOX. As such, the effect of audit firm change on audit quality in the post-SOX period is largely unknown. Audit quality is operationalized using discretionary accruals, as is consistent with prior audit tenure studies (e.g. Johnson, Khurana, and Reynolds 2002; Myers, Myers, and Omer 2003; Davis, Soo, and Trompeter 2009). In addition to the conventional OLS regression, we also use quantile regression to examine the differential impact of the first year of audit engagement to audit quality across its distribution (Carson, Tronnes, and Wong 2013).

We find that the average audit quality in the first year of an engagement is not significantly different from that of the other years of the engagement. This result is consistent with the findings of DeFond and Subramanyam (1998). We, however, identify that the effect of the initial audit engagements on audit quality is dependent on the level of the audit quality itself. In particular, we find that for clients with low audit quality, audit quality in the first year of an engagement is significantly higher than for the other years of the engagement. Further, the inclusion of the reason for audit firm change suggests that audit quality in the first year of an audit engagement is higher only for clients from which the predecessor auditor has resigned, and clients that benefit most from an improvement of audit quality are those with low audit quality.

The results of this study are of interest to academics and regulators. For academics, this study offers insight into how audit quality is specifically affected in the first year of an engagement. This study also adds to the current literature by providing evidence for the beneficial impact of audit firm change on audit quality in the first year of an engagement for a specific group of firms – namely, those with low audit quality. Clients with low audit quality should be the greatest concern, as they pose the highest risk of audit failure. For regulators, this study offers support for the adoption of a mandatory audit firm rotation policy. A policy of mandatory audit firm rotation, if applied, could potentially improve audit quality for clients with low audit quality – the firms that the policy should be targeting if the key concern is to prevent audit failures.

2. Literature Review and Hypothesis Development

2.1. Audit Quality in Initial Audit Engagements

The arguments surrounding audit quality in initial audit engagements generally stem from the effects of a change in a client's audit firm. Prior studies have suggested that there are two main effects of an audit firm change: the independence effect and the knowledge effect. These two effects are important inputs to audit quality, as audit quality itself refers to the joint production of auditor competence (which increases with knowledge of the client firm) and auditor independence (DeAngelo 1981).

A change of audit firm decreases the client-specific knowledge held by the auditor, potentially reducing audit quality (Knapp 1991; Arruñada and Paz-Ares 1997; Pricewaterhouse Coopers 2002; Arel, Brody, and Pany 2005; Srinidhi, Leung, and Gul 2010; American Institute of Certified Public Accountants (AICPA) 2011; BDO 2011; Center for Audit Quality 2011). However, a change of audit firm may also improve auditor independence and therefore increase audit quality (Arel et al. 2005; Bamber and Iyer 2007; Dopuch, King, and Schwartz 2001; European Commission 2011; European Parliament Committee on Legal Affairs 2013; Gietzmann and Sen 2002; Mautz and Sharaf 1961; Petty and Cuganesan 1996; Public Company Accounting Oversight Board 2011; Raiborn, Schorg, and Massoud 2006; Ryan, Herz, Iannaconi, Maines, Palepu, Schrand, Skinner, and Vincent 2001). Both of the aforementioned effects of audit firm change would be stronger in the first year of an engagement, as an auditor in this year has no prior experience or relationship with the client.

The empirical evidence on audit quality in the initial year of engagements is mainly provided by the audit firm tenure literature.[1] Most of these studies assume that audit quality in the first year of an engagement is similar to that of the second and third year of the engagement (St. Pierre and Anderson 1984; American Institute of Certified Public Accountants (AICPA) 1992; Geiger and Raghunandan 2002; Carcello and Nagy 2004; Mansi, Maxwell, and Miller 2004; Ghosh and Moon 2005; Jenkins and Velury 2008). These studies consistently indicate that audit quality in the early years of an engagement[2] – including the audit quality in the first year of the engagement – is significantly lower than during the later years of the engagement.

In contrast with those studies which assume that audit quality in the first year of an engagement is similar to that of the following years, Deis and Giroux (1996) provided evidence that audit quality in the initial year of an engagement is significantly higher than that of the second year. The potentially different audit quality of the first year of an engagement has also been mentioned in several audit firm tenure studies where audit quality in the initial year of an engagement was potentially associated with higher audit quality (Johnson et al. 2002; Myers et al. 2003; Davis et al. 2009). However, these studies tended to exclude the first year of engagement from their data to avoid confounding their results.

The studies discussed above provide several insights into audit quality in initial audit engagements. Evidence from these audit firm tenure studies suggest that the first year of an engagement – as part of a short tenure – is associated with lower audit quality (American Institute of Certified Public Accountants (AICPA) 1992; Geiger and Raghunandan 2002;

[1] Studies in audit firm change also provide evidence on audit quality in the first year of engagement. This is discussed in Section 2.2.
[2] Early years of engagement is mostly defined as the first three years of auditor-client relationship (St. Pierre and Anderson 1984; American Institute of Certified Public Accountants (AICPA) 1992; Geiger and Raghunandan 2002; Carcello and Nagy 2004).

Carcello and Nagy 2004; Mansi et al. 2004; Ghosh and Moon 2005; Jenkins and Velury 2008). However, this result may not apply specifically to the first year of an engagement, as audit quality may differ uniquely in this year. In particular, audit quality in the first year of an engagement could potentially be higher than that of the following years of engagement (Deis and Giroux 1996; Johnson et al. 2002; Myers et al. 2003; Davis et al. 2009). In light of the conflicting arguments and contrasting evidence on audit quality in the first year of an engagement, we posit the following hypothesis below (in the null form):

H1a: There is no association between the first year of an audit engagement and audit quality.

2.2. Reason for Auditor Change on Audit Quality in Initial Audit Engagements

One aspect which may differentiate audit quality in the first year of an engagement is the reason for audit firm change. The literature recognizes two main reasons for audit firm change: client dismissal (Chow and Rice 1982; Schwartz and Menon 1985; Williams 1988; Johnson and Lys 1990; Kluger and Shields 1991; Krishnan 1994; Sankaraguruswamy and Whisenant 2004) and auditor resignation (Krishnan and Krishnan 1997; Bockus and Gigler 1998; Shu 2000; Cenker and Nagy 2008; Catanach, Irving, Perry Williams, and Walker 2011). Evidence from the literature suggests that an audit firm change resulting from a dismissal would perhaps decrease the audit quality provided in the first year of the engagement, as the client may have dismissed the previous auditor to search for a new auditor who may render a more favourable audit opinion on future financial statements (Matsumura, Subramanyam, and Tucker 1997; Simunic and Stein 1990). Despite this argument, prior studies have provided contrasting evidence on the practice of opinion-shopping in the US. Several studies have suggested that audit quality in the first year of the new engagement is lower compared to that of the last year before the auditor change (DeFond and Subramanyam 1998; Carver, Hollingsworth, and Stanley 2011). In contrast, other studies have suggested that there is no difference between the audit quality in the first year of the engagement with the successor auditor and the last year of the engagement with the predecessor auditor (Chow and Rice 1982; Schwartz and Menon 1985; Krishnan and Stephens 1995). Most of these studies were, however, conducted before the passage of the SOX, and their result may not be applicable in the post-SOX era. One exception is the study conducted by Carver et al. (2011), which employed data gathered after the passage of the SOX. However, Carver et al. (2011) only focused on an audit firm change from a Big N auditor to a non–Big N auditor.

An audit firm change may also occur because of an auditor resignation. Auditor resignation frequently happens due to client-auditor disagreements on reporting policy that are perceived to carry increased litigation risk for the auditor (Berton 1995; Johnstone 2000; Krishnan and Krishnan 1997; MacDonald 1997; Turner, Williams, and Weirich 2005). As a result, auditors perceive that clients from which predecessor auditors have resigned pose greater litigation risks than clients that have instead dismissed their auditors (Krishnan and Krishnan 1997; Bockus and Gigler 1998; Shu 2000; Johnstone and Bedard 2004; Calderon and Ofobike 2008; Cenker and Nagy 2008; Landsman, Nelson, and Rountree 2009). Hence, new auditors engaging clients from which predecessor auditors have resigned may have increased independence in the first year of an engagement. The audit quality delivered by auditors in the first year of an engagement may therefore be relatively higher when the predecessor has resigned. Consequently, in consideration of the effects of these two reasons for audit firm change on audit quality in the first year of an engagement, we posit the following hypotheses below (in the null form):

H1b: There is no association between the first year of an audit engagement and audit quality for clients which dismissed their predecessor auditors.

H1c: There is no association between the first year of an audit engagement and audit quality for clients from which the predecessor auditors have resigned.

2.3. Audit Quality in the First Year of Engagement across Audit Quality Distribution

Carson et al. (2013) suggest that the effect of auditor tenure on audit quality is to some extent dependent on the level of audit quality itself. Specifically, arguments to limit auditor tenure as a means of improving auditor independence imply that for firms with low audit quality auditor change would be associated with improved audit quality. On the other hand, for firms with higher audit quality, there would only be limited benefits to be derived from auditor change, and it may in fact decline because the new auditor does not have the same understanding. As this differential impact across the audit is likely to be quite strong in the first year of auditor tenure, we accordingly test the assumption underpinning prior research that the learning effect and the independence effect associated with auditor change is uniform across the audit quality distribution. Consequently, we posit the following hypotheses (in alternative form):

H2a: The association between the first year of an audit engagement and audit quality is uniform across the distribution of audit quality.

