Estimates of Optimal Audit Firm Tenure Across Different Legal Regimes

Li (Lily) Z. Brooks
Washington State University, USA

C. S. Agnes Cheng
The Hong Kong Polytechnic University, Hong Kong

Joseph A. Johnston
Illinois State University, Normal, USA

Kenneth J. Reichelt
Louisiana State University, Baton Rouge, USA

Abstract

Based on a quadratic form of audit tenure in explaining audit quality, we estimate a refer-ence point that is potentially optimal for audit firm rotation for 22 countries across legal regimes with high versus low levels of investor protection. We find that our estimate for the high investor protection regime is longer than that for the low investor protection regime (24 years vs. 14 years for our main measure). However, very few firms from our sample would have been affected if there were a requirement of a mandatory rotation term, suggesting that mandatory audit firm rotation may not be necessary. In additional analyses, we not only evaluate the empirical validity of the quadratic form but also use vari-ous measures of our key variables, to conduct several other robustness tests. We continue to find a longer optimal point for countries with stronger investor protection in these robustness tests. Our findings imply that stronger country-level investor protection is a substitute for a shorter term of mandatory audit firm rotation.

Keywords

auditor firm tenure, earnings quality, audit quality, mandatory audit firm rotation, investor protection, legal regime

Introduction

Regulators around the world require, or are considering, mandatory audit firm rotation because anecdotal evidence suggests that long audit tenure decreases audit quality (e.g., Enron, Lehman Brothers, and Nortel Networks Corp). [1] However, regulators differ in estab-lishing the point in time at which mandatory auditor rotation should take place. For exam-ple, Italy has a 9-year term (Republic of Italy, 1975), the European Union recently mandated a 20-year maximum term (10-year minimum) effective 2016

Corresponding Author:
Kenneth J. Reichelt, Department of Accounting, E. J. Ourso College of Business, Louisiana State University, 2821 Business Education Complex, Baton Rouge, LA 70803, USA.
Email: reichelt@lsu.edu

(European Parliament, 2014), and Indonesia has a 6-year term (Lennox, 2014, p. 92). In this article, we estimate the point at which audit quality starts to decline (hereinafter, the *turning point*), and the optimal point at which mandatory audit firm rotation should occur (herein-after, the *reference point*). We predict that countries with stronger investor protection should have a longer *reference point*. Accordingly, we provide estimates of the *reference point* for countries with high and low investor protection. Our study is empirical in nature, so arguably if we do not find empirical evidence of a *turning point* or if few client firms keep their auditor beyond the *reference point*, then market forces are operating efficiently at least with regard to auditor turnover; consequently, regulation requiring mandatory audit firm rotation is unnecessary.

In theory, audit quality should increase in early years due to a learning effect. Early studies support this notion (e.g., Johnson, Khurana, & Reynolds, 2002; Myers, Myers, & Omer, 2003). However, when audit tenure becomes longer, the auditor and the client may form a bond impairing the auditor's independence and their ability to detect and report errors and biased financial reporting. Nevertheless, a decrease in audit quality does not necessarily warrant mandatory audit firm rotation, because the decline in audit quality may not be sufficient to justify the costs of switching audit firms.[2] Although this broad trade-off is clear from a theoretical perspective, to find the actual point in time at which auditor turnover becomes efficient is an empirical question. Thus, we let the data speak for itself.

In estimating the *reference point*, we primarily focus on client firms in countries that do not have mandatory audit firm rotation.[3] Using a model that follows Cheng and Zhang (2013), we show that the *reference point* lies at the midpoint of the inverted-U-shaped curve between the *turning point* and the lowest point on the curve (hereinafter, the *crucial low point*). As our model only considers cumulative audit quality and does not consider out-of-pocket switching costs of the client firm, we use the term "*reference point*" inter-changeably as our *estimate* of the optimal rotation point.[4] We conjecture that the rate at which auditor independence declines is slower (faster) for countries with stronger (weaker) legal liability regimes, and thus, the *reference point* at which auditor rotation becomes desirable is reached faster for countries with weak legal protection.

For our main analyses, we employ a sample of 19,247 firm-year observations from 22 countries covering 14 years from 1996 to 2009. This sample excludes U.S. firms[5] and firms with multiple auditors. We first establish that a quadratic relationship between audit quality and audit firm tenure is empirically valid, by using goodness-of-fit tests that include a graphical method and a comparison with other models (see Section "Validation of Quadratic Model" and Figure 3). We measure audit quality by the magnitude of firm-level-estimated abnormal accruals (DeFond & Park, 2001; Francis & Wang, 2008)[6] and measure the strength of a country's legal liability regime by its litigation risk score (Wingate, 1997). We use these two measures to estimate an ordinary least squares (OLS) regression of audit quality on audit firm tenure and audit firm tenure-squared (quadratic relation), and obtain the *reference point* for the high and low legal liability country groups. We find that the *reference point* for the high (low) litigation risk countries is approximately 24 (14) years.[7] This result suggests that stronger investor protection delays the decline in audit quality; thus, a longer audit firm rotation term should be required. For robustness purposes, we use alternative measures of audit quality and legal regime, and we control for survivorship bias.

We note that very few observations in our sample have audit tenure beyond the *reference point*. Specifically, we find that only 64 observations (0.49%) in the high litigation

risk countries and 143 (2.34%) in the low litigation risk countries have audit firm tenure greater than or equal to their respective *reference points*. In fact, there are no observations in our sample that are longer than the *crucial low point* (31 years for high and 19 years for low litigation risk countries). As mentioned earlier, it is likely that the optimal rotation point is longer than the *reference point* if switching costs are considered. The fact that very few firms have audit firm tenure that is beyond the *reference point*, and none are beyond the *crucial low point*, implies that it may not be necessary to require mandatory audit firm rotation. This should be true for at least the observations and countries in our sample, because client firms will voluntarily switch auditors over time.[8] Nevertheless, we show that investor protection prolongs the point at which audit quality declines. As country-level investor protection improves across the world, the optimal rotation point should be even longer than that suggested by our ex post analysis of past observations.

Our method for estimating the *reference point* is based on an observed empirical relation between audit quality and audit firm tenure, and our estimates are sample dependent and may encounter survivorship bias. Our sample includes many young and frequently switching client firms that have shorter audit firm tenure. The inclusion of these firms in our sample increases the weight of the observations in the early tenure years which may only capture the learning effect (i.e., the positive relation between audit quality and audit tenure), and may bias the results if too many observations are in the early tenure years.[9] To mitigate the potential bias, we perform stratified random sampling as a robustness check. The *reference point* for the high (low) litigation risk group is 36 (16) years. Although these results are longer than our main OLS results, our conclusion is still supported.

In addition, we conduct several other robustness checks to solidify our main results. We use the magnitude of performance-adjusted abnormal accruals (Kothari, Leone, & Wasley, 2005)[10] and the magnitude of a cross-sectional abnormal accruals measure following Ecker, Francis, Olsson, and Schipper (2013). We also use signed abnormal accruals, rather than the magnitude of abnormal accruals, as a measure of audit quality. For the legal liability regime measure, we use several alternatives, including legal origin (La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 1997, 1998), the efficiency of judiciary (La Porta, Lopez-De-Silanes, & Shleifer, 2006; La Porta et al., 1998), the rule of law (Kaufmann, Kraay, & Mastruzzi, 2009), and the auditing enforcement index (Brown, Preiato, & Tarca, 2013). Moreover, we use various sample constructions, such as including U.S. observations, including multiple auditors, and excluding Andersen clients. Among these tests, we consistently find that the *reference point* for the high (low) litigation risk countries surrounds 24 (14) years,[11] thus reinforcing our conclusion that the *reference point* is greater in countries with stronger investor protection.

Our article extends the literature on audit firm tenure and audit quality in several ways. First, we provide convincing evidence that the *reference point* is longer for firms in stronger investor protection countries. Prior studies by Francis and Wang (2008) and Choi, Kim, Liu, and Simunic (2008) show that audit quality on average increases with the strength of investor protection, and we show that the *reference point* lengthens with stronger investor protection, which has not been documented in prior published studies (e.g., Davis, Soo, & Trompeter, 2009). Arguably, stronger investor protection reduces auditor–client bonding, and thus lengthens the *reference point*; however, it could also shorten the *reference point* because auditor learning is higher. Our results support the former. A major implication is that the negative effect from auditor–client bonding is less severe in countries with stronger investor protection, thus warranting a longer audit firm rotation term.

Second, our study provides a more rigorous comparison of the *reference point* between investor protection regimes, by using 22 countries in our analysis. Prior studies by Chi and Huang (2005) and Davis et al. (2009) are restricted to single countries (Taiwan and United States, respectively). By examining a larger number of countries, there are fewer confounding effects such as from unique country characteristics, differing sample periods, and differing audit quality measures.

Third, we test the validity of the quadratic model with more robust measures than prior studies (Chi & Huang, 2005; Davis et al., 2009) by using a graphical method based on mean residuals of accrual quality (Hill, Griffiths, & Lim, 2011) and statistical comparisons with other functional forms (linear, higher orders, and logarithmic). We find that the quadratic model is a reasonable approximation of the data.

Fourth, we point out that the optimal rotation point should not be the *turning point* that was not made evident in previous studies; rather, we suggest using the *reference point* to evaluate the mandatory rotation term. We then provide empirical estimates of the *reference point* that maximize audit quality over the life of the firm for our selected sample. Our study extends the unpublished paper by Cheng and Zhang (2013) who show that the rotation term should be after the *turning point*, by establishing the midpoint as the optimal rotation point, if switching costs are minimal.

Our article is important to policymakers. Although prior research has not yet answered whether mandatory audit *firm* rotation is in fact beneficial to improving audit quality (Lennox, 2014), regulators must weigh the costs against the benefits in deciding whether to implement mandatory audit firm rotation. Our study gives regulators a better understanding of what audit firm rotation term is desirable and how the strength of the country's investor protection laws and institutions matters. Specifically, our *reference point* estimates (that maximize long-run audit quality) are longer than the 10-year minimum term enacted by the European Parliament in 2014. If the current legal liability status and other factors affecting the costs and benefits, on average, remain similar to the periods that we analyze, then it seems that the current 10-year minimum rotation term is too short. Moreover, because the theoretical *reference point* does not take into account the switching costs incurred by the audit client (e.g., start-up costs for the new auditor), the actual rotation term should be longer (i.e., toward the *crucial low point*) as switching costs increase. One important implication of our study is that regulators, who show a desire to require mandatory auditor rotation, should consider a country's strength of investor protection as a substitute for a shorter auditor rotation term.

The remainder of the article is organized as follows. The next section presents our background literature and hypothesis. The "Method" section describes our empirical methods. The "Empirical Results" section describes our results, and the final section concludes the article.