H2b: The association between the first year of an audit engagement and audit quality for clients which dismissed their predecessor auditors is uniform across the distribution of audit quality.

H2c: The association between the first year of an audit engagement and audit quality for clients which the predecessor auditors have resigned is uniform across the distribution of audit quality.

Overall, we maintain our first hypothesis in the null form because of the contrasting arguments surrounding audit quality in the first year of audit firm engagements and because there is insufficient a priori evidence to expect a positive or negative effect of the first year of engagement on audit quality. Hence, we maintain consistency through all our hypotheses, including the hypotheses in relation to the effect of the reason for auditor change on audit quality in the first year of an engagement and also across the audit quality distribution.

3. Research Methodology

3.1. Sample and Data

Our initial sample consists of all US firm-year observations in CRSP/Compustat Merged (CCM) dataset after the passage of Sarbanes-Oxley Act (30 July 2002 to 2011) (57,160 observations). We then limit the sample based on the exclusion criteria shown in Table 1. First, we exclude all financial firms (SIC code 6000-6999) due to the inherent differences of modelling accruals (22,251 observations). Furthermore, we choose a cut-off for the timing of the starting of SOX. Although the SOX Act was enacted on 30 July 2002, the consequences of the Act are supposedly not directly occur after this date as the Act only requires the creation of further rules.[3] One of the latest and most important changes resulting from SOX is the requirement to provide internal

[3] Prior studies also have various cut-offs for the real timing of the starting of SOX as each of the further rules creates considerable changes to the auditing profession (Geiger, Raghunandan, and Rama 2005; Patterson and Smith 2007; Carter, Lynch, and Zechman 2009).

control assessment, as brought by the Section 404 of SOX. The passage of this section, as documented by prior studies, leads to a significant increase in the earnings quality (Ashbaugh-Skaife, Collins, Kinney, and LaFond 2008; Chan, Farrell, and Lee 2008). Therefore, in order to account for the stabilization of the effect of SOX, we choose to limit our sample to only include observations which are affected by Section 404 – these are the firms with fiscal year end starting from 15 November 2004.[4]

We then excluded any observations relating to newly listed firms (as captured in the first six years of observations) (7,433 observations) and mergers and acquisitions (13,576 observations) to limit the effect of abnormal accruals (Myers et al. 2003; Carson et al. 2013). Finally, we removed all observations with missing data (4,084 observations). This produced a final sample of 7,385 firm-year observations (2,202 unique firms) for the period of 15 November 2004 to 2011.[5] Of the 443 observations which represent the first year of an audit engagement, 339 occurred because of client dismissals, while the remaining 104 observations occurred because of auditor resignations.

[INSERT TABLE 1 HERE]

[4] This cut-off has been used primarily in the post-SOX studies on audit fees and low-balling (Raghunandan and Rama 2006; Huang, Raghunandan, and Rama 2009). We performed a sensitivity test on the timing of SOX to investigate of whether the chosen timing of SOX has an impact on the result of this study. This is reported in Section 5.

[5] The number of observations in the final sample is lower than the prior studies examining the first year of engagement. For instance, the number of observations in Griffin and Lont (2011) is 12,772 observations, and there are 952 auditor changes included in Carver et al. (2011). These differences in sample size may be due to differences in the database used in this study to the one used in Carver et al. (2011) and Griffin and Lont (2011). The main database used in this study to identify audit firm change was CCM; however, CCM does not recognize a number of audit firm changes between small audit firms that are recognized in Audit Analytics – the database which is used in Griffin and Lont (2011) and Carver et al. (2011).

3.2. Measuring Discretionary Accruals

We use discretionary accruals to measure audit quality due to its prominence in the auditing literature and specifically to maintain similarities with prior audit firm tenure studies that excluded the first year of audit engagements (Johnson et al. 2002; Myers et al. 2003; Davis et al. 2009).[6] We use signed discretionary accruals as our dependent variable in contrast to the absolute value of discretionary accruals, as auditors have been found to have greater incentive to constrain upwardly opportunistic earnings management compared to earnings understatements (Ashbaugh, LaFond, and Mayhew 2003; Becker et al. 1998; Krishnan, Sun, Wang, and Yang 2012; DeFond and Park 2001).[7] This practice is also consistent with the prior audit firm change study that examined audit quality in the first year of audit engagements (Carver et al. 2011). We examined the values of discretionary accruals using the cross-sectional performance-adjusted modified Jones discretionary accruals, following Kothari, Leone, and Wasley (2005) and Ashbaugh et al. (2003).[8] Discretionary accruals were measured by the residual term (ε_t) by industry-year (with a minimum of eight firm-years per two-digit SIC code) using the following model:

$$ACC_t = \alpha_0 + \alpha_1(\Delta Sales_t - \Delta REC_t) + \alpha_2 PPE_t + \alpha_3 ROA_t + \varepsilon_t \qquad (1)$$

where ACC is the net profit after tax before extraordinary items less cash flows from operations; ΔSales is the change in net sales revenue; ΔREC is the change in net receivables; PPE is gross

[6] Discretionary accruals should reflect the quality of reported earnings. Reported earnings are a joint production between auditors and managers and should reflect the audit quality since the audit process affects the client's audited financial statements (Becker, Defond, Jiambalvo, and Subramanyam 1998; Francis 2011).
[7] Absolute value of discretionary accruals, however, is more prominently used in audit firm tenure literature. The studies that exclude the first year of engagement also use absolute value of discretionary accruals (Johnson et al. 2002; Myers et al. 2003; Davis et al. 2009).
[8] We perform another test using DeFond and Jiambalvo (1994) method of measuring discretionary accruals to investigate of whether a specific method of calculating accruals affects the result, as reported in Section 5.

property, plant and equipment; and ROA is return on assets. All variables except for ROA are scaled by average total assets.

3.3. Empirical Model

Our empirical model is consistent with those of prior audit tenure studies (e.g. Johnson et al. (2002) and Myers et al. (2003)) with additional control variables added for firm-specific growth (Carey and Simnett 2006), cash flow volatility, sales volatility, length of the operating cycle, loss frequency (Francis, LaFond, Olsson, and Schipper 2005; Callen, Khan, and Lu 2013), and the probability of bankruptcy (Zmijewski 1984). Furthermore, following Carson et al. (2013), we winsorized the top and bottom 0.5% observations of all continuous variables to remove the effect of outliers.[9] Our empirical model is as follows:

$$DA= \beta_0 + \beta_1 AGE + \beta_2 SIZE + \beta_3 GROWTH + \beta_4 INDGROWTH + \beta_5 CFO + \beta_6 OPCYCLE + \beta_7 VOLCFO + \beta_8 VOLSALES + \beta_9 PROPLOSS + \beta_{10} PBANK + \beta_{11} BIGN + \beta_{12} \textbf{(Variables of Interest)} + \Sigma\beta_k Year + \varepsilon_t \quad (2)$$

where:

Variables of Interest:

FIRST = indicator variable, 1 for the first year of audit firm engagement, 0 otherwise

DISMISSED = indicator variable, 1 for the first year of audit firm engagement as a result of client dismissals, 0 otherwise

RESIGNED = indicator variable, 1 for the first year of audit firm engagement as a result of auditor resignations, 0 otherwise

Dependent Variable:

DA = signed value of discretionary accruals scaled by average total assets

[9]We repeat the multivariate test after winsorizing 1% of the top and bottom variables to account for the possibility of differences in the result. The choice to winsorize 1% of the continuous variables is to follow Johnson et al. (2002) and Davis et al. (2009). This is reported in Section 5.

Control Variables:

AGE = the number of years the client firm has been listed
SIZE = the natural log of total assets at year end
GROWTH = $\sum$ Total $Assets_{i,t}$/ $\sum$Total $Assets_{i,t-1}$
INDGROWTH = $\sum$ Total $Assets_{i,t}$ / $\sum$ Total $Assets_{i,t-1}$ by two-digit SIC code
CFO = the firm's cash flows from operations divided by average total assets
OPCYCLE = the natural log of the sum of days receivables and days inventory
VOLCFO = rolling 5-year standard deviation of operating cash flow
VOLSALES = rolling 5-year standard deviation of sales
PROPLOSS = rolling 5 year proportion of years that net profit after tax before abnormal are losses
PBANK = the probability value of Zmijewski (1984) score measuring the probability of bankruptcy[10]
BIGN = indicator variable, 1 if the audit firm is a Big N auditor, 0 otherwise
YEAR = indicator variables, 1 for each year

3.4. Variables of Interest

We run six separate analyses in order to test all hypotheses proposed in Section 2. Our first variable of interest (FIRST) tests the association between the first year of audit firm engagements and audit quality (H1a & H2a). New engagements (FIRST) are divided into DISMISSED for those resulting from client dismissals (H1b & H2b) and RESIGNED for those resulting from auditor resignations (H1c & H2c) to examine the effect of the first year of an audit firm engagement on audit quality based on the reason for auditor change. We expect a significant and negative coefficient on each variable of interest if a positive association exist with audit quality, while we expect a significant and positive coefficient if the tested variable is negatively associated with audit quality. We do not specify any certain expectations on the directions of the variables of interest, as all of our hypotheses are non-directional.