Related Literature and Prediction

Auditor Tenure and Audit Quality

For the past several decades, regulators and professional bodies have debated mandatory audit *firm* rotation (The Conference Board, 2003; European Commission, 2010; PricewaterhouseCoopers, 2002; Public Company Accounting Oversight Board, 2011). In recent years, it has been debated in the United States with no change in regulation (e.g., Chasan, 2012; Public Company Accounting Oversight Board, 2011; Tysiac, 2012, 2013a)

and in the European Union with an eventual mandate (''Auditor Rotation: Musical Chairs,'' 2011; European Commission, 2010; European Parliament, 2014; Tysiac, 2013b). Opponents contend that mandatory audit firm rotation is not warranted for several reasons. First, the benefits are not justified, because switching costs are too high for both the client and the auditor. For instance, the U.S. Congress Committee on Financial Services in 2013 reported that client switching costs, including additional management time and company resources, can range between US$500,000 and US$5 million, and most large audit firms believe that initial audit costs will increase by more than 20% compared with those in the subsequent year (U.S. Congress, 2013). These costs potentially include tendering a new auditor, resources invested by the auditor in learning about the business and accounting systems, initial client costs related to auditor learning and new audit procedures, and reduced auditor effectiveness in detecting material errors. Auditor effectiveness is reduced because of a steep ''learning curve'' in understanding new and complex transactions. Second, opponents insist that mandatory *partner* rotation, which is mandated in Australia, China, Taiwan, the United Kingdom, and the United States, is an acceptable alternative to balance ''the need to bring a 'fresh look' to the audit engagement with the need to maintain continuity and audit quality'' (Securities and Exchange Commission, 2003, Section C). Earlier empirical evidence finds that earnings quality increases with audit firm tenure (Ghosh & Moon, 2005; Myers et al., 2003), and that the cost of debt decreases with audit firm tenure (Mansi, Maxwell, & Miller, 2004), supporting the opponents' standpoint.

On the contrary, proponents of mandatory auditor rotation argue that an extended auditor–client relationship negatively affects audit quality for several reasons. First, the economic incentives to retain a client may compromise the auditor's independence, leading to greater auditor tolerance of management misrepresenting the financial statements. Second, the ''close ties'' that develop over time between the auditor and the client may impair the auditor's professional skepticism. Consequently, the auditor is less likely to introduce more creative audit programs that can better detect errors and fraud risks. Instead, the auditor over-relies on management's honesty or on the prior year's working papers as the tasks become more routine for older clients. Third, a long-term auditor–client relationship reduces audit market competition, and hence lowers audit quality. Thus, a term limit under mandatory rotation can increase audit market competition, and the auditor has a ''fresh set of eyes'' to better resist management's pressure to tolerate earnings management. Fourth, a long-term auditor–client relationship creates a slippery slope for the auditor because managers could strategically increase misstatements over time knowing that auditors are less likely to report the misstatement in later years to protect the auditor's reputation. For instance, in the case of E.S.M. Government Securities Inc., the auditor knowingly concealed fraud to protect their reputation (Maggin, 1989). In a related study, Corona and Randhawa (2010) show analytical support for this conjecture, arguing that auditors in later years are reluctant to report misstatements, because this also questions their competence for not having reported them in prior periods, even though the misstatements were less material. Finally, it is unclear whether mandatory *partner* rotation is an effective substitute for mandatory audit firm rotation (Lennox, 2014, p. 103). In support of these arguments by proponents, recent empirical evidence has used the quadratic model and has shown that both actual and perceived audit quality increase in the earlier years and decrease in the later years of audit firm tenure (e.g., Boone, Khurana, & Raman, 2008; Chi & Huang, 2005; Davis et al., 2009).

The arguments for and against mandatory audit firm rotation can be summarized in two factors that influence the relation between audit quality and audit firm tenure: the *learning effect*, dominant in the early years of the audit firm's tenure; and the *bonding effect*,

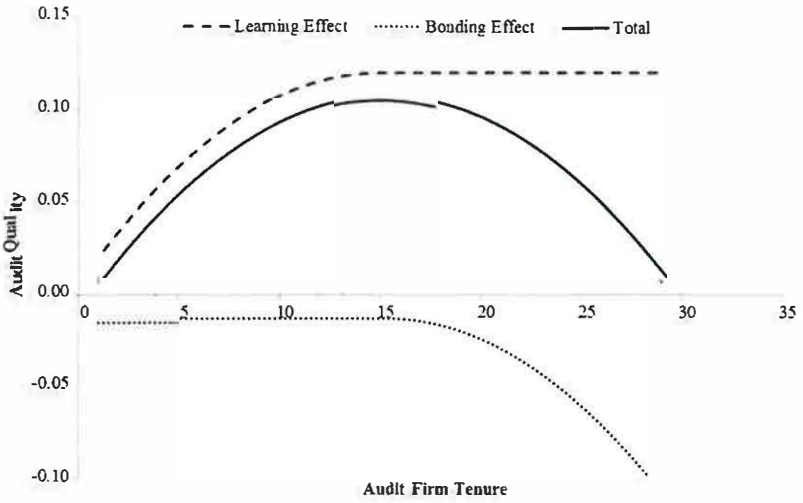

Figure 1. Audit quality and audit tenure relation.

Note. The figure models the relation between audit quality and audit firm tenure based on the learning effect, the bonding effect, and the combined effect. The learning effect is modeled by a standard exponential asymptotic function and is indicated by the dashed line. The bonding effect is modeled as a concave function and is indicated by the dotted line. The combined effect (total) reflects the theoretical relation between audit quality and audit firm tenure, and is indicated by the solid line. See the section "Auditor Tenure and Audit Quality" of the text for further discussion.

dominant in later years (Boone et al., 2008; Chi & Huang, 2005; Davis et al., 2009).[12] The *learning effect* increases audit quality in the initial years as the auditor acquires new knowledge of the client's industry, business, and internal controls, and as such the auditor's ability to detect and report client errors increases. The *bonding effect* decreases audit quality over time, because of a growing economic bond between the auditor and the client that deteriorates the auditor's independence. Because the marginal rate of gaining new knowledge is diminishing (i.e., the "learning curve," Chen & Manes, 1985; Yelle, 1979), the *learning effect* eventually plateaus, while the *bonding effect* increases over time (Corona & Randhawa, 2010). The combined effect is that audit quality increases in the early years and decreases in the later years.

To illustrate, Figure 1 demonstrates from the dashed line, with only a *learning effect* present, the relation between audit quality and audit tenure is approximately logarithmic. However, as seen from the solid line, with combined *learning* and *bonding effects* present, the right tail is pulled down, resulting in a concave relation. Although prior studies have used the quadratic form to estimate the relation between audit quality and audit firm tenure (Boone et al., 2008; Chi & Huang, 2005; Davis et al., 2009), we strengthen our case for using the quadratic form by providing empirical support over higher order forms (see the "Validation of Quadratic Model" section). This support permits us to discuss the *reference point* as the optimal auditor rotation term and for other estimates.

Reference Point

An important aspect of our article is to provide a *reference point* at which auditor rotation maximizes audit quality. In the absence of switching costs and assuming a quadratic audit

quality–tenure relationship, it can easily be shown that the theoretical *reference point* that maximizes long-term audit quality is equal to 3/2 of the *turning point* (see Appendix A). The examples in Figure 2 illustrate how switching at the *reference point* maximizes long-term audit quality. In Panel A, the client changes their auditor at the *turning point* (10 years), and audit quality immediately drops to the initial level where a new auditor starts its term. Panel B shows that switching at the *crucial low point* (20 years) will not result in a sharp drop in audit quality; however, the client will suffer a gradual and lengthy decline in audit quality after the *turning point* until a new auditor starts its term. Panel C shows that the highest cumulative audit quality is achieved when the auditor switches at the *reference point* (15 years). It has the highest long-term average cumulative audit quality (0.5625 units), compared with switching at either the *turning point* or the *crucial low point* (which has the same number of units [0.5] due to the symmetric nature of a quadratic function). Thus, the *reference point* provides a reference for choosing the optimal rotation point.[13]

Legal Liability Regime and Audit Quality

Our study investigates how the *reference point* varies by the strength of the legal liability regime; thus, we discuss in further depth what a legal liability regime is and how it affects audit quality, before positing our prediction. Legal liability regimes are country-specific investor protection laws and institutions (e.g., La Porta et al., 1997, 1998), which consist of legal institutions and securities regulations serving to protect investors against exploitation by managers and controlling shareholders. La Porta et al. (2006) argue that investor protection works to benefit investors by disclosure rules (e.g., a prospectus with earnings and ownership information), liability rules that facilitate private enforcement (e.g., liability standards for issuers, auditors, and intermediaries when investors seek damages), and stricter enforcement mechanisms (e.g., a Securities and Exchange Commission that can clarify legal obligations and impose penalties to issuers and auditors).

Prior studies conclude that the strength of a legal liability regime increases audit quality. The intuition is that a strong legal liability regime not only deters the ex ante financial reporting risk faced by investors (e.g., Ball, Kothari, & Robin, 2000; Bhattacharya, Daouk, & Welker, 2003; Bushman, Piotroski, & Smith, 2004; Hail & Leuz, 2006; Hung, 2000; Leuz, Nanda, & Wysocki, 2003; Stulz, 2009) but it also increases the auditor's incentives to be more diligent in reporting detected material misstatements, so as to minimize the auditor's litigation risk (Francis & Wang, 2008). The quality of financial reporting is also associated with the strength of laws and other institutions that protect investors (e.g., Ball et al., 2000; Bhattacharya et al., 2003; Bushman et al., 2004; Hail & Leuz, 2006; Hung, 2000; Leuz et al., 2003; Stulz, 2009). Moreover, Francis and Wang (2008) document that earnings quality (proxied by discretionary accruals) is higher in countries with a stronger legal liability regime for client firms audited by the Big N auditors. Similarly, Choi et al. (2008) provide corroborating evidence that auditors charge higher audit fees to client firms in countries with a stronger legal liability regime because higher litigation risk not only affects the audit firm's reputation but also reduces the audit firm's "deep-pocketed" wealth arising from investor lawsuits. Although it is clear from prior studies that strong legal liability regimes are associated with higher audit quality, what is not clear is how the *reference point* varies, which leads to our prediction.

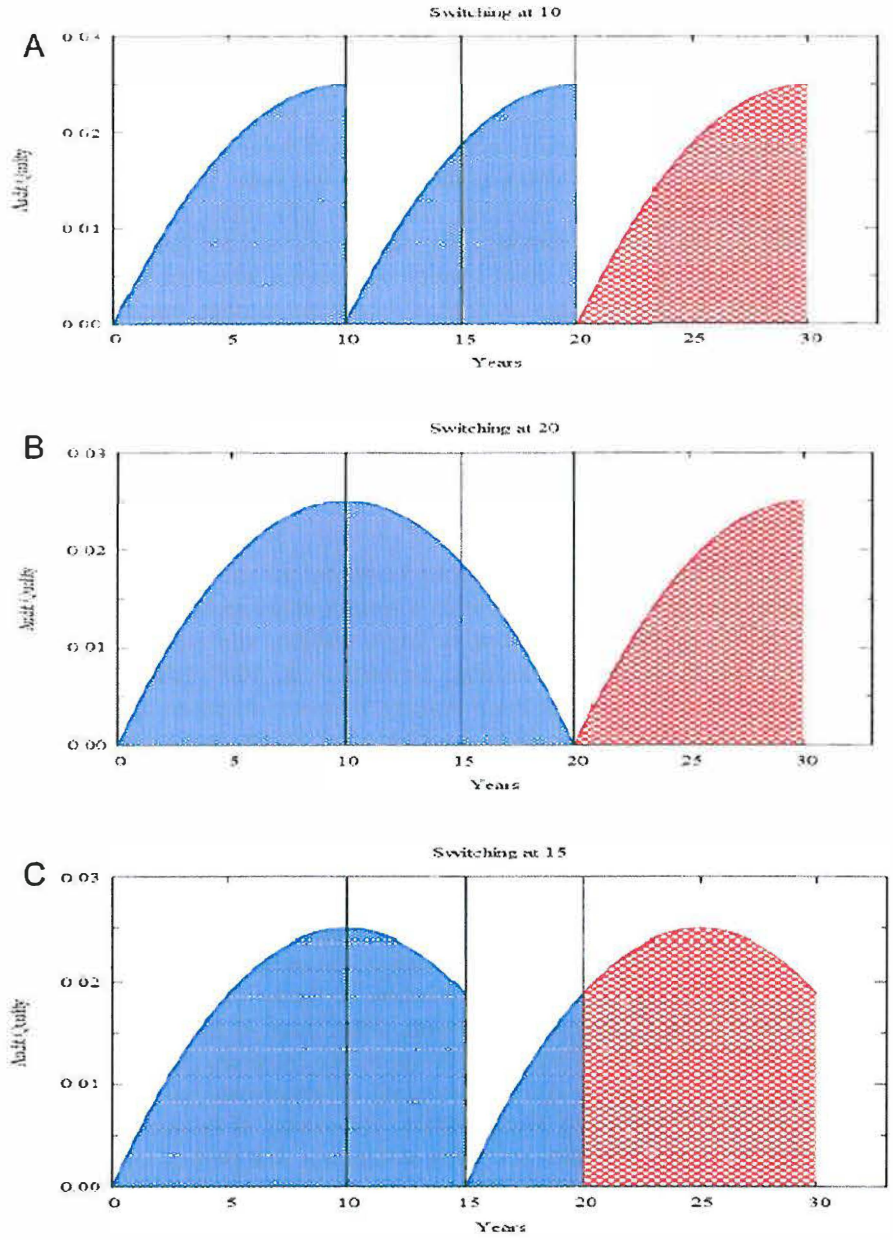

Figure 2. Cumulative audit quality and alternative rotation points.
Panel A: Rotation at the turning point (10 years).
Panel B: Rotation at the crucial low point (20 years).
Panel C: Rotation at the reference point (15 years).
Note. The figures show the cumulative audit quality (the area under the curve) from three alternative audit firm rotation points—the turning point (Panel A), the crucial low point (Panel B), and the reference point (Panel C) for a company with a 30-year life, when the turning point is 10 years, and when audit quality is a quadratic function of audit firm tenure. The cumulative audit quality is the highest when the reference point is the rotation point (0.5625 cumulative audit quality), compared with when either the turning point or the crucial low point is the rotation point (0.5).

Prediction

We predict that firms in a high (i.e., stronger) legal liability regime will have a longer *reference point* relative to firms in a low (i.e., weaker) legal liability regime. Even in a very strong legal liability regime, such as in the United States (e.g., Baginski, Hassell, & Kimbrough, 2002; Seetharaman, Gul, & Lynn, 2002; Wingate, 1997), audit quality still decreases when there is long audit firm tenure (Brooks, Cheng, Johnston, & Reichelt, 2013; Davis et al., 2009). We argue that a high legal liability regime encourages a less vigorous bonding effect, and hence a slower decline in audit quality (i.e., a delayed *reference point*). The underlying reason is that in a high legal liability regime, institutions (such as stricter regulators and a more effective legal system) and incentives (such as higher legal costs and greater reputational risk) make it more costly for auditors to compromise independence. Consequently, the negative effects on audit quality, arising from bonding with the client, are counteracted more effectively. Thus, the erosion of audit quality is dampened, prolonging the *turning point* and the *reference point*. Thus, we predict that *firms in a high legal liability regime will have a longer reference point relative to firms in a low legal liability regime.*

To illustrate our prediction, we provide an example. Audit staff frequently use the prior year's checklist (e.g., an internal control questionnaire) as a guide to answer the current year's checklist. As audit staff turns over and the client's business changes, the checklist slowly becomes less accurate. In a high legal liability regime, there are stronger legal incentives (e.g., more frequent and costly auditor litigation), stronger regulatory oversight (e.g., frequent practice inspections), and stronger audit standards (e.g., better quality control procedures for staff training and supervision). These higher legal, regulatory, and professional standards raise the checklist's accuracy to a higher maximum and slow down the degradation rate over time, thus lengthening the *reference point*.

An alternative argument is that stronger legal regimes have a shorter *reference point* because auditors have stronger incentives to speed up the learning effect of their new clients (e.g., stricter professional standards and higher litigation risk). However, it is unclear whether the shortened learning effect is stronger than the dampened bonding effect. Thus, it is unclear whether the *reference point* lengthens or shortens by the strictness of the legal liability regime. We shed light on this question from our empirical analysis.

Method

In this section, we discuss our research methodology. We first introduce our measures of audit quality and the legal liability regime. We then discuss how we estimate the *reference point* and assess the effects of legal liability regimes on the relation between audit quality and audit firm tenure. All variables are described in Appendix B.

Audit Quality Measure

Following prior research (Balsam, Krishnan, & Yang, 2003; Johnson et al., 2002; Myers et al., 2003), we measure audit quality as accruals quality (AQ). AQ is equal to -1 times the absolute value of abnormal accruals. To maintain our sample size, we follow the method used in Francis and Wang (2008), which is adapted from DeFond and Park (2001) to measure abnormal accruals ($AbAcc$), as described below.

$$PredAcc_{i,t} = Sale_{i,t}\left(\frac{WCA_{i,t-1}}{Sale_{i,t-1}}\right) - PPE_{i,t}\left(\frac{Dep_{i,t-1}}{PPE_{i,t-1}}\right). \quad (1)$$

$$AbAcc_{i,t} = \frac{PredAcc_{i,t} - TACC_{i,t}}{Assets_{i,t-1}}, \quad (2)$$

where[14] $PredAcc_{i,t}$ is the predicted accruals for firm i in year t; $Sale_{i,t}$ is the sales (*sale*) for firm i in year t; $WCA_{i,t}$ is the change in non-cash working capital for firm i from year $t-1$ to year t, defined as Δ[total current assets (*act*) − cash and short-term investments (*che*) − treasury stock shown as current assets (*tsca*)] − Δ[total current liabilities (*lct*) − total amount of debt in current liabilities (*dlc*) − proposed dividends (*prodv*)]; $PPE_{i,t}$ is the gross value of property, plant, and equipment (*ppegt*) for firm i in year t; $Dep_{i,t}$ = depreciation and amortization expense less amortization expense (*dp* − *am*) for firm i in year t; $Assets_{i,t}$ is the total assets (*at*) for firm i in year t; $TACC_{i,t}$ is the total accruals, measured as net income before extraordinary items (*ib*) less cash flow from operations for firm i in year t;[15] and $AbAcc_{i,t}$ is the abnormal accruals for firm i in year t, that is, predicted accruals (*PredAcc*) less total accruals (*TACC*) scaled by lagged assets.

Note that this method uses the prior year's ratio of working capital accruals (*WCA*) to sales and the prior year's ratio of depreciation to *PPE* to estimate predicted accruals ($PredAcc_{it}$). A major assumption of this model is that these firm-specific past ratios should persist for 1 year. In contrast to the cross-sectional Jones (1991) model (e.g., DeFond & Jiambalvo, 1994), this method considers firm-specific differences. A major advantage of this method is that it only requires 1 year of prior data, hence it is more useful with international data where there are fewer cross-sectional observations.[16] Our primary measure of accruals quality (*AQ*) is the negated absolute value of $AbAcc_{i,t}$ which measures a higher level of audit quality for a lower level of abnormal accruals magnitude.

Measure of Legal Liability Regime

Our main measure of a country's legal liability regime is the litigation risk rating (*LITIGATE*). Wingate (1997) develops a litigation risk score with reference to an international insurance underwriter for one of the Big 6 audit firms, which has also been used in other international accounting studies (e.g., Choi et al., 2008). The litigation risk score measures the rank of the combined risk and cost of performing audit services in a particular country. We adopt this measure because it more closely captures the underlying risk to the auditor. The rating takes on values from 1 to 15, with higher values assigned to countries with higher litigation risk. We classify countries into two litigation risk groups: high litigation risk countries with a rating of greater than or equal to 5.79 and low litigation risk countries with a rating of less than 5.79.[17] We refer to these two litigation risk groups as the high litigation risk group and the low litigation risk group.[18]

Estimation of the Turning and Reference Points

To estimate the turning and reference points, we model accruals quality as a quadratic function of audit tenure, including control variables following prior studies (e.g., Francis & Wang, 2008; Myers *et* al., 2003). Equation 3 *presents* our model:

$$AQ_{i,t} = \beta_0 + \beta_1 Tenure_{i,t} + \beta_2 Tenure_{i,t}^2 + \beta_3 OCF_{i,t} + \beta_4 Size_{i,t} + \beta_5 Size_{i,t}^2 + \beta_6 Age_{i,t} + \beta_7 BigN_{i,t} + \beta_8 MtB_{i,t} + \beta_9 IndGrowth_{i,t} + \beta_{10} GDP_{t,k} + \beta_{11} SOE_k + \beta_{12} ExpRisk_k + \Sigma\, Industry\ Dummies + \Sigma\, YearDummies + \varepsilon_{it,k}, \quad (3)$$

where $AQ_{i,t}$ is the accruals quality for firm i in year t, measured as -1 times the absolute value of $AbAcc_{i,t}$ from Equation 2; $Tenure_{i,t}$ is the number of consecutive years that firm i has been audited by its current auditor in year t, as reflected in the Compustat North American and Global Vantage database; $Tenure_{i,t}^2$ is the square of $Tenure_{i,t}$; $OCF_{i,t}$ is the cash flow from operations (*oancf*) scaled by average total assets (*at*) for firm i in year t; $Size_{i,t}$ is the natural log of market value of equity, where market value of equity is calculated as the closing price times the number of shares outstanding at the end of the fiscal year for firm i in year t; $Size_{i,t}^2$ is the square of $Size_{i,t}$; $Age_{i,t}$ is the natural log of the number of years since 1950 that firm i first appeared in Compustat in year t; $BigN_{i,t}$ = 1 if firm i is audited in year t by a Big N auditor and 0 otherwise; $MtB_{i,t}$ is the market-to-book ratio, calculated as the market value of equity divided by the book value of common equity (*ceq*) for firm i in year t; $IndGrowth_{i,t}$ is the change in mean industry (two-digit Standard Industrial Classification [SIC]) sales growth divided by the prior year's mean industry growth for firm i in year t; $GDP_{t,k}$ is the log of GDP per capita in year t for country k (in thousands) adjusted to current U.S. dollars (source: International Monetary Fund, 2012); SOE_k is the state ownership in the economy index in country k, ranging from 0 to 10, in which higher scores indicate lower state ownership (source: La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 1999); $ExpRisk_k$ is the risk of expropriation by the state in country k, ranging from 0 to 10, in which higher scores indicate lower risk (source: La Porta et al., 1998); and *IndustryDummies* is the industry dummies based on two-digit SIC groups. Nine industry groups are formed as follows: 1-9 (Agriculture/Forest), 10-17 (Mining/ Construction), 20-39 (Manufacturing), 40-47 (Transportation), 48 (Communication), 49 (Utilities), 50-51 (Wholesale), 52-59 (Retail), and 70-99 (Other).