[10]The Zmijewski score measurement of the probability of bankruptcy is calculated as: b = Φ[-4.803 - 3.599(return on assets) + 5.406(leverage) - 0.100(current ratio)] (Zmijewski 1984, 69), where Φ is the cumulative distribution function of the standard/unit normal distribution.

3.5. Control Variables

Prior audit firm tenure studies concerning audit quality have controlled for AGE, or the number of years that the firm has been listed, to control for differences in the discretionary accruals of firms at different stages in their life cycles (Johnson et al. 2002; Myers et al. 2003; Gul, Fung, and Jaggi 2009). SIZE, operationalized as the natural log of year-end total assets, is also commonly included to control for the differences in accrual behaviours driven by differences in managers' influence between large and small firms (Dechow and Dichev 2002). We also included firm-specific growth (GROWTH) in the empirical model to account for the differences in the level of accruals between high- and low-growth firms (Carey and Simnett 2006). In addition, prior studies have stressed the importance of controlling for the growth of firms in specific industries, as this also systematically affects the level of accruals; this concern was captured by the variable INDGROWTH (Myers et al. 2003). Furthermore, the cash flow from operations over average total assets (CFO) was included in the model to account for the negative association between accruals and cash flows (Myers et al. 2003). We also controlled for the firms' operating volatility, which has been shown to be an innate determinant of earnings quality (Callen et al. 2013; Francis et al. 2005), by controlling for the length of operating cycle (OPCYCLE), volatility of cash flows (VOLCFO), volatility of sales (VOLSALES), and the proportion of reported losses in the last five years (PROPLOSS). Financial distress was also controlled using Zmijewski (1984) probability of bankruptcy value (PBANK), as prior studies have suggested that a higher number of financially distressed firms are in the first year of audit engagement at a given time (Schwartz and Menon 1985). Further, BIGN and YEAR were included to control for audit quality differences and mitigate year fixed effects, respectively.

3.6. Quantile Regression

We use the quantile regressions developed by Koenker and Bassett (1978) and employed in Carson et al. (2013)[11] to examine the distribution of audit quality in the first year of engagement. In the more common ordinary least squares (OLS) regression, the objective is to estimate the *mean* of the dependent variable conditional on the value of the independent variables. An alternative method is found in least absolute value (LAV) where the object is to estimate the *median* of the dependent variable conditional on the values of the independent variables. In other words, the median regression finds the regression plane that minimizes the sum of the absolute residuals rather than the sum of the squared residuals. Akin to OLS regressions where the regression coefficient represents the marginal change in the conditional mean of the dependent variable produced by a one unit change in the independent variable associated with that coefficient, the least absolute value regression coefficients estimates the marginal change in the conditional median of the dependent variable produced by a one unit change in the predictor variable. The least absolute value (LAV) regression is a special case of the more general quantile regressions – the conditional median is the same as the conditional .50th quantile. Since the symmetry of the absolute residuals yields the median (that is, the .50th quantile), minimizing the sum of asymmetrically weighted absolute residuals –allowing different positive and negative residuals to have different weights depending on whether they are above or below the specific quantile regression line – would yield other conditional quantiles (Koenker and Hallock 2001). The coefficients estimates obtained for a specific quantile would denote the marginal change in that conditional quantile of the dependent variable produced by a one unit change in the predictor variable.

[11] Following Carson et al. (2013), we run the quantile regression analyses by bootstrapping each quantile 500 times.

Consequently, estimating multiple quantile regressions in addition to the more traditional ordinary least square regression allows us to compare the marginal effect of the first year of auditor tenure across the conditional distribution of discretionary accruals expressed as a function of the observed control variables. The quantile regression approach allows comparison as to how some quantiles of the conditional audit quality proxy's distribution may be more affected by first year of auditor tenure than other quantiles. That is, quantile regressions are capable of investigating effects beyond just central location shifts of the conditional distribution.[12]

4. Results

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics for all of the main variables included in the empirical model. As reported in Table 2, the median of the discretionary accruals in the first year of engagement is -0.005, suggesting that the majority of the observations exhibit income-decreasing accruals. The average firm age and size across the sample data are 21.5 years and 294 million, respectively. In addition, the average growth rate for the firms across the sample is 6%. The average score for PBANK is 0.103, indicating that the average probability for bankruptcy in the sample is 10.3%. However, the median value for PBANK is 0.003, indicating that the majority of the observations have less than a 0.5% chance of bankruptcy.

[INSERT TABLE 2 HERE]

[12] A more detailed explanation on quantile regression can be found in Appendix A.

Table 3 outlines the correlation coefficients between the variables using Pearson rank correlations. AGE and SIZE are negatively correlated with discretionary accruals, suggesting that more mature and larger firms have lower levels of discretionary accruals. CFO and BIGN are also negatively correlated with discretionary accruals, indicating that Big N audit firms and companies with higher operating cash flows are associated with lower discretionary accruals. In contrast, GROWTH, PROPLOSS, and PBANK are associated with higher discretionary accruals, consistent with the observation that companies experiencing high growth or financial distress have higher levels of accruals. Several independent variables are not found to be mutually exclusive, as the correlations between these variables are higher than 0.50. These correlations include those between SIZE and BIGN and CFO and PROPLOSS (both less than 0.60). Overall, despite the existence of several significant correlations between the control variables, multi-collinearity does not appear to be a prominent issue.

[INSERT TABLE 3 HERE]

4.2. Multivariate Analysis

4.2.1. Audit Quality in Initial Audit Engagements

We present the results of the multivariate analysis using both OLS and quantile regression, in Table 4 and Table 5. Table 4 provides the results for audit quality in the initial year of an engagement (H1a & H2a), while Table 5 reports the findings for audit quality in the initial year of an engagement based on the reason for auditor change (H1b-H1c & H2b-H2c). In respect to the quantile regression result, the main quantiles which will be tabulated are the 10^{th}, 25^{th}, 50^{th}, 75th, and 90th quantile, consistent with the literature that employs quantile regression (e.g. Koenker and Bassett 1978; Buchinsky 1994; Carson et al. 2013).[13]

[INSERT TABLE 4 HERE]

The R-square values for the regression results are 45.04% (FIRST) and 45.06% (DISMISSED and RESIGNED), higher than the values in previous audit firm tenure studies that used the absolute values of the discretionary accruals (Gul et al. 2009; Carson et al. 2013).[14] This result suggests that signed discretionary accruals are better explained by the independent variables than are the absolute values of discretionary accruals.

In Table 4, the result for the test of H1a using OLS regression is consistent with the findings of DeFond and Subramanyam (1998), indicating that, on average, there is no significant difference of audit quality in the first year of an engagement relative to that of subsequent years. The coefficient for FIRST is negative but not significant (coeff. = -0.0025, p-value = 0.497). We are therefore unable to reject H1a in favour of the alternative. This result may suggest that the two main effects of audit firm change – the independence effect and the knowledge effect – are equally strong on average and offset each other in the first year of an audit firm engagement. However, the result may also imply that there are no such effects resulting from an audit firm change.[15]

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[13] The 10th and 25th quantile of signed discretionary accruals distribution represent firms with high audit quality, while the 75th and 90th quantile represent firms with low audit quality.
[14] The R-square values for these studies are reported to be around 20%.
[15] Although the coefficients are reported to be insignificant, it does not necessarily imply that there is no effect of audit firm change in the population. However, for the sample used in this study, there is not enough evidence to reject the null hypothesis at conventional levels of statistical significance.

The analysis across the entire distribution for audit quality (H2a), however, yields evidence that auditors do provide significantly higher audit quality in the first year of an engagement, particularly for groups of clients with low audit quality. Specifically, as reported in Table 4, the coefficient for FIRST is found to be negative and marginally significant in the 75th quantile (coeff. = -0.0061, p-value = 0.064). This effect is even stronger for clients with even lower audit quality, as the coefficient for FIRST is found to be negative and significantly different from zero in the 90th quantile range (coeff. = -0.0085, p-value = 0.045). This is consistent when the analysis is run on the entire distribution, as shown in Figure 1. This, therefore, enables us to reject H2a.

This result demonstrates that whether auditors provide higher audit quality in the first year of an engagement is somewhat dependent on the clients' audit quality itself. Some clients with lower audit quality may be perceived to pose more risk to the auditors and consequently cause auditors to exert greater independence. As a result, the increase in independence resulting from an audit firm change may be stronger than the knowledge effect for clients with low audit quality. This situation leads auditors to provide significantly higher levels of audit quality in the first year of engagements for clients with low audit quality.[16]

4.2.2. Reasons for Audit Firm Change

We conduct further tests by including the reason for an audit firm change to investigate its effect on audit quality in the first year of an audit engagement (H1b and H1c). As shown in Table 5, the results suggest that the extent of the difference between audit quality in the first year of an audit engagement and the other years is conditional on the reason for the auditor change, primarily in

[16] In contrast, auditors may not exhibit significantly higher level of independence for clients with higher audit quality as they are seen to pose lower risk to auditors. This may explain why the coefficient for FIRST is not significantly different from zero in the lower quantiles.

the OLS regression result. Specifically, we find that first-year audit quality is marginally higher when compared to the other years of the engagement, only for clients from which the predecessor auditors resigned.