Following prior literature, we control for operating cash flow, firm size, firm age, auditor size, firm growth opportunities, industry growth, country-level conditions, and industry and year effects.[19] We control for operating cash flow (*OCF*) because discretionary accruals models do not entirely eliminate non-discretionary accruals that are correlated with firm performance, which is correlated with operating cash flow (Frankel, Johnson, & Nelson, 2002). We control for firm size (*Size*) as accruals quality increases with firm size due to greater stability and diversification of the portfolio of activities (Dechow & Dichev, 2002). We also control for the square of size ($Size^2$) to capture any non-linearity in accruals quality that is associated with the growth of the firm.[20] Firm age (*AGE*) is included because accruals differ with changes in the firm's life cycle (Anthony & Ramesh, 1992). We control for Big N auditors (*BigN*) because prior literature indicates that Big N auditors perform higher quality audits due to either brand name reputation or concern for higher litigation risk (i.e., "deeper pockets"; DeAngelo, 1981; Simunic & Stein, 1987; Weber & Willenborg, 2003), and because Big N audit quality varies by legal regime (Francis & Wang, 2008). We control for the market-to-book ratio (*MtB*) because growth firms may have stronger incentives to manipulate earnings (Frankel et al., 2002). Industry growth (*IndGrowth*) is included because it should be positively associated with accruals (Myers et al., 2003). Following prior studies (Bushman & Piotroski, 2006; Guedhami, Pittman, & Saffar, 2009), we control for general country-level conditions—GDP per capita (*GDP*), state ownership index (*SOE*), and risk of expropriation (*ExpRisk*).[21] GDP per capita is

included because more developed countries should have greater demand for transparency. State ownership and risk of expropriation are included as measures of state involvement which are negatively associated with conservative accounting (Bushman & Piotroski, 2006). Finally, we include industry and year dummies to control for their fixed effects.

We estimate Equation 3 separately for the high and low litigation risk groups. Following prior literature (Chi & Huang, 2005; Davis et al., 2009), we expect that the coefficient on *Tenure* is positive and the coefficient on $Tenure^2$ is negative. Applying the analysis from Appendix A, the *turning point* is estimated as $-\frac{\beta_1}{2\beta_2}$, and the *reference point* is 3/2 times the *turning point*.

To test whether the *reference point* is longer for firms in countries with a high legal liability regime than for firms in countries with a low legal liability regime, we compute the difference in the *turning point* between the high litigation risk group and the low litigation risk group. We also present the point estimates and confidence intervals of *reference points* for each group.

Empirical Results

Sample Selection and Descriptive Statistics

Table 1 presents our sampling procedure. Our initial sample starts with all firm-year observations with financial data from Compustat Global Vantage and Compustat North America for the period 1996 to 2009, which totals 379,979 firm-year observations.[22] We impose the following restrictions on our sample. We exclude all U.S. firms (128,005 observations) as they would comprise too large a proportion in our sample. We exclude observations that have missing data for our control variables (160,014). All observations with negative book values (2,390 observations) and firms in the financial service industries (2,306 observations) are excluded because of their unusual nature. We exclude any firms that have an auditor identified by Compustat as "other" (58,982 observations) or with missing auditor data (258 observations) as audit tenure cannot be computed for unidentified audit firms.[23] We exclude firms that have multiple auditors (1,467 observations) from countries with joint audits, because audit firm tenure is ambiguous in these cases.[24] We also exclude firm-year observations that are unaudited. We exclude observations in the first year of the audit engagement (2,700 observations) because abnormal accruals are systematically different—prior studies argue that firms which switch auditors are more likely to be financially distressed and have an unusual level of negative abnormal accruals in the first year (DeFond & Subramanyam, 1998). We exclude all firm-year observations without the necessary data to compute abnormal accruals (3,856 observations) and countries without a *LITIGATE* score (499 observations). We winsorize the continuous firm-specific independent variables by year at the 1st and 99th percentiles, and we remove 27 observations that have absolute studentized residuals from Equation 3 greater than 5, to mitigate extreme outlier effects (Belsley, Kuh, & Welsch, 1980). To avoid countries with a trivial number of observations that may not be representative of the legal environment, we exclude countries with less than 30 firm-year observations (62 observations). Finally, we only include observations where the number of observations per litigation-tenure group is more than 30 to ensure a stable estimate of the quadratic model, which removes 166 observations.[25] After these screens, our main sample has 19,247 firm-year observations for the period 1996 to 2009 from 22 countries.[26]

Table 1. Sample Selection.

	Observations excluded	Sample size
Observations in Compustat North America and Global Vantage for fiscal years 1996-2009		379,979
Less		
U.S. firms	(128,005)	251,974
Missing control variables	(160,014)	91,960
Negative book values	(2,390)	89,570
Financial industries	(2,306)	87,264
Auditor codes as "Other Auditor" or "Unaudited"	(58,982)	28,282
Missing tenure values	(258)	28,024
Countries or client firms with multiple audit firms	(1,467)	26,557
First year of audit	(2,700)	23,857
Missing abnormal accruals data	(3,856)	20,001
Missing *LITIGATE* score	(499)	19,502
Studentized residual greater than 5	(27)	19,475
Countries with less than 30 observations	(62)	19,413
Tenure-Litigation risk group with less than 30 observations	(166)	19,247

Panels A and B in Table 2 present the number of firms, observations, percentage of observations, and the litigation risk score (*LITIGATE*) by country. Approximately 39% of firms (12 countries) are in the low litigation risk group and 61% (10 countries) are in the high litigation risk group, primarily due to the large proportion of firms from Canada and the United Kingdom. The mean *LITIGATE* score is lower for the low litigation risk group (4.00) than for the high litigation risk group (8.00). Note that due to data restrictions and the research design, several Asian countries (India, Japan, Pakistan, and South Korea), European countries (Denmark and France), and South Africa are excluded from our sample. The Asian countries are excluded because Compustat Global Vantage does not identify Big N firms that are operated by local affiliates. Denmark, France, and South Africa are also excluded because these countries have or had a joint audit requirement which does not permit us to compute a unique value for the *Tenure* variable.[27] By not including the Asian countries and South Africa, our results may be less powerful because there are fewer country observations from the low litigation risk group. If these countries could be added back, the distribution would be more heavily weighted toward the low litigation risk group, and the sample size would be larger.

Panel C in Table 2 presents the distribution of firm-year observations by year of *Tenure*. Because we are estimating a quadratic function, we need to ensure that there are sufficient observations after the *turning point*. Within the high litigation group, 810 (6.17%) of the firm-year observations have *Tenure* greater than 15 years. For the low litigation group, 577 (9.46%) of the firm-year observations have *Tenure* greater than 9 years. Although we believe that there are sufficient data to estimate the respective *turning points*, we provide a robustness test to address the skewed distribution of audit firm tenure. [28]

Table 3 reports the summary statistics for the variables used in our main analysis and the differences in mean and median values of these variables between the high litigation risk group and the low litigation risk group. Mean accruals quality (*AQ*) is higher for the high litigation risk group (−0.118) than for the low litigation risk group (−0.123). Also,

Table 2. Observations by Country (N = 19,247).

Panel A: Low Litigation Risk.

	Firms	Observations	% of observations	*LITIGATE* score
Argentina	15	31	0.51	3.61
Belgium	57	123	2.02	4.82
Greece	38	71	1.16	3.61
Malaysia	478	1,558	25.54	3.61
Mexico	51	157	2.57	4.82
Portugal	15	32	0.52	3.61
Singapore	327	1,007	16.51	4.82
Spain	73	138	2.26	4.82
Sweden	22	59	0.97	4.82
Taiwan	1,004	2,786	45.67	3.61
Thailand	78	87	1.43	3.61
Turkey	31	51	0.84	2.42
Totals/mean *LITIGATE* score	2,189	6,100	100.00	4.00

Panel B: High Litigation Risk.

	Firms	Observations	% of observations	*LITIGATE* score
Australia	319	971	7.39	10.00
Canada	1,491	7,699	58.57	8.07
Germany	71	163	1.24	6.22
Hong Kong	97	340	2.59	10.00
Ireland	45	141	1.07	6.22
Italy	56	92	0.70	6.22
The Netherlands	124	311	2.37	6.22
New Zealand	58	193	1.47	10.00
Switzerland	84	156	1.19	6.22
United Kingdom	1,021	3,081	23.44	10.00
Totals/mean *LITIGATE* score	3,366	13,147	100.00	8.00

Note. *LITIGATE* score is the litigation risk of a country, measured by Wingate's (1997) litigation index.

(*continued*)

median accruals quality is higher for the high litigation risk group (−0.066) than for the low litigation risk group (−0.076). The difference between the two groups (means and medians) is statistically significant (at least at the 10% level), suggesting that audit quality increases with legal regime strength (Choi et al., 2008). The mean (median) audit firm tenure for the high litigation risk group is 7.326 (6), which is longer than 5.423 (5) for the low litigation risk group. We identify two reasons for the longer tenure in the high litigation risk group. First, we find that the mean *Age* of the client firm is higher in the high litigation risk group when compared with the low litigation risk group (11.270 vs. 7.209 years, respectively); and *Age* is positively and significantly correlated with *Tenure* (Pearson's correlation coefficient = .568, as reported in Table 4). Second, we find that the switching rate is lower in the high litigation risk group. The average number of times that a firm switches auditors in the high litigation risk group (0.56, untabulated) is less than that in the low litigation risk group (0.78, untabulated). In addition, the percentage of firms that

Table 2. (continued)

Panel C: Distribution of Observations by Tenure (in Years).

	High litigation risk		Low litigation risk	
Tenure	Observations	Sample (%)	Observations	Sample (%)
2	938	7.13	843	13.83
3	1,827	13.90	1,222	20.04
4	1,607	12.22	745	12.21
5	1,334	10.15	671	11.00
6	1,153	8.77	768	12.59
7	1,049	7.98	606	9.93
8	1,005	7.64	436	7.15
9	842	6.40	232	3.80
10	667	5.07	165	2.70
11	539	4.10	117	1.92
12	410	3.12	80	1.31
13	336	2.56	72	1.18
14	308	2.34	55	0.90
15	322	2.45	46	0.75
16	276	2.10	42	0.69
17	143	1.09		
18	87	0.66		
19	66	0.50		
20	52	0.40		
21	45	0.34		
22	34	0.26		
23	43	0.33		
24	34	0.26		
25	30	0.23		

Table 3. Summary Statistics by Litigation Regime.

	High litigation risk group					Low litigation risk group					Difference	Difference
	M	*SD*	Q1	Median	Q3	*M*	*SD*	Q1	Median	Q3	in means	in medians
AQ	−0.118	0.166	−0.137	−0.066	−0.028	−0.123	0.172	−0.152	−0.076	−0.033	−0.005*	−0.010***
Tenure	7.326	4.462	4.000	6.000	10.000	5.423	2.974	3.000	5.000	7.000	−1.904***	−1.000***
OCF	0.065	0.171	0.023	0.088	0.148	0.073	0.105	0.016	0.069	0.132	0.008***	−0.018***
Size	5.315	1.910	3.956	5.256	6.648	4.654	1.694	3.385	4.493	5.727	−0.661***	−0.762***
Age	11.270	8.670	6.000	9.000	14.000	7.209	3.136	5.000	7.000	8.000	−4.061***	−2.000***
BigN	0.957	0.203	1.000	1.000	1.000	0.982	0.131	1.000	1.000	1.000	0.026***	0.000
MtB	2.774	2.805	1.137	1.909	3.201	1.668	1.730	0.753	1.191	1.922	−1.107***	−0.718***
IndGrowth	0.077	0.354	−0.078	0.065	0.186	0.047	0.350	−0.116	0.030	0.194	−0.030***	−0.035***
GDP	10.248	0.263	10.048	10.208	10.514	9.362	0.706	8.484	9.701	9.763	−0.885***	−0.508***
SOE	5.896	0.870	5.200	6.000	6.000	4.985	1.504	4.000	4.000	5.200	−0.911***	−2.000***
ExpRisk	9.626	0.254	9.670	9.670	9.710	8.743	0.698	7.950	9.120	9.120	−0.883***	−0.550***

Note. This table presents the sample statistics for the variables used in our study. The sample covers firms in 22 countries over the period from 1996 to 2009. All variables are defined in Appendix B.

* and *** indicate significance at the 10% and 1% levels, respectively.