[INSERT TABLE 5 HERE]

In Table 5, the coefficient for DISMISSED is positive but insignificant (coeff. = 0.0010, p-value = 0.797). We, therefore, are unable to reject H1b. This result also implies that there is insufficient evidence to suggest any negative effect of opinion-shopping on audit quality, as the audit quality in the first year of engagements for clients from which the predecessor auditors were dismissed is not found to be significantly lower than that of the other years of the engagements. In contrast, auditors are found to provide marginally higher audit quality, on average, in the first year of the engagement for clients from which the predecessor auditors resigned, as the coefficient for RESIGNED is both negative and marginally significant (coeff. = -0.0147, p-value = 0.080). This enables us to reject H1c in favour of the alternative. The result supports the notion that auditors perceive clients from which the predecessor auditors resigned to pose higher risk relative to clients from which predecessor auditors were dismissed (Securities and Exchange Commission (SEC) 1988; Krishnan and Krishnan 1997; Shu 2000; Cenker and Nagy 2008). This differential risk leads auditors to exhibit higher level of independence in the first year of an engagement towards those clients from which the predecessor auditors resigned than in the other years.

We also examine the marginal impact of the reason for auditor change on audit quality provided in the initial year of an engagement across the audit quality distribution (H2b and H2c) using quantile regression. Consistent with the OLS regression result, the reason for auditor change –

especially resignation – is an important factor in explaining the audit quality in the initial year of an engagement. The results indicate that auditors provide significantly higher audit quality in the first year of engagement compared to subsequent years for clients from which the predecessor auditors resigned; however, this result only applies for clients with low audit quality. Specifically, the coefficient for RESIGNED is negative and significant on the 50th quantile of the conditional signed discretionary accruals distribution (coeff. = -0.0150, p-value = 0.022). Furthermore, this effect is stronger at the 75th, as the coefficient for RESIGNED is negative and highly significant at this quantile (coeff. = -0.0187, p-value = 0.001), and also significant in the 90th quantile (coeff. = -0.0193, p-value = 0.020). The result, therefore, enable us to reject H2c. For the observations relating to client dismissals, however, audit quality in the initial year of an engagement is not significantly different from that of the other years across the main quantiles, leading us to be unable to reject H2b.[17] The result is consistent when the analysis is run on the entire distribution, as presented in Panels A and B of Figure 2.

In conclusion, in agreement with the results of DeFond and Subramanyam (1998), the OLS results suggest that, on average, there is no significant effect of audit firm change on audit quality in the first year of engagement as auditors do not provide significantly different audit quality in this year. The results, however, suggest that the auditors' behaviour in the first year of engagement is dependent on the clients' risk itself as there is a stronger effect on auditor independence than on auditor knowledge in the first year of audit engagement for a client with low audit quality, and also an audit firm change that arises as a result of auditor resignation as these clients are perceived to pose more risk. We provide evidence that the effect of an audit firm

[17] The coefficient for the variable of interest DISMISSED is not significant in any of the main quantiles.

change in the first year of an engagement on audit quality is not uniform across different groups of clients.

5. Sensitivity Analyses and Robustness Tests

We also performed several sensitivity analyses to confirm the robustness of the results presented in the main analysis. Specifically, we repeated the analysis using: (1) DeFond and Jiambalvo (1994) measure of discretionary accruals; (2) absolute value of discretionary accruals; (3) different periods to account for the timing of SOX;[18] (4) relaxing the sample exclusion criteria;[19] and (5) winsorizing 1% of the top and bottom observations for each continuous variable. The results are presented in Table 6, Panels A to E, respectively.

[INSERT TABLE 6 HERE]

In sum, we find that the main results with regard to FIRST does not hold up in all the sensitivity analysis, but that the main results with regard to DISMISSED and RESIGNED is robust to these alternative tests. Thus, it appears that first year audits still has a significant effect for at least a subset of the firms – namely those where the prior auditor resigned. Furthermore, the insignificant results from using absolute value of discretionary accruals – at least at higher quantiles - suggest that it is not just the magnitude that is important but also the sign of the accruals. Thus, it appears that our conclusion regarding auditors' ability to improve audit quality in the first year of the tenure is confined to (1) to those auditors where the previous auditor

[18] We included all observations from 31 July 2002 to 2011 in this test, and excluded all observations in relation to Arthur-Andersen because successor auditors may display higher skepticism in these firms as a result of the demise of Arthur Andersen in 2001.
[19] Specifically, we add back firm-years affected by mergers, acquisitions and dispositions..

resigned and (2) this effect is concentrated around reducing high levels of income-increasing accruals.

6. Conclusion, Limitations and Future Research

Prior studies examining audit firm tenure have suggested that an audit firm change is associated with lower audit quality in the first three years of the engagement, assuming that the audit quality in the first year of an engagement is similar with that of the second and third year of the engagement. We, however, offer the contrasting view that audit quality in the first year of an engagement is potentially different from that of the subsequent years. Specifically, the effects of an audit firm change should be more prominent in the first year of an engagement compared to subsequent years, as this period is the first time when the auditor is exposed to the client's system and financial records. Hence, our study examines the extent of the difference between audit quality in initial audit engagements and the subsequent periods. Our study also investigates the effect of the reasons for auditor change on the audit quality differential in the first year of an engagement relative to the subsequent engagements.

Across non-financial US firms in the post-SOX era, we find that on average, audit quality in the first year of an engagement is not significantly different from the audit quality in the subsequent years. However, we find that audit quality in the initial year of an engagement is significantly higher than that of the other years of the engagement for specific groups of firms. In particular, for clients with low audit quality, audit quality in the first year of an engagement is found to be significantly higher compared to that of the subsequent years. The inclusion of the reason for auditor change provides further evidence regarding audit quality in the first year of an engagement. Specifically, audit quality is found to be higher in the initial year of an audit engagement that results from an auditor resignation. This effect is even more prominent for clients with low audit quality from which the predecessor auditors have resigned.

We believe those results to be interesting for regulators as they may have an asymmetric preference for instigating regulation that specifically targets and improve the audit quality for firms with low audit quality due to the high potential costs involved with an audit failure, and are perhaps relatively less concerned with how this regulation affects high, or even the average level of audit quality. In particular, we believe that regulators should direct their efforts towards improving low audit quality with as little as possible impact where audit quality is currently high. In this respect, our study show that mandatory auditor change may have a positive impact on the overall audit quality in the market as it seems to specifically improve low audit quality and restrict the use of high income increasing accruals in the first year following a change in auditor.

There are, however, some important limitations to this study. First, the data for this study were gathered under a voluntary rotation regime, and the results may therefore not be directly translatable into a mandatory audit firm rotation setting. Second, this study only employed one measure of audit quality – discretionary accruals – and consequently captures only one dimension of audit quality. Despite the prominent use of discretionary accruals in the auditing literature, several other measures of audit quality could be investigated in future research to assess the robustness of the results provided in this study. Furthermore, the validity of our findings is also dependent on the appropriateness of the method used in estimating discretionary accruals, which is still under debate in the literature.

This study also provides fruitful areas for future research. Future studies could examine the impact of the first year of an engagement on audit quality by employing other measures of audit quality. In addition, future research could also employ quantile regression to further the understanding of how audit quality is differently affected for both low and high audit quality firms. It can, for example, be applied to examine audit quality between Big N and non-Big N audit firms and in industry specialization setting.

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Table 1: Sample Construction

Initial Sample (US firms with fiscal years ending 31 July 2002 – 31 December 2011)	57,160
Less Financial firms (SIC 6000-6999)	-22,251
Non-financial firms (fiscal years ending 31 July 2002 - 31 December 2011)	**34,909**
Observations before 15 November 2004	-8,403
Newly listed firms	-5,558
Mergers and acquisitions	-10,687
Observations with missing data	-2,876
Final Sample (firms with fiscal years ending 15 November 2004 - 31 December 2011)	**7,385**

Table 2: Descriptive Statistics

Descriptive Statistics for winsorized sample (n = 7,385 observations)						
Variables	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Skewness**
DA	-0.005	-0.005	0.0963	-0.361	0.452	0.534
AGE	21.516	17	13.207	6.000	61.000	1.080
SIZE	5.684	5.505	2.037	1.549	11.105	0.390
SIZE (US$ Mil.)	294.124	245.919	7.668	4.707	66,502.840	1.477
GROWTH	1.060	1.037	0.253	0.439	2.717	2.508
INDGROWTH	0.992	0.987	0.051	0.835	1.189	0.441
CFO	0.051	0.080	0.182	-0.944	0.425	-2.297
OPCYCLE	4.682	4.770	0.772	2.003	6.919	-0.701
VOLCFO	0.078	0.055	0.080	0.005	0.597	3.222
VOLSALES	0.177	0.132	0.159	0.009	1.028	2.349
PROPLOSS	0.336	0.200	0.361	0	1	0.677
PBANK	0.103	0.003	0.229	0	1	2.797
BIGN	0.684	1	0.465	0	1	-0.791
FIRST	0.060	0	0.237	0	1	3.706
DISMISSED	0.046	0	0.209	0	1	4.400
RESIGNED	0.014	0	0.118	0	1	4.340