Table 4. Sample Correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) *AQ*		**.100**	**.050**	**.154**	**.121**	**.018**	**−.059**	**−.013**	**.049**	.007	**.060**	**.046**
(2) *Tenure*	**.100**		**.058**	**.240**	**.622**	**.071**	**.022**	**−.017**	**.206**	**.139**	**.160**	**.200**
(3) *OCF*	**.135**	**.055**		**.320**	**.068**	**.015**	**.208**	**.035**	**.042**	**−.063**	**.099**	**.058**
(4) *Size*	**.123**	**.278**	**.292**		**.315**	**.090**	**.408**	**.039**	**.135**	**.013**	**.164**	**.174**
(5) *Age*	**.083**	**.568**	**.064**	**.308**		**.019**	**.013**	**.017**	**.244**	**.118**	**.210**	**.242**
(6) *BigN*	**.021**	**.071**	**.026**	**.095**	**.031**		.004	**−.013**	**−.071**	**−.017**	**−.049**	**−.065**
(7) *MtB*	**−.130**	**−.019**	**−.097**	**.234**	**−.013**	**−.012**		**.061**	**.154**	**.118**	**.242**	**.267**
(8) *IndGrowth*	**−.024**	.004	.009	**.012**	**.023**	−.005	.011		**.173**	**.078**	**.021**	**.058**
(9) *GDP*	.011	**.170**	**−.017**	**.146**	**.176**	**−.041**	**.128**	**.064**		**.472**	**.652**	**.683**
(10) *SOE*	**.023**	**.129**	**−.059**	.002	**.112**	−.005	**.047**	**.031**	**.311**		**.255**	**.482**
(11) *ExpRisk*	**.037**	**.133**	**−.016**	**.107**	**.168**	**−.022**	**.163**	**.018**	**.846**	**.188**		**.781**
(12) *LITIGATE*	**.013**	**.214**	**−.025**	**.164**	**.248**	**−.065**	**.201**	**.040**	**.673**	**.357**	**.678**	

Note. This table presents the correlations among the 19,247 firm-year observations for firms in 22 different countries over the period from 1996 to 2009. Pearson's (Spearman's) correlations are below (above) the diagonal. All correlations significant at least at the 10% level are in bold. All variables are defined in Appendix B.

switch auditors at least once is lower in the high litigation risk group (41.58%, untabulated) than in the low litigation risk group (49.74%, untabulated).

Other descriptive statistics comparisons between the high and low litigation risk groups are as follows. The high (vs. low) litigation risk group has a lower mean operating cash flow (0.065 vs. 0.073), a higher mean market-to-book ratio (2.774 vs. 1.668), and a higher mean industry growth (0.077 vs. 0.047). Furthermore, firms in the high (vs. low) litigation risk group tend to be larger in mean *Size* (5.315 vs. 4.654). The mean GDP per capita is slightly higher for the high (vs. low) litigation risk group (10.248 vs. 9.362). The state ownership (*SOE*) and expropriation risk (*ExpRisk*) indexes are greater in the high (vs. low) litigation risk group (5.896 vs. 4.985 and 9.626 vs. 8.743, respectively). The variation in all of these variables between the high and low litigation risk groups supports the need to control for them in our multivariate analysis.

Table 4 reports the correlation coefficients among the variables used in our multivariate analysis. Pearson's correlation coefficients are reported in the lower diagonal, and Spearman's coefficients are reported in the upper diagonal. Accruals quality (*AQ*) and audit firm tenure (*Tenure*) are positively correlated: .100 for both the Pearson and Spearman coefficients, consistent with prior literature. The positive correlation between *AQ* and *Tenure* is based on a linear relation between the two variables. To test for a non-linear relation, we include a squared term of *Tenure* (*Tenure*^{2}) in our multivariate analysis. We find a positive Spearman correlation coefficient between *AQ* and litigation risk (*LITIGATE*) (.046) and a positive Pearson correlation coefficient (.013), suggesting that accruals quality is higher in countries with higher litigation risk (Leuz et al., 2003).

Validation of Quadratic Model

To validate the use of the quadratic model, we provide graphical evidence. Specifically, we estimate Equation 3 without the tenure variables by litigation risk group. We then average the residuals from the regression estimates by tenure year. We then plot the residuals and

fit a quadratic function for each litigation risk group, following a model misspecification test for quadratic data (Hill et al., 2011, p. 147). This method effectively gives an equal weight to each tenure year; otherwise, the regression results would be weighted by the number of observations in each tenure year. The *reference points* from the graphical method are within a 90% confidence interval, suggesting that they are not statistically different from the *reference points* that we will later report in Table 5 from estimating Equation 3. Even though we believe that the graphical method effectively identifies a *reference point*, we prefer referring to the OLS estimates reported in Table 5. The OLS estimates are based on a larger number of observations compared with the graphical method estimates that are derived from aggregated amounts, which may be affected by the cancelling-out effect of individual observations.

We also employ a more objective statistical test by comparing the goodness of fit of the quadratic model with a linear model, and with higher order models that include the third-, fourth-, and fifth-order audit tenure terms. We statistically test whether the adjusted R^2 of the quadratic model is greater than those of the linear model and the higher order models. Appendix C reports the results. For the high litigation risk group, the quadratic model is tied for the highest adjusted R^2 among all higher order models. For the low litigation risk group, the adjusted R^2 values of the fourth- and fifth-order models are the greatest. Although the adjusted R^2 of the third-order model is statistically greater than that of the quadratic model, a visual inspection of the data (see Figure 3) shows that this difference is small in terms of the estimation of the *turning* and *reference* points. In addition, we compare the adjusted R^2 of the quadratic model with the logarithmic form for both the high and low litigation risk groups, and we find that it is higher for the quadratic model in both groups (untabulated). Thus, we conclude that the quadratic model appropriately fits the data for both the high and the low litigation risk groups.

Regression Results

Our multiple regression analysis investigates how cross-country variation in legal liability regimes affects the *reference point*. Table 5 presents the estimation of Equation 3, which compares the *turning* and *reference points* of the high litigation risk group with those of the low litigation risk group.[29] Recall that the *reference point* is 3/2 of the *turning point*. In the first column, we present the results for firms in the high litigation risk group. We observe a significantly positive coefficient on $Tenure^{30}$ and a significantly negative coefficient on $Tenure^2$, suggesting that the quadratic function takes the shape of an inverted-U and the *turning point* is at the maximum accruals quality rather than at the minimum. The estimated turning point is 15.71 years[31] (significant), and the *reference point* is 23.57 years with a 90% confidence interval between 18.60 and 28.55. In the second column of Table 5, we present results for firms in the low litigation risk group. As predicted, we also find a significantly positive coefficient on *Tenure* and a significantly negative coefficient on $Tenure^2$. The estimated *turning point* is 9.30 years (significant), and the *reference point* is 13.96 years with a confidence interval between 11.41 and 16.51. In the last column of Table 5, we report that the *reference point* of accruals quality is significantly longer by about 10 years for firms in the high litigation risk group than for firms in the low litigation risk group.[32] Together, these results support our prediction that the *reference point* is longer for client firms in countries with a strong legal liability regime than for client firms in countries with a weak legal liability regime.

Table 5. Regression of Accruals Quality (*AQ*) on Audit Firm Tenure by Litigation Risk.

	High	Low	Difference
Tenure	0.0423	0.1045	−0.0622
	(4.22)***	(3.93)***	(−2.19)**
$Tenure^2$	−0.0135	−0.0561	0.0427
	(−3.04)***	(−3.32)***	(2.44)**
OCF	0.0925	0.0894	0.0031
	(6.05)***	(2.80)***	(0.09)
Size	0.0241	0.0073	0.0168
	(5.60)***	(1.21)	(2.26)**
$Size^2$	−0.0011	0.0002	−0.0013
	(−3.06)***	(0.35)	(−1.92)*
Age	0.0003	−0.0007	0.0010
	(1.79)*	(−0.65)	(0.97)
BigN	−0.0096	0.0267	−0.0363
	(−1.39)	(0.79)	(−1.06)
MtB	−0.0092	−0.0126	0.0034
	(−11.92)***	(−6.27)***	(1.57)
IndGrowth	−0.0093	−0.0073	−0.0019
	(−2.00)**	(−1.06)	(−0.23)
GDP	0.0267	−0.0829	0.1096
	(2.35)**	(−3.73)***	(4.39)***
SOE	−0.0020	0.0095	−0.0115
	(−0.85)	(2.84)***	(−2.81)***
ExpRisk	−0.0030	0.0872	−0.0902
	(−0.39)	(4.26)***	(−4.12)***
Turning Point	**15.71**	**9.30**	**6.41**
	(7.79)***	(9.01)***	(2.83)***
Reference Point	**23.57**	**13.96**	**9.61**
	[18.60, 28.55]	[11.41, 16.51]	[4.02, 15.20]
Observations	13,147	6,100	
Adjusted R^2 (%)	8.14	7.63	

Note. This table presents the OLS regression results of estimating accruals quality from tenure, tenure-squared, and control variables. The dependent variable is *AQ*, measured as −1 times the absolute value of abnormal accruals. Abnormal accruals (*AbAcc*) are firm-level estimated following Francis and Wang (2008) and DeFond and Park (2001) as defined in Equations 1 and 2 in the text and in Appendix B. All other variables are defined in Appendix B. The sample covers firms in 22 countries over the period from 1996 to 2009. The high model includes firms in countries with a Wingate litigation index greater than or equal to 5.79. The low model includes firms in countries with a Wingate litigation index less than 5.79. *Turning Point* is defined as the ratio of the coefficient estimates on *Tenure* to $Tenure^2$ times −½ (note that this ratio should be multiplied by 10 because the coefficient on *Tenure* [$Tenure^2$] has been multiplied by 10 [100] for presentation purposes). *Reference Point* is 3/2 of the *Turning point*. Industry and year fixed effects are included but are not reported for brevity. White's *t* values are reported in parentheses. The 90% confidence interval for the *Reference* Point is presented in brackets. OLS = ordinary least squares.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Robustness Tests

Alternative measures of abnormal accruals. In this section, we use performance-adjusted abnormal accruals, as well as modified Jones (1991) model abnormal accruals (following

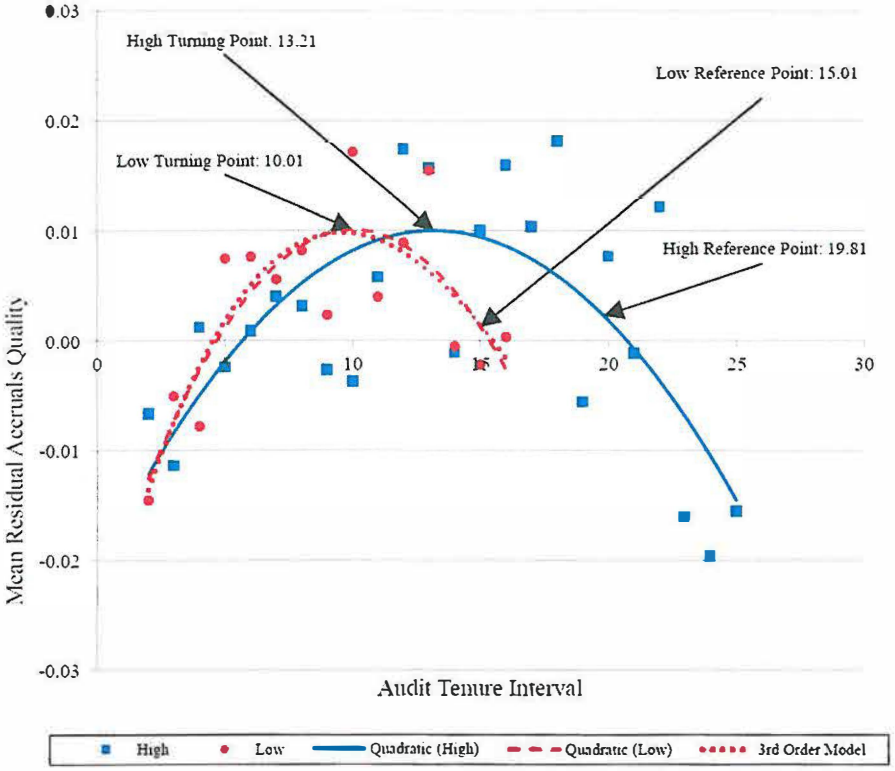

Figure 3. Mean residual accruals quality and tenure.