Notes to Table 2:
1. Variable Definitions

DA = signed value of discretionary accruals scaled by average total assets
AGE = the number of years the client firm has been listed
SIZE = the natural log of total assets at year end
SIZE (US$ Mil.) = total assets at year end in US$ million dollars
GROWTH = $\sum$ Total $Assets_{i,t}$/ $\sum$Total $Assets_{i,t-1}$
INDGROWTH = $\sum$ Total $Assets_{i,t}$ / $\sum$ Total $Assets_{i,t-1}$ by two-digit SIC code
CFO = the firm's cash flows from operations divided by average total assets
OPCYCLE = the natural log of the sum of days receivables and days inventory
VOLCFO = rolling 5-year standard deviation of operating cash flow
VOLSALES = rolling 5-year standard deviation of sales
PROPLOSS = rolling 5-year proportion of years that net profit after tax before abnormals are losses
PBANK = the Zmijewski (1984) score measuring the probability of bankruptcy
BIGN = indicator variable, 1 if the audit firm is a Big N
FIRST = indicator variable, 1 for the first year of audit engagement, 0 otherwise
DISMISSED = indicator variable, 1 for the first year of audit engagement as a result of client dismissals, 0 otherwise
RESIGNED = indicator variable, 1 for the first year of audit engagement as a result of auditor resignations, 0 otherwise

2. All variables are winsorized at the top and bottom 0.5% level.

Table 3: Pearson Correlation Matrix

	DA	AGE	SIZE	GROWTH	INDGROWTH	CFO	OPCYCLE	VOLCFO	VOLSALES	PROPLOSS	PBANK	BIGN	FIRST	DISMISSED	RESIGNED
DA	1.000														
AGE	-0.011	1.000													
SIZE	**-0.113**	**0.405**	1.000												
GROWTH	**0.062**	**-0.032**	**0.072**	1.000											
INDGROWTH	-0.018	0.019	**0.076**	**0.108**	1.000										
CFO	**-0.574**	**0.165**	**0.356**	**0.172**	0.014	1.000									
OPCYCLE	**0.070**	**-0.057**	**-0.220**	0.027	-0.015	**-0.177**	1.000								
VOLCFO	**0.146**	**-0.264**	**-0.401**	**0.121**	0.019	**-0.395**	**0.130**	1.000							
VOLSALES	**0.050**	**-0.165**	**-0.283**	**0.071**	-0.004	**-0.061**	**-0.083**	**0.359**	1.000						
PROPLOSS	**0.160**	**-0.330**	**-0.419**	**-0.104**	-0.002	**-0.583**	**0.135**	**0.420**	**0.182**	1.000					
PBANK	0.025	**-0.047**	**-0.025**	**-0.167**	-0.007	**-0.405**	**-0.117**	**0.242**	**0.054**	**0.374**	1.000				
BIGN	**-0.061**	**0.096**	**0.553**	0.003	0.058	**0.118**	**-0.141**	**-0.172**	**-0.176**	**-0.131**	**0.030**	1.000			
FIRST	0.010	**-0.064**	**-0.122**	-0.003	0.002	**-0.042**	**0.022**	**0.042**	**0.058**	**0.064**	0.019	**-0.221**	1.000		
DISMISSED	0.010	**-0.046**	**-0.096**	-0.007	-0.007	-0.020	0.009	0.015	**0.047**	**0.041**	0.001	**-0.171**	**0.868**	1.000	
RESIGNED	0.002	**-0.047**	**-0.076**	0.006	**0.016**	**-0.050**	**0.030**	**0.058**	**0.035**	**0.057**	**0.036**	**-0.141**	**0.473**	**-0.026**	1.000

Notes to Table 3:

1. Bold: Correlation is significant at the 5% level (2-tailed).
2. For variable definitions, refer to Table 2.

Table 4: Multivariate Analysis - Audit Quality in Initial Audit Engagements

$$DA = \beta_0 + \beta_1 AGE + \beta_2 SIZE + \beta_3 GROWTH + \beta_4 INDGROWTH + \beta_5 CFO + \beta_6 OPCYCLE + \beta_7 VOLCFO + \beta_8 VOLSALES + \beta_9 PROPLOSS + \beta_{10} PBANK + \beta_{11} BIGN + \beta_{12}\textbf{(Variables of Interest)} + \Sigma\beta_k Year + \varepsilon_t$$

	OLS		10^{th} Quantile		25^{th} Quantile		50^{th} Quantile		75^{th} Quantile		90^{th} Quantile	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
INTERCEPT	0.0370	0.246	0.0461*	0.061	0.0468***	0.007	0.0237	0.143	-0.0096	0.587	-0.0521**	0.019
AGE	0.0002***	0.002	0.0004***	0.001	0.0002***	0.001	0.0001*	0.096	-0.0000	0.608	-0.0000	0.709
SIZE	0.0046***	0.001	0.0056***	0.001	0.0034***	0.001	0.0018***	0.001	0.0007	0.217	0.0002	0.760
GROWTH	0.0607***	0.001	0.0539***	0.001	0.0479***	0.001	0.0584***	0.001	0.0892***	0.001	0.1178***	0.001
INDGROWTH	-0.0510***	0.001	-0.0843***	0.001	-0.0492***	0.002	-0.0154	0.268	0.0075	0.632	0.0330*	0.085
CFO	-0.4543***	0.001	-0.4533***	0.001	-0.4566***	0.001	-0.4745***	0.001	-0.5098***	0.001	-0.5275***	0.001
OPCYCLE	-0.0072***	0.001	-0.0109***	0.001	-0.0086***	0.001	-0.0068***	0.001	-0.0048***	0.001	-0.0041***	0.001
VOLCFO	-0.0771***	0.002	-0.3559***	0.001	-0.2340***	0.001	-0.1118***	0.001	-0.0169	0.410	0.1066***	0.001
VOLSALES	0.0440***	0.001	0.0245**	0.022	0.0287***	0.001	0.0282***	0.001	0.0278***	0.001	0.0326***	0.003
PROPLOSS	-0.0468***	0.001	-0.0785***	0.001	-0.0579***	0.001	-0.0389***	0.001	-0.0326***	0.001	-0.0268***	0.001
PBANK	-0.0930***	0.001	-0.1693***	0.001	-0.1008***	0.001	-0.0623***	0.001	-0.0317***	0.001	-0.0257***	0.001
BIGN	-0.0081***	0.001	-0.0119***	0.004	-0.0072***	0.001	-0.0064***	0.001	-0.0058***	0.004	-0.0042	0.150
FIRST	**-0.0025**	**0.497**	**-0.0015**	**0.793**	**-0.0030**	**0.444**	**0.0004**	**0.885**	**-0.0061***	**0.064**	**-0.0085****	**0.045**
Year Fixed Effects	Included		Included		Included		Included		Included		Included	
N	7,385		7,385		7,385		7,385		7,385		7,385	
R^2/Pseudo R^2	45.04%		27.20%		25.48%		27.11%		34.65%		44.58%	

Notes to Table 4:

1. ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. All p-values are two-tailed.
2. The standard error used in the OLS test is robust standard errors. The standard error used in the quantile test is bootstrapped standard errors.
3. See Table 2 for variable description.

Table 5: Multivariate Analysis - Audit Quality in Initial Audit Engagements for Each Reason for Auditor Change

$$DA = \beta_0 + \beta_1 AGE + \beta_2 SIZE + \beta_3 GROWTH + \beta_4 INDGROWTH + \beta_5 CFO + \beta_6 OPCYCLE + \beta_7 VOLCFO + \beta_8 VOLSALES + \beta_9 PROPLOSS + \beta_{10} PBANK + \beta_{11} BIGN + \beta_{12}\textbf{(Variables of Interest)} + \Sigma\beta_k Year + \varepsilon_t$$

	OLS		**10th Quantile**		**25th Quantile**		**50th Quantile**		**75th Quantile**		**90th Quantile**	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
INTERCEPT	0.0367**	0.048	0.0381	0.101	0.0485**	0.002	0.0242*	0.098	-0.0064	0.698	-0.0551***	0.010
AGE	0.0002***	0.002	0.0004***	0.001	0.0002***	0.001	0.0001*	0.096	0.0000	0.549	-0.0000	0.835
SIZE	0.0046***	0.001	0.0056***	0.001	0.0034***	0.001	0.0018***	0.001	0.0007	0.213	0.0003	0.704
GROWTH	0.0607***	0.001	0.0543***	0.001	0.0480***	0.001	0.0588***	0.001	0.0870***	0.001	0.1187***	0.001
INDGROWTH	-0.0509**	0.001	-0.0767***	0.001	-0.0508***	0.001	-0.0162	0.181	0.0060	0.673	0.0343*	0.070
CFO	-0.4545***	0.001	-0.4532***	0.001	-0.4570***	0.001	-0.4755***	0.001	-0.5064***	0.001	-0.5268***	0.001
OPCYCLE	-0.0072***	0.001	-0.0107***	0.001	-0.0086***	0.001	-0.0067***	0.001	-0.0046***	0.001	-0.0041***	0.001
VOLCFO	-0.0764***	0.002	-0.3560***	0.001	-0.2333***	0.001	-0.1109***	0.001	-0.0012	0.529	0.1119***	0.002
VOLSALES	0.0439***	0.001	0.0248***	0.010	0.0289***	0.001	0.0283***	0.001	0.0271***	0.001	0.0318***	0.001
PROPLOSS	-0.0468***	0.001	-0.0795***	0.001	-0.0580***	0.001	-0.0389***	0.001	-0.0327***	0.001	-0.0265***	0.001
PBANK	-0.0929***	0.001	-0.1688***	0.001	-0.1008***	0.001	-0.0623***	0.001	-0.0312***	0.001	-0.0256***	0.001
BIGN	-0.0083***	0.001	-0.0124**	0.004	-0.0074***	0.008	-0.0065***	0.001	-0.0061***	0.002	-0.0040	0.187
DISMISSED	**0.0010**	**0.797**	**0.0056**	**0.317**	**-0.0012**	**0.772**	**0.0034**	**0.271**	**-0.0017**	**0.600**	**-0.0071**	**0.150**
RESIGNED	**-0.0147***	**0.080**	**-0.0239**	**0.112**	**-0.0118**	**0.232**	**-0.0150****	**0.022**	**-0.0187*****	**0.001**	**-0.0193****	**0.020**
Year Fixed Effects	Included		Included		Included		Included		Included		Included	
N	7,385		7,385		7,385		7,385		7,385		7,385	
R^2/Pseudo-R^2	45.06%		27.25%		25.49%		27.15%		34.69%		44.60%	

Notes to Table 5:

1. ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. All p-values are two-tailed.
2. The standard error used in the OLS test is robust standard errors. The standard error used in the quantile test is bootstrapped standard errors.
3. See Table 2 for variable description.

Table 6: Sensitivity Analysis

Panel A: Alternative Measure of Discretionary Accruals (DeFond and Jiambalvo (1994)) (n = 7,385)

	OLS		10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
FIRST	-0.0024	0.522	-0.0013	0.813	-0.0051	0.220	0.0002	0.943	-0.0056*	0.068	-0.0095**	0.030
DISMISSED	0.0012	0.748	0.0082	0.142	-0.0021	0.641	0.0031	0.297	-0.0026	0.397	-0.0071	0.101
RESIGNED	-0.0149*	0.073	-0.0258	0.080	-0.0132	0.126	-0.0129**	0.038	-0.0200***	0.000	-0.0188**	0.034

Panel B: Absolute Value of Discretionary Accruals (n = 7,385)

	OLS		10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
FIRST	0.0011	0.769	-0.0023**	0.019	-0.0006	0.767	-0.0007	0.813	-0.0001	0.990	-0.0048	0.587
DISMISSED	-0.0038	0.927	-0.0022**	0.025	0.0011	0.637	-0.0007	0.818	-0.0002	0.965	-0.0035	0.690
RESIGNED	-0.0037	0.680	-0.0033	0.231	-0.0058	0.172	-0.0002	0.978	0.0008	0.938	-0.0104	0.724

Panel C: Timing of SOX (from 31 July 2002) (n = 8,360)

	OLS		10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
FIRST	-0.0024	0.563	-0.0029	0.693	-0.0034	0.373	-0.0004	0.899	-0.0044	0.137	-0.0063	0.191
DISMISSED	0.0028	0.549	0.0042	0.559	0.0022	0.565	0.0042	0.221	-0.0005	0.870	-0.0009	0.891
RESIGNED	-0.0232***	0.005	-0.0300**	0.040	-0.0209	0.138	-0.0161*	0.057	-0.0248***	0.001	-0.0241***	0.001

Panel D: Relaxing Sample Exclusion Criteria (Merger) (n = 15,429)

	OLS		10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
Variables	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**	**Coefficient**	**P>|t|**
FIRST	-0.0007	0.822	0.0018	0.673	-0.0015	0.627	-0.0021	0.275	-0.0049*	0.055	-0.0035	0.326
DISMISSED	0.0020	0.517	0.0054	0.160	-0.0006	0.845	0.0002	0.912	-0.0027	0.346	-0.0020	0.600
RESIGNED	-0.0104	0.142	-0.0083	0.494	-0.0072	0.291	-0.0066*	0.086	-0.0145**	0.012	-0.0134*	0.092

Panel E: Winsorize 1% (n = 7,385)

	OLS		10th Quantile		25th Quantile		50th Quantile		75th Quantile		90th Quantile	
Variables	**Coefficient**	**P>│t│**	**Coefficient**	**P>│t│**	**Coefficient**	**P>│t│**	**Coefficient**	**P>│t│**	**Coefficient**	**P>│t│**	**Coefficient**	**P>│t│**
FIRST	-0.0021	0.541	0.0027	0.624	-0.0026	0.506	-0.0029	0.924	-0.0062*	0.061	-0.0072	0.112
DISMISSED	0.0013	0.718	0.0066	0.183	-0.0015	0.725	0.0035	0.300	-0.0010	0.756	-0.0049	0.299
RESIGNED	-0.0139*	0.077	-0.0229	0.122	-0.0085	0.307	-0.0154***	0.009	-0.0182***	0.001	-0.0189*	0.051

Notes to Table 6:

1. ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level. All p-values are two-tailed.
2. The standard error used in the OLS test is robust standard errors. The standard error used in the quantile test is bootstrapped standard errors.
3. Regressions are based on the models used in table 4 and 5, but control variables have not been tabulated for reasons of brevity.
4. See Table 2 for variable description.

Figure 1: Marginal Effect of Initial Audit Engagements to Audit Quality

The figure plots the coefficient point estimate and the 95% confidence interval of the marginal effects of initial audit engagements to signed discretionary accruals. The plots are based on quantile regression estimates for 99 percentiles with 500 bootstrap replications. The figure also provides the coefficient point estimate and the 95% confidence interval for the conditional mean distribution as obtained from OLS regression result. The test is conducted using the following model: DA = β_0 + β_1AGE + β_2SIZE + β_3GROWTH + β_4INDGROWTH + β_5CFO + β_6OPCYCLE + β_7VOLCFO + β_8VOLSALES + β_9PROPLOSS + β_{10}PBANK + β_{11}BIGN + β_{12}(Variables of Interest) + $\Sigma\beta_k$Year+ $\varepsilon_{t..}$ The displayed quantile regression estimates are obtained across 99 percentiles with 500 bootstrap replications.