Note. The figure plots the mean residual accruals quality (*AQ*) against *Tenure* (in years) for high and low litigation risk countries (*LITIGATE*). Mean residual audit quality is estimated from Equation 3 without the *Tenure* and *Tenure*^{2} variables. The figure also fits a quadratic function to support the use of a quadratic function in our main analysis. See Appendix B for variable definitions.

Ecker et al., 2013), as alternative measures of accruals quality. To control for the fact that accruals increase with performance, we adjust our abnormal accruals using the method suggested by Kothari et al. (2005). Specifically, we construct deciles by return on assets for each year, and we calculate the median abnormal accruals for each decile. We then subtract the median abnormal accruals from the firm's abnormal accruals to obtain the performance-adjusted abnormal accruals.

We also use an alternative measure of accruals quality based on the modified Jones model as suggested by Ecker et al. (2013). The typical Jones model (and the modified Jones model) is estimated by industry and year, and with a minimum number of observations for each industry-year cross-section. However, international data are often sparsely populated in each country, industry, and year cross-section. Therefore, Ecker et al. (2013) suggest to estimate the modified Jones model cross-sectionally by country, year, and size decile. Following their suggestion, we rank firms by total assets within each country-year, and we require at least 100 firm-year observations for each county-year group. We then estimate the modified Jones model by country-year-size decile.

Table 6. Regression of Accruals Quality on Audit Firm Tenure by Litigation Risk Using Alternative Measures of Abnormal Accruals.

Panel A: Performance-Adjusted Abnormal Accruals.

	High	Low	Difference
Tenure	0.0411	0.1000	−0.0589
	(4.13)***	(3.79)***	(−2.09)**
$Tenure^2$	−0.0132	−0.0525	0.0392
	(−3.00)***	(−3.12)***	(2.26)**
Turning Point	**15.56**	**9.53**	**6.03**
	(7.77)* **	**(8.35)*** **	**(2.61)*** **
Reference Point	**23.34**	**14.30**	**9.04**
	[18.40, 28.29]	**[11.48, 17.12]**	**[3.35, 14.73]**
Observations	13,147	6,100	
Adjusted R^2 (%)	8.54	8.06	

Panel B: Modified Jones Model Abnormal Accruals.

	High	Low	Difference
Tenure	0.0186	0.0204	−0.0018
	(3.64)***	(2.12)**	(−0.17)
$Tenure^2$	−0.0064	−0.0186	0.0122
	(−3.42)***	(−2.83)***	(1.78)*
Turning Point	**14.50**	**5.49**	**9.01**
	(8.99)* **	**(5.20)*** **	**(4.67)*** **
Reference Point	**21.75**	**8.24**	**13.51**
	[17.77, 25.73]	**[5.63, 10.85]**	**[8.75, 18.27]**
Observations	10,539	5,941	
Adjusted R^2 (%)	17.23	9.03	

Note. This table presents the OLS regression results of estimating accruals quality from tenure, tenure-squared, and control variables. The dependent variable is performance-adjusted accruals quality, measured as −1 times the absolute value of performance-adjusted abnormal accruals. Abnormal accruals (*AbAcc*) are firm-level estimated following Francis and Wang (2008) and DeFond and Park (2001) as defined in Equations 1 and 2 in the text and in Appendix B. In Panel A, the abnormal accruals are performance adjusted by subtracting from the abnormal accruals estimate the median abnormal accruals for firms that are in the same *ROA* (return on assets) decile by year. In Panel B, accruals quality is based on the modified Jones model estimated within country, year, and size (total assets) decile, as suggested by Ecker, Francis, Olsson, and Schipper (2013). All other variables are defined in Appendix B. The sample covers firms in 22 countries over the period from 1996 to 2009. The high model includes firms in countries with a Wingate litigation index greater than or equal to 5.79. The low model includes firms in countries with a Wingate litigation index less than 5.79. *Turning Point* is defined as the ratio of the coefficient estimates on *Tenure* to $Tenure^2$ times − ½ (note that this ratio should be multiplied by 10 because the coefficient on *Tenure* [$Tenure^2$] has been multiplied by 10 [100] for presentation purposes). *Reference Point* is 3/2 of the *Turning Point*. We include the same control variables presented in Table 5, as well as industry and year fixed effects, but we do not report the coefficients for brevity. White's *t* values are reported in parentheses. The 90% confidence interval for the *Reference Point* is presented in brackets. OLS = ordinary least squares.
*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 presents the results of estimating Equation 3 using our two alternative measures of abnormal accruals. Panel A reports *AQ* measured by the negated absolute value of performance-adjusted abnormal accruals. We find that the estimated *reference point* for firms

in the high (low) litigation risk group is 23.34 (14.30) years, and the difference is statistically significant. Panel B uses the negated absolute value of modified Jones model abnormal accruals as our measure of AQ. We find that the estimated *reference point* is 21.75 (8.24) years for the high (low) litigation risk group, and the difference is statistically significant. Overall, our main results are robust to these two alternative measures of abnormal accruals.

Alternative measures of legal liability regime. In our main analysis, we use the litigation risk index from Wingate (1997) as our measure of legal liability regime. While this measure is used in the literature, it was derived in the mid-1990s and does not consider subsequent regulatory reforms. To address this issue, we use four alternative measures of legal liability regime that are commonly used in the literature. First, we use the country's legal origin (Francis & Wang, 2008; La Porta et al., 1997, 1998), which is classified as either common law (a strong legal liability regime) or code law (a weak legal liability regime). We use this measure to capture the private enforcement of liability laws through courts, which is more predominant in common law countries.

Next, we use the country's auditing enforcement index (Brown et al., 2013), which is a more current measure than either the litigation risk index or legal origin. An important aspect of a strong legal liability regime is the public enforcement of financial reporting standards by regulators and by a high-quality audit profession. This index captures the enforcement of accounting and auditing standards across countries, including the enforcement by public regulators and the quality of public company audits. Furthermore, this index is available for the years 2002, 2005, and 2008, so it has some time-series variation.

We also use the rule of law index provided by the World Bank, which captures

> perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. (Kaufmann et al., 2009, p. 6)

We use this measure to capture the existence of liability laws and their private enforcement through courts. This measure is updated biannually from 1996 to 2002 for each country and annually thereafter.[33] Thus, some countries (e.g., Hong Kong) change from a weaker to a stronger rule of law index.

Finally, we use the efficiency of the judiciary index (La Porta et al., 2006; La Porta et al., 1998) which measures the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms." We use this measure to capture the private enforcement of liability laws through the judiciary system.

In Table 7, we present the results of estimating Equation 3, partitioned by each alternative measure of legal regime. Panel A partitions the sample by legal origin for common law (code law) countries, and reports that the *reference point* is 22.33 (11.60) years. Panel B partitions the sample by the auditing enforcement index. We classify firms as high (low) if the country is above (below) the mean annual audit index and the mean annual enforcement index (Brown et al., 2013). For high (low) countries, the *reference point* is 25.13 (18.43) years. Panel C partitions the sample by the rule of law index for high (low) countries, and reports that the *reference point* is 23.54 (13.20) years. Panel D partitions the sample by the mean efficiency of the judiciary index. For high (low) efficiency, the *reference point* is 23.08 (10.61) years. In short, all four alternative measures have comparable *reference points*, and we consistently find that the *reference point* is longer for stronger

Table 7. Regression of Accruals Quality on Audit Firm Tenure by Litigation Risk Using Alternative Litigation Risk Measures.

Panel A: Legal Origin.			
	Common	Code	Difference
Tenure	0.0428	0.1209	−0.0781
	(4.46)***	(2.46)**	(−1.56)
$Tenure^2$	−0.0144	−0.0782	0.0638
	(−3.37)***	(−2.05)**	(1.66)*
Turning Point	**14.89**	**7.73**	**7.16**
	(8.94)* **	**(7.49)*** **	**(3.65)*** **
Reference Point	**22.33**	**11.60**	**10.73**
	[18.23, 26.45]	**[9.05, 14.15]**	**[5.90, 15.57]**
Observations	15,102	4,060	
Adjusted R^2 (%)	7.86	10.35	
Panel B: Auditing Enforcement Index.			
	High	Low	Difference
Tenure	0.0373	0.0809	−0.0436
	(4.82)***	(3.68)***	(−1.88)*
$Tenure^2$	−0.0111	−0.0329	0.0218
	(−4.00)***	(−2.58)***	(1.67)*
Turning Point	**16.76**	**12.28**	**4.47**
	(9.97)* **	**(5.99)*** **	**(1.69)***
Reference Point	**25.13**	**18.43**	**6.70**
	[20.99, 29.28]	**[13.37, 23.48]**	**[0.17, 13.25]**
Observations	12,224	4,909	
Adjusted R^2 (%)	8.49	6.54	
Panel C: Rule of Law Index.			
	High	Low	Difference
Tenure	0.0399	0.1138	−0.0739
	(4.13)***	(3.17)***	(−1.99)**
$Tenure^2$	−0.0127	−0.0647	0.0520
	(−2.95)***	(−2.54)**	(2.02)**
Turning Point	**15.69**	**8.80**	**6.89**
	(7.45)* **	**(7.40)*** **	**(2.85)*** **
Reference Point	**23.54**	**13.20**	**10.34**
	[18.34, 28.73]	**[10.26, 16.13]**	**[4.37, 16.31]**
Observations	14,221	4,994	
Adjusted R^2 (%)	8.11	8.67	

(continued)

legal liability regimes. Thus, our main conclusions are robust to these alternative measures of legal liability regime.[34]

Table 7. (continued)

Panel D: Efficiency of the Judiciary Index.

	High	Low	Difference
Tenure	0.0419	0.1357	−0.0938
	(4.48)***	(2.48)**	(−1.70)*
$Tenure^2$	−0.0136	−0.0959	0.0823
	(−3.25)***	(−2.24)**	(1.92)*
Turning Point	**15.38**	**7.07**	**8.31**
	(8.27)* **	**(8.72)*** **	**(4.10)*** **
Reference Point	**23.08**	**10.61**	**12.47**
	[18.49, 27.67]	**[8.60, 12.61]**	**[7.46, 17.48]**
Observations	15,827	3,408	
Adjusted R^2 (%)	7.72	12.74	

Note. This table presents the OLS regression results of estimating accruals quality (*AQ*) from tenure, tenure-squared, and control variables. The dependent variable is *AQ*, measured as −1 times the absolute value of abnormal accruals. Abnormal accruals (*AbAcc*) are firm-level estimated following Francis and Wang (2008) and DeFond and Park (2001) as defined in Equations 1 and 2 in the text and in Appendix B. All other variables are defined in Appendix B. The sample covers firms in 22 countries over the period from 1996 to 2009. Panel A reports the results when we partition the sample by legal origin (La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 1997, 1998). Common indicates that sample firms are from common law countries, and Code indicates that they are from code law countries. In Panel B, the sample is divided by the mean auditing enforcement index (Brown, Preiato, & Tarca, 2013). High (low) indicates that observations are from countries above (below) the mean auditing enforcement index. In Panel C, the sample is divided by the mean rule of law index (Kaufmann, Kraay, & Mastruzzi, 2009). High (low) indicates that observations are from countries above (below) the mean rule of law index. In Panel D, the sample is divided by the mean efficiency of the judiciary index (La Porta, Lopez-De-Silanes, & Shleifer, 2006; La Porta et al., 1998). High (low) indicates that observations are from countries above (below) the mean efficiency of the judiciary index. *Turning Point* is defined as the ratio of the coefficient estimates on *Tenure* to $Tenure^2$ times − ½ (note that this ratio should be multiplied by 10 because the coefficient on *Tenure* [$Tenure^2$] has been multiplied by 10 [100] for presentation purposes). *Reference Point* is 3/2 of the *Turning Point*. We include the same control variables presented in Table 5, as well as industry and year fixed effects, but we do not report the coefficients for brevity. White's *t* values are reported in parentheses. The 90% confidence interval for the *Reference Point* is presented in brackets. OLS = ordinary least square.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Stratified random sample. As shown in Panel C in Table 1, observations from later tenure years tend to be less frequent, which may affect our estimation of the *reference point*, particularly in the low litigation risk group where the mean *Tenure* is the lowest. In principle, as long as we have enough observations in each tenure year and the sample is random, we can make statistical inferences. To control for the unequal distribution by tenure year, we construct a stratified random sample to ensure that an equal number of observations are selected from each tenure interval. Specifically, the sample consists of 16 random draws of 30 observations from each tenure and litigation risk group. Table 8 reports the estimation of Equation 3 using the stratified random sample. The *reference point* for the high (low) litigation risk group is 35.56 (16.21) years, and the difference is statistically significant. These results are comparable with our main results, except that the estimates for the high litigation risk group are greater than those in the main results. This result suggests that our main high litigation risk group likely includes observations that have a faster deterioration

Table 8. Regression of Accruals Quality (*AQ*) on Audit Firm Tenure by Litigation Risk From a Stratified Random Sample.

	High	Low	Difference
Tenure	0.0322	0.1211	−0.0889
	(7.32)***	(4.83)***	(−3.50)***
$Tenure^2$	−0.0068	−0.0560	0.0492
	(−6.26)***	(−4.64)***	(4.06)***
Turning Point	**23.71**	**10.81**	**12.90**
	(21.61)***	**(12.02)*****	**(9.09)*****
Reference Point	**35.56**	**16.21**	**19.35**
	[32.86, 38.27]	**[13.99, 18.43]**	**[15.85, 22.85]**
Observations	11,520	6,240	
Adjusted R^2 (%)	8.58	5.45	

Note. This table presents the OLS regression results of estimating accruals quality (*AQ*) from tenure, tenure-squared, and control variables. The dependent variable is *AQ*, measured as −1 times the absolute value of abnormal accruals. Abnormal accruals (*AbAcc*) are firm-level estimated following Francis and Wang (2008) and DeFond and Park (2001) as defined in Equations 1 and 2 in the text and in Appendix B. All other variables are defined in Appendix B. The sample is a pooled stratified random sample consisting of 16 random draws of 30 observations from each tenure and litigation risk group, from a larger sample of 19,247 observations of 22 countries over the period from 1996 to 2009. The high model includes firms in countries with a Wingate litigation index greater than or equal to 5.79. The low model includes firms in countries with a Wingate litigation index less than 5.79. *Turning Point* is defined as the ratio of the coefficient estimates on *Tenure* to $Tenure^2$ times − ½ (note that this ratio should be multiplied by 10 because the coefficient on *Tenure* [$Tenure^2$] has been multiplied by 10 [100] for presentation purposes). *Reference Point* is 3/2 of the *Turning Point*. We include the same control variables presented in Table 5, as well as industry and year fixed effects, but we do not report the coefficients for brevity. White's *t* values are reported in parentheses. The 90% confidence interval for the *Reference Point* is presented in brackets. OLS = ordinary least squares.
*** indicates significance at the 1% level.

rate than an average sample. More importantly, we still observe that the *reference point* is significantly longer for the high litigation risk group.

Inclusion of multiple audit firms. As we noted in the discussion of the sample selection (Section "Sample Selection and Descriptive Statistics"), we exclude 1,467 firm-year observations with two or more audit firms (hereinafter, multiple auditors) because audit firm tenure is ambiguous in these cases. Specifically, computing audit firm tenure is ambiguous when two or more audit firms start their tenure with the same client but in different years. Furthermore, starting in 2006, Compustat Global Vantage (hereinafter, CGV) stopped collecting data on all but the primary audit firm; thus, our firm-year observations only include multiple audit firms before 2006. In addition, many of the multiple audit firms are local auditors who are not identified by CGV, and consequently would be excluded.

To overcome these data limitations, we expand our sample to include *identifiable* multiple audit firms, and we construct three alternative measures of audit firm tenure. The first measure uses the tenure of the primary audit firm (identified by CGV). We find that the *reference point* for the high (low) litigation risk group is 22.42 (14.19) years. The second measure is the average tenure of the identifiable multiple audit firms. We find that the *reference point* for the high (low) litigation risk group is 23.67 (14.18) years. The third measure is the maximum tenure of the identifiable multiple audit firms. We find that the

reference point for the high (low) litigation risk group is 23.56 (14.65) years. Furthermore, the differences in *reference points* between high and low litigation risk groups are all significant. In short, these results do not differ significantly from our main results reported in Table 5. Thus, our results are robust to inclusion of multiple audit firms in our sample.

Inclusion of U.S. client firms. We next examine whether our main results are robust to the inclusion of U.S. client firms. In our main analysis, we exclude U.S. firms because they would have dominated the sample. To test whether U.S. firms are similar to firms in other high litigation risk countries, we add back the U.S. firms. In untabulated results, we find that the high litigation risk group has a *reference point* of 26.04 years, which is longer than 22.94 years that we observe in our main analysis. If we restrict the sample to only U.S. firms, the *reference point* is 26.21 years. These estimates are comparable with Brooks et al.'s (2013), which reports an implied *reference point* of 26.04 years (based on a reported turning point of 17.36 years from their pooled model). Thus, adding back the U.S. firms to our sample results in a longer *reference point*, suggesting that the United States is a stronger legal liability regime than other countries in the high litigation risk group. Not surprisingly, the *reference point* is still longer for the high litigation risk group. Overall, our main results are robust to including U.S. firms in the sample.

Exclusion of Arthur Andersen client firms. In our main regression analysis, we assume that switches from Arthur Andersen in 2002 resulted in a switch to a new audit firm. However, in some cases, the offices were acquired by Deloitte and Touche, Ernst and Young, or KPMG, and several clients (177 of 674) followed the office (Kohlbeck, Mayhew, Murphy, & Wilkins, 2008, Table 3). Thus, our *Tenure* variable may be understated because the same partners and staff from Andersen likely conducted the audit for the new audit firm but with greater scrutiny. To ensure that our results are not affected by the Andersen switches, we exclude any firm that, at any time, was a client of Andersen. We find that the *reference point* for the high (low) litigation risk group is 23.00 (12.34) years, which is comparable with our main results. Overall, our main results are robust to excluding Arthur Andersen clients.

Conclusion

Mandatory audit firm rotation is viewed by many regulators as a means to improve auditor independence, thereby improving financial reporting quality. The essence of the debate is whether audit quality actually deteriorates when audit firms have longer tenure; and if so, ignoring switching costs, when is the optimal auditor rotation term (i.e., the *reference point*)? We investigate how country-level investor protection, proxied by the strength of the legal liability regime, affects the *reference point*. We predict that the *reference point* is greater for strong legal liability regimes than for weak legal liability regimes, because auditors will prolong their independence when a country's legal liability requirements are stronger. We follow the previous literature by using a quadratic model (an inverted-U-shaped curve) to depict the relation between audit quality and audit firm tenure, and conduct validity tests of the quadratic model. We provide a theoretical prediction of the *reference point* and its empirical estimate based on historical data. Our estimated *reference point* for mandatory auditor rotation may be an ambitious endeavor; however, regulators need empirical evidence to support their decision on mandatory auditor rotation. Our findings should provide a starting point for the debate.

Using a broad sample of 19,247 firm-year observations in 22 countries covering 14 years, our empirical analysis supports our prediction that legal liability increases the *reference point*. We use various measures of accruals quality as proxies for audit quality and various measures of legal liability as proxies for investor protection. We predict that a strong legal environment will better deter the negative bonding effects between the client and the audit firm; therefore, we should observe a longer *reference point* for firms in a high legal liability regime (vs. a low legal liability regime). We compare the *reference points* across high and low legal liability country groups, and find that the *reference point* is significantly longer in high legal liability countries (around 24 years) than in the low legal liability countries (around 14 years), which supports our prediction.

Our study has important implications. First, our findings suggest that a longer auditor rotation term should be set for countries with stronger investor protection. Second, on the basis of past data, we find that firms in the high (low) legal liability regime have longer (shorter) *reference points*. Moreover, we find that a minority of firms have tenure exceeding the 24-year (14-year) *reference point* for high (low) legal liability regimes, suggesting that mandatory auditor rotation may not be necessary, especially for countries with stronger investor protection.[35]

Several points are worth noting. First, due to data limitations, our findings, to a certain extent, are sample dependent (e.g., Japan is not in the sample); thus, regulators should at best compare their country's legal system with the countries in our sample. Second, we assume implicitly that any differences in the rate of learning are small compared with the time period over which auditor independence is compromised. That is, the effects on the *turning point* due to differences in legal regimes are small relative to the effect on the time difference between the *turning point* and the *reference point*. Third, our theoretical *reference point* does not take into account the switching costs incurred by the client (e.g., start-up costs of a new auditor); thus, the optimal rotation term is likely longer. Last, our measure of audit quality depends on abnormal accruals, which may also be used to measure management's propensity to bias earnings, as well as the auditor's ability to constrain their attempts. Because preaudited accruals are not observable, we accept this as a limitation.

Appendix A

The Rotation Point That Maximizes Average Audit Quality

Following Cheng and Zhang (2013), we mathematically derive the *turning point* (τ), the *crucial low point* (κ), and the *reference point* (μ). We show that rotation at the *reference point*, midway between the *turning point* and the *crucial low point*, or $3/2\tau$, maximizes the average audit quality over a reasonably long period of time (e.g., the firm's life span).

Assume that at any point in the tenure of an audit firm (t), audit quality follows a concave quadratic function, defined as

$$q(t) = a + b \cdot t + c \cdot t^2, \tag{1}$$

where $b > 0$ and $c < 0$. We define τ as the point that maximizes $q(t)$. For a quadratic function, this point is $\tau = -b/2c$. The initial audit quality ($t = 0$) is a. The point at which audit quality equals a is

$$\begin{aligned} a &= a + b \cdot t + c \cdot t^2 \\ 0 &= b \cdot t + c \cdot t^2 \\ 0 &= (b + c \cdot t) \cdot t, \end{aligned} \tag{2}$$

which is satisfied when $t = 0$ (the initial audit quality) and when $t = {}^{-b}/_{c} = 2 \cdot \tau$. The latter point is what we define as the *crucial low point* (i.e., $\kappa = 2\,\tau$). Because the function is concave (i.e., $c < 0$) and increases for small t (i.e., $b > 0$), the *crucial low point* is positive ($\kappa > 0$), and audit quality will be below the initial quality for any tenure longer than the *crucial low point* ($q(t) < a \quad \forall t > \kappa$).

Next, we turn to the maximization of average audit quality over an arbitrarily long period T. Assuming that an auditor must be replaced at $x \in [0, T]$ years of service, we define the average audit quality over the long period T as

$$Q(t) = \frac{\frac{T}{x}\int_0^x q(t)dt}{T}. \tag{3}$$

Substituting Equation 1 into 3 and evaluating the integral, we see that given a rotation point of x, the average audit quality over the period T is

$$\begin{aligned} Q(x) &= \frac{\frac{T}{x}(a \cdot x + \frac{b}{2} \cdot x^2 + \frac{c}{3}x^3)}{T} \\ &= a + \tfrac{b}{2} \cdot x + \tfrac{c}{3} \cdot x^2. \end{aligned} \tag{4}$$

The FOC to find the maximum average audit quality is

$$0 = \tfrac{b}{2} + \tfrac{2c}{3} \cdot x^*, \tag{5}$$

which is satisfied when

$$x^* = \frac{-3b}{4c}. \tag{6}$$

Note that $x^* = {}^{-3b}/_{4c} = {}^{3}/_{2} \cdot \tau$ and also,

$$\mu = \frac{\kappa + \tau}{2} = \frac{2\tau + \tau}{2} = \frac{3}{2} \cdot \tau = x^*. \tag{7}$$

Therefore, if the relationship between audit quality and audit tenure is quadratic, then the *reference point* (μ) that maximizes average audit quality over a reasonably long period (T) is equal to the midpoint between the *turning point* and the *crucial low point* or simply 3/2 $\times$ *turning point*. Note that the above derivation does not take into account the out-of-pocket switching costs incurred by the audit client, and thus the actual rotation term is likely to be longer (i.e., toward the *crucial low point*) if the costs are higher.

Appendix B

Variable Names and Definitions

Accrual quality measures. AQ is -1 times the absolute value of abnormal accruals for firm i in year t, following Francis and Wang (2008) and DeFond and Park (2001), where abnormal accruals ($AbAcc_{i,t}$) are described below:

$$PredAcc_{i,t} = Sale_{i,t}\left(\frac{WCA_{i,t-1}}{Sale_{i,t-1}}\right) - PPE_{i,t}\left(\frac{Dep_{i,t-1}}{PPE_{i,t-1}}\right). \quad (1)$$

$$AbAcc_{i,t} = \frac{PredAcc_{i,t} - TACC_{i,t}}{Assets_{i,t-1}}, \quad (2)$$

where $PredAcc_{i,t}$ is the predicted accruals for firm i in year t; $Sale_{i,t}$ is the sales (*sale*) for firm i in year t; $WCA_{i,t}$ is the change in non-cash working capital for firm i from year $t-1$ to year t, defined as Δ[total current assets (*act*) − cash and short-term investments (*che*) − treasury stock shown as current assets (*tsca*)] − Δ[total current liabilities (*lct*) − total amount of debt in current liabilities (*dlc*) − proposed dividends (*prodv*)]; $PPE_{i,t}$ is the gross value of property, plant, and equipment (*ppegt*) for firm i in year t; $Dep_{i,t}$ is the depreciation and amortization expense less amortization expense (*dp* − *am*) for firm i in year t; $Assets_{i,t}$ is the total assets (*at*) for firm i in year t; $TACC_{i,t}$ is the total accruals, measured as net income before extraordinary items (*ib*) less cash flow from operations for firm i in year t. Cash flow from operations is calculated as income before extraordinary items (*ib*) plus depreciation and amortization (*dp*) plus change in deferred taxes (*txdb*) plus change in untaxed reserve (*rvutx*) plus change in other liabilities (*lo*) plus minority interest (*mib*) less change in non-cash working capital; and $AbAcc_{i,t}$ is the abnormal accruals for firm i in year t, that is, predicted accruals (*PredAcc*) less total accruals (*TACC*) scaled by lagged assets.

Additional accrual quality measures. *Performance-Adjusted Abnormal Accruals* is -1 times the absolute value of the difference between $AbAcc_{i,t}$ and the median of firm observations that are in the same *ROA* (return on assets) decile by year.

Modified Jones Model Abnormal Accruals is -1 times the absolute value of abnormal accruals estimated from the modified Jones model within country, year, and total assets decile, as suggested by Ecker, Francis, Olsson, and Schipper (2013).

Legal liability regime measures. *LITIGATE* is the country-level litigation risk rating from Wingate (1997), ranging from 1 to 15. High (low) litigation risk countries have a rating greater than or equal to (less than) 5.79.

Legal Origin is common law countries (*Common*) and code law countries (*Code*), as defined by La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1997, 1998).

Auditing Enforcement Index is the country-level audit and enforcement index. High (low) indicates that observations are from countries above (below) the mean annual audit index and the mean annual enforcement index, as defined by Brown, Preiato, and Tarca (2013).

Rule of Law Index is the country-level rule of law index (Kaufmann, Kraay, & Mastruzzi, 2009). High (low) indicates that observations are from countries above (below) the mean rule of law index.

Efficiency of the Judiciary Index is the country-level efficiency of the judiciary index (La Porta, Lopez-De-Silanes, & Shleifer, 2006; La Porta et al., 1998). High (low) indicates that observations are from countries above (below) the mean efficiency of the judiciary index.

Variables of interest. $\boldsymbol{Tenure_{i,t}}$ is the number of consecutive years that firm i has been audited by its current auditor in year t, as reflected in the Compustat North American and Global Vantage database;

$\boldsymbol{Tenure^2_{i,t}}$ is the square of $Tenure_{i,t}$;

Turning Point is $-\frac{\beta_1}{2\beta_2}$, here β_1 is the coefficient on *Tenure* and β_2 is the coefficient on $Tenure^2$ from estimating Equation 3; and

Reference Point is 3/2 times the *Turning Point*.

Control variables. $OCF_{i,t}$ is cash flow from operations (*oancf*) scaled by average total assets (*at*) for firm i in year t;

$Size_{i,t}$ is the natural log of market value of equity, where market value of equity is calculated as the closing price times the number of shares outstanding at the end of the fiscal year for firm i in year t;

$Size^2_{i,t}$ is the square of $Size_{i,t}$;

$Age_{i,t}$ is the natural log of the number of years since 1950 that firm i first appeared in Compustat in year t;

$BigN_{i,t}$ is 1 if firm i is audited in year t by a Big N auditor and 0 otherwise;

$MtB_{i,t}$ is the market-to-book ratio, calculated as the market value of equity divided by the book value of common equity (*ceq*) for firm i in year t;

$IndGrowth_{i,t}$ is the change in mean industry (two-digit Standard Industrial Classification [SIC]) sales growth divided by the prior year's mean industry growth for firm i in year t;

$GDP_{i,t}$ is the log of GDP per capita in year t for country k (in thousands) adjusted to current U.S. dollars (source: International Monetary Fund, 2012);

SOE_k is state ownership in the economy index in country k, ranging from 0 to 10, in which higher scores indicate lower state ownership (source: La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 1999);

$ExpRisk_k$ is risk of expropriation by the state in country k, ranging from 0 to 10, in which higher scores indicate lower risk (source: La Porta et al., 1998); and

IndustryDummies is industry indicator variables based on two-digit SIC groups. Nine industry groups are formed as follows: 1-9 (Agriculture/Forest), 10-17 (Mining/ Construction), 20-39 (Manufacturing), 40-47 (Transportation), 48 (Communication), 49 (Utilities), 50-51 (Wholesale), 52-59 (Retail), and 70-99 (Other).

Appendix C

Adjusted R^2 for Various Higher Order Models.

Panel A: High Litigation Risk Group.

	Quadratic	Linear	Third order	Fourth order	Fifth order
Adjusted R^2 (%)	8.04	7.99	8.04	8.04	8.04
Difference		Linear	Third order	Fourth order	Fifth order
Quadratic (%)		0.05***	0.00	0.00	0.00
Linear (%)			−0.05***	−0.05***	−0.05**
Third order (%)				0.00	0.00
Fourth order (%)					0.00

Panel B: Low Litigation Risk Group.

	Quadratic	Linear	Third order	Fourth order	Fifth order
Adjusted R^2 (%)	7.63	7.49	7.67	7.68	7.68
Difference		Linear	Third order	Fourth order	Fifth order
Quadratic (%)		0.14***	−0.04*	−0.05	−0.05
Linear (%)			−0.18***	−0.19***	−0.19**
Third order (%)				−0.01	−0.01
Fourth order (%)					0.00

Note. This table presents the goodness-of-fit statistics for various polynomial models that include higher order terms of the *Tenure* variable. For each model, we present the adjusted R^2, the difference in the adjusted R^2 between the models, and the joint significance of the additional terms. The sample and the model are the same as that used in Equation 3, except for the polynomial terms of *Tenure*. The quadratic model uses the same polynomial terms as in Equation 3, which are *Tenure* and $Tenure^2$. The linear model only includes *Tenure*. The third-order model includes *Tenure*, $Tenure^2$, and $Tenure^3$. The fourth- and fifth-order models add to the third-order model $Tenure^4$ and $Tenure^5$, respectively.

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, based on the joint significance of the additional terms.

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Notes

1. The following high-profile audit scandals had audit firm tenure longer than the 12-year mean reported by Davis, Soo, and Trompeter (2009): Enron Corp (27 years—Andersen; source: Compustat), Lehman Brothers (15 years—Ernst and Young; source: Compustat), and Nortel Networks Corp (92 years—Deloitte; "Experts Question Deloitte's Role," 2007).
2. Switching costs are significant, according to the U.S. Congress Committee on Financial Services Report on the Audit Integrity and Job Protections Act. As stated in the committee's report, costs may range from US$500,000 to US$5 million; and most large audit firms believe that the initial year's audit costs would be higher than those of the following year by more than 20% (U.S. Congress, 2013, p. 3). Thus, if switching costs significantly outweigh the lower audit quality resulting from long audit tenure, then the mandatory rotation point should be longer than our theoretical *reference point*.
3. The exceptions are Italy, Portugal, and Turkey, which comprise a small proportion of our sample. Our results still hold when we exclude these countries.
4. It is likely that the optimal rotation point is longer than the *reference point* once switching costs are considered.
5. We exclude U.S. firms because of the large sample size. In a robustness test, we add back the U.S. firms, and we find that our estimate of the *reference point* is higher.
6. It is worth noting that abnormal accruals are an acceptable proxy for audit quality because they yield similar conclusions to restatements in other research settings (e.g., Francis, Michas, & Yu, 2013; Francis & Yu, 2009). Moreover, abnormal accruals yield similar results to restatements in an audit tenure setting, because restatements are greater for U.S. clients with longer audit firm tenure (Lobo & Zhao, 2013) which corroborates the results of Davis et al. (2009) using abnormal accruals.
7. Our *reference point* estimate of 24 (14) years varies using different estimation methods and abnormal accruals measures. Nevertheless, we consistently find a longer *reference point* for countries with stronger investor protection. We refer to our *reference point* estimate of 24 (14) years as our main result, because it is based on the largest sample size.
8. Note that in estimating our quadratic model, it is not necessary for us to have observations near the *crucial low point*. As long as there are a significant number of observations experiencing a decline in audit quality (i.e., there is a *turning point*), we can estimate the *crucial low point* under the assumption that the quadratic model approximates the underlying relation. For instance, if we exclude observations that exceed the *reference point*, our estimated *reference point* is similar: 27 (9) years for the high (low) litigation risk countries. In addition, we use various methods to validate the quadratic model, and