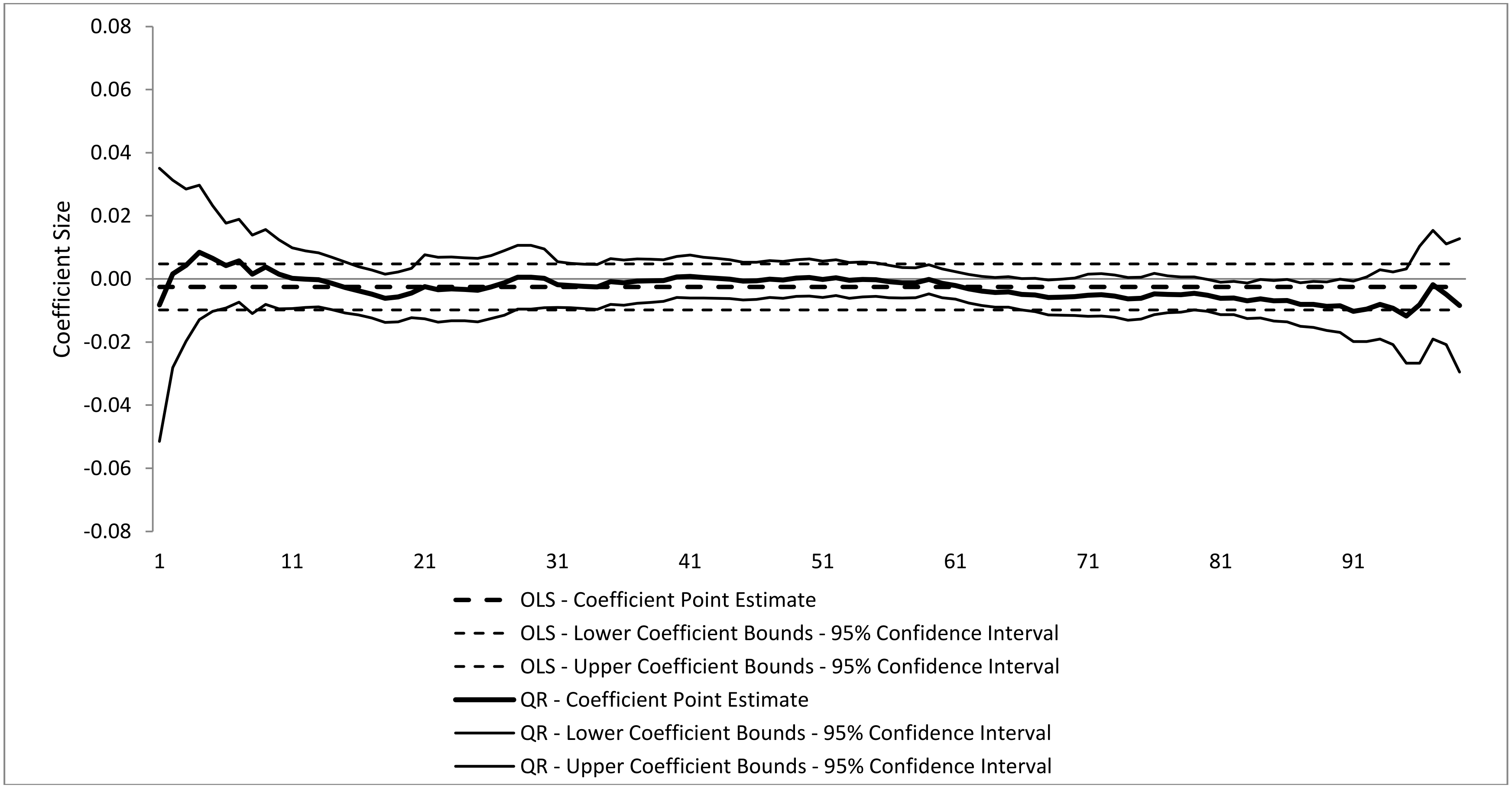
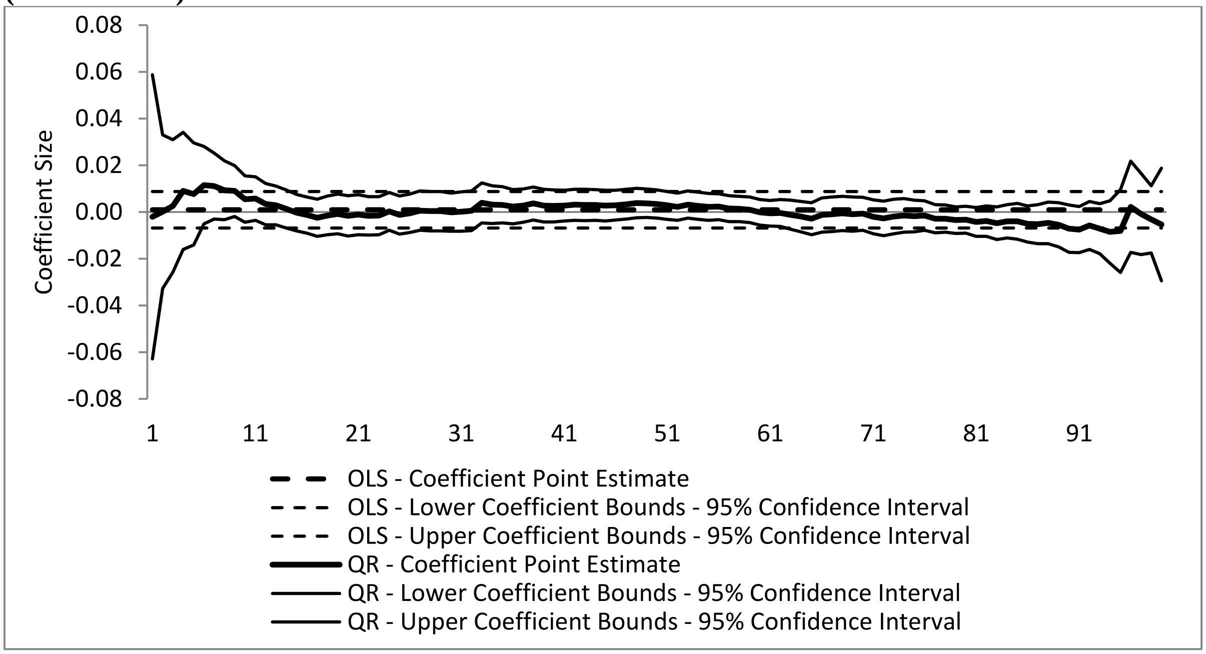


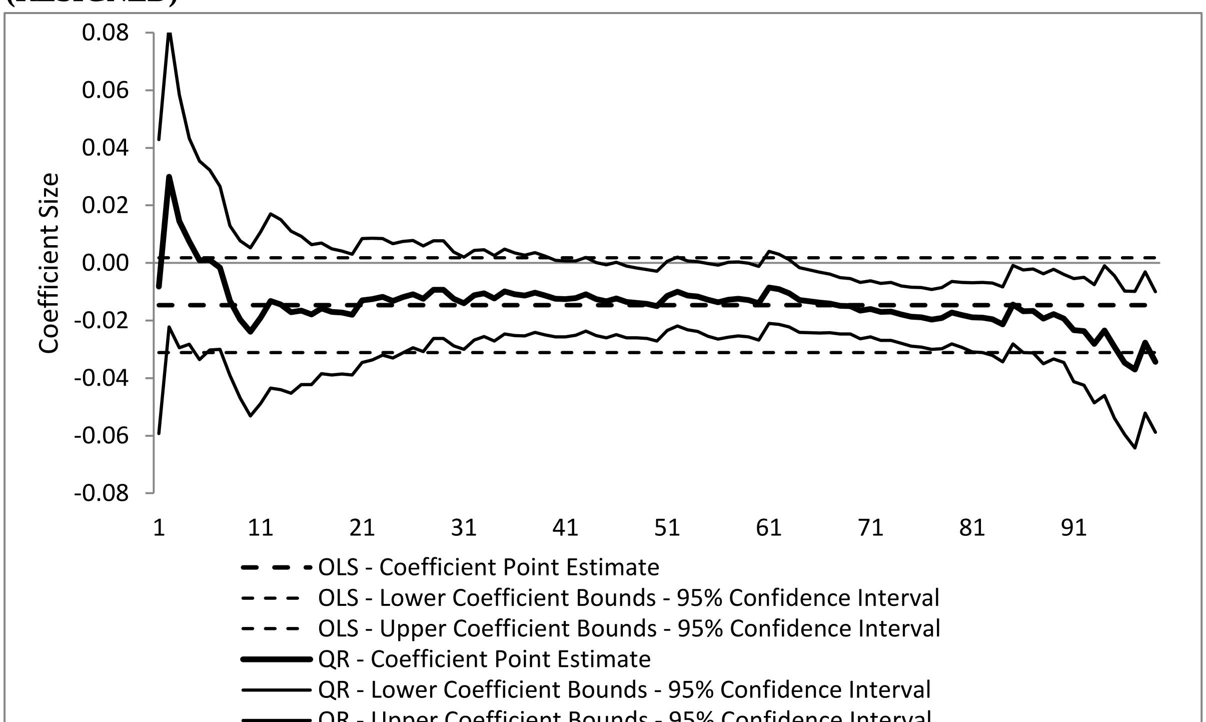
Figure 2: Marginal Effect of Reasons for Auditor Change on Audit Quality in Initial Audit Engagements

The figure plots the coefficient point estimates and the 95% confidence interval of the marginal effects of initial audit engagements to signed discretionary accruals based on reasons for auditor change across the conditional distribution of discretionary accruals. The marginal effects are obtained by using the following model: $DA = \beta_0 + \beta_1 AGE + \beta_2 SIZE + \beta_3 GROWTH + \beta_4 INDGROWTH + \beta_5 CFO + \beta_6 OPCYCLE + \beta_7 VOLCFO + \beta_8 VOLSALES + \beta_9 PROPLOSS + \beta_{10} PBANK + \beta_{11} BIGN + \beta_{12}(\text{Variables of Interest}) + \Sigma\beta_k Year + \varepsilon_t$. The displayed quantile regression estimates are obtained across 99 percentiles with 500 bootstrap replications.

Panel A: Marginal Effect of Client Dismissals to Audit Quality in Initial Audit Engagements (DISMISSED)



Panel B: Marginal Effect of Auditor Resignations to Audit Quality in Initial Audit Engagements (RESIGNED)



Appendix A: Detailed Explanation of Quantile Regression

Formally, indexing individual observations by i and variables by j, the linear regression model can be written as:

$$y_i = \sum_{j=1}^{k} x_{ij}\beta_j + \varepsilon_i \tag{3}$$

Where y_i is the dependent variable, the x_{ij} are independent variables predicting y, the β_j are the regression coefficients, and the ε_i represent a random component (that is, errors) that is independent of the *x*s. Residuals *e*, which have an expectation of zero, are defined simply as

$$e_i = y_i - \hat{y}_i, \tag{4}$$

where $\hat{y}_i$ are the fitted values of the model.

The more familiar OLS estimator solves for the parameter estimates by taking those values of the parameters that minimizes the sum of squared residuals:

$$\min \sum_{i=1}^{n} (y_i - \sum_{j=1}^{k} x_{ij}\beta_j)^2 = \min \sum_{i=1}^{n} e_i^2 \tag{5}$$

If the appropriate model assumption are correct, the fitted parameter function approaches the population conditional mean function *E*(Y | X) as the sample size goes to infinity.

For an analogous prescription, the least absolute value (LAV) regression estimator solves for the parameter estimates by taking those values of the parameters that minimizes the sum of the absolute value of residuals:

$$\min \sum_{i=1}^{n} | y_i - \sum x_{ij}\beta_j | = \min \sum_{i=1}^{n} | e_i | \tag{6}$$

Under the appropriate model assumptions, as the sample size goes to infinity, the conditional median of y given x at the population level is obtained. The symmetry of the piecewise linear absolute value function implies that the minimization of the sum of absolute residuals must equate the number of positive and negative residuals, thus assuring that there are the same number of observations above and below the median regression line (Koenker and Hallock 2001). Because the conditional median is a special case of a quantile regression line (that is, the .50th quantile) the least absolute value (LAV) regression can be generalized to allow for p^{th} quantile-regression estimators (Koenker and D'Orey 1987). The p^{th} quantile-regression estimators, $\hat{\beta}_j^{(p)}$, can be defined as the values that minimizes the *weighted* sum of the absolute value of residuals, where a weight of 1 – *p* is used if the residual is negative and a weight of *p* is used if the residual is positive. In other words, if the fitted value $\hat{y}_i$ under-predicts the observed value y_i a weight of 1 – *p* is used, and if the fitted value $\hat{y}_i$ over-predicts the observed value y_i a weight of *p* is used. Formally that is, the p^{th} quantile regression estimators are chosen to minimise:

$$\min p \sum_{y_i \geq x_{ij}\beta_j^{(p)}}^{n} | y_i - \sum x_{ij}\beta_j^{(p)} | + (1-p) \sum_{y_i < x_{ij}\beta_j^{(p)}}^{n} | y_i - \sum x_{ij}\beta_j^{(p)} |$$

$$= \min p \sum_{y_i \geq x_{ij}\beta_j^{(p)}}^{n} | e_i^{(p)} | + (1-p) \sum_{y_i < x_{ij}\beta_j^{(p)}}^{n} | e_i^{(p)} | \tag{7}$$

Thus, except the median-regression (.50 quantile) case, where negative residuals are given the same importance as the positive residuals, equation 7 assigns different weights to positive and negative residuals. Observe that the first sum is the sum of distances of data points above the quantile regression line. The second is a similar sum over all data points lying below the line. For example, when estimating coefficients for the .25th quantile regression line, the observations below the line are given a weight of 0.75 and the ones above the line receive a smaller weight of 0.25. As a result, 75 percent of the data points (x_i, y_i) lie above the fitted line leading to positive residuals, and 25 percent lie below the line and thus have negative residuals (Hao and Naiman 2007). Conversely, weighting the negative (positive) residuals by .25 (.75) would yield the estimated coefficients for the .75th quantile.[20]

For maximum simplicity, we illustrate the concept of quantile regressions in a simple regression framework on a manufactured scatterplot in Figure A-1, Panels A to C.

[INSERT FIGURE A-1 HERE]

Figure 1, Panel A shows the traditional OLS estimate which yields a conditional *mean* prediction model by minimizing the sum of the squared errors. That OLS estimate is given by:

$$Y = 1.45 + 0.71*X \quad (8)$$

That is, the line predicts the mean value of Y for a given value of X. For example, if X takes a value of 4 the OLS model predict that the mean value of Y is 4.28, and if x takes a value of 5 the mean value of y is 4.99. In other words, the coefficient on X indicates that the mean value of y changes by 0.71 for a one unit change in X.

[20]Importantly, the estimation of coefficients for each quantile regression is based on the weighted data of the *whole* sample, not just the portion of the sample at that quantile (Hao and Naiman 2007). Thus, using the whole sample to derive the conditional quantiles for our audit quality proxy is not the same, and should not be confused with estimating an OLS model and the marginal effect of variables by constructing sub-samples between different unconditional quantiles of this proxy. The latter is methodologically inferior to quantile regressions for two important reasons. Firstly, we are not interested in the effect of auditor tenure on high and low *unconditional* values of our audit quality proxy *per se*, what we are interested in is the effect of audit tenure at different *conditional* values – i.e. the high and low values of discretionary accruals *after* any confounding factors have been controlled for. Secondly, if endogenous sample selection is present, of which stratifying the sample on the dependent variable would be an example of, "… bias always occurs in OLS in estimating the population model" (Wooldridge 2006, 326) and using such a strategy in place of quantile regressions is, as Koenker and Hallock (2001, 147) puts it, "…doomed to failure for all the reasons so carefully laid out in Heckman (1979) work on sample selection".

Figure 1, Panel B, shows the LAV estimate which yields the conditional median prediction model by minimizing the sum of the absolute errors. That LAV model is given by:

$$Y = 1.25 + 0.57*X \tag{9}$$

For example, if X takes a value of 4 the LAV model predict that the median value of Y is 3.54, and if X takes a value of 5 the median value of Y is predicted to be 4.11. Thus, in a LAV model, the coefficient on X indicates that the median value of Y changes by 0.57 for a one unit change in X.

Figure 1, Panel C, shows the model estimated of the .75thquantile which predicts the conditional .75thquantile value of y by model by minimizing the sum of weighted absolute errors. The 25% percent of the errors above the line is given a weight of .75 and the 75% of the points below the line is given a weight of .25. That 75th quantile estimate is given by:

$$Y = 1.917 + 0.91*X \tag{10}$$

For example, if X takes a value of 4 the .75th quantile model predict that the .75 quantile value of Y is 5.56, and if X takes a value of 5 the .75thquantilevalue of Y is predicted to be 6.47. Thus, in the .75th quantile model, the coefficient on X indicates that the 75th quantile value of Y changes by 0.91 for a one unit change in X.

Thus it should be apparent that quantile regressions can overcome some inherent limitations of ordinary least square regressions provide further insight to audit quality research. First, and by extending the focus to non-central locations of the conditional distributions, which arguably is where the interest lies sometimes with regard to audit quality research, we can specifically focus on how to identify and improve low audit quality. Second, and since multiple quantiles can be modelled, it is possible to achieve a more complete understanding of how the distribution of the dependent variable, which in archival audit research often is a proxy of audit quality, is affected by independent variables, including information about shape changes to the conditional distribution.

Quantile regressions have some additional beneficial properties over OLS regressions. OLS achieves the property of BLUE, it is the best, linear, and unbiased estimator, if the following four assumptions hold:

1. The explantoary variables **X** is non-stochastic
2. The expectations of the error term e are zero
3. Homoscedasiticity – the variance of the error term is constant
4. No autocorrelation

However, frequently one or more of these assumptions are violated, resulting in that OLS is not anymore the best, linear, unbiased estimator. Heteroscedasticity is often associated with cross-sectional data, and according to Deaton (1997), quantile regressions are useful in these situations. If the heteroscedasticity depends on the independent variables, the estimated slope parameters will differ across different quantiles and by estimating a number of quantile regressions this complexity in the data can be accounted for. With heteroscedasticity, focusing solely on the mean as a measure of location, important information about the tails of the distribution is lost. In fact, it is only when the distribution of the errors is homoscedastic, that the estimated slope parameters from any quantile regressions will be identical to those produced by ordinary least squares (OLS).[21] Buchinsky (1998) notes two other advantages of the quantile regression model. First, when the error terms are not normally distributed, the quantile regression estimator may be more efficient than the OLS estimator. This is especially so if the standard errors are obtained through bootstrapping as it does not require distributional assumptions and as such yields more accurate inferences when the data are not well behaved. Second, the quantile regression parameter estimates are relatively robust to outliers because, in contrast to the OLS, it is not the magnitude of the dependent variable that matters but on which side of the estimated hyperplane is the observation. In the case of a positive residual, the dependent variable can be increased towards infinity without altering the solution. For a negative residual, the solution will be the same if the dependent variable is decreased towards minus infinity. Standard errors and confidence limits for the quantile regression coefficient estimates can be obtained with bootstrapping methods.[22]

[21] It should be noted that even if the standard errors are obtained with heteroskadicity robust standard errors in a model estimated using OLS, that does not change that parameter estimate yield a conditional *mean* model.

[22] Standard errors and confidence limits may also be obtained asymptotically, and while both methods provide robust results (Koenker and Hallock (2001)), the bootstrap method (Efron and Tibshirani (1993)) is preferred as more practical (Hao and Naiman (2007)), and as such is adopted in this study.

Figure A-1: Illustration of different model estimations in a simple regressions: OLS, LAV and Quantile Regressions

Illustration of fitting a regression model $Y=\beta_0+\beta_1X+e$ using different estimation method on a fabricated dataset with a hundred (X,Y) observations. Panel A fits the model by using ordinary least square (OLS) estimatation (i.e. minimising the sum of squared errors) and as such fits a conditional mean model. Panel B fits the model by using least absolute value (LAV) estimatation (i.e. minimising the sum of absolute errors) and as such fits a conditional median model. Panel C fits the model by using leas absolute value (LAV) estimatation (i.e. minimising the sum of absolute errors) but after the errors are weighted. In this case, the 25% of the observation above the regression line is weighted by .75 and the 75% of the observation under the regression line is weighted by .25. As such, the Panel C exhibts a model that predicts the 75th quantile of Y conditional on the value of X.

Panel A: OLS Estimation **Panel B: LAV Estimation** **Panel C: 75. Quantile Estimation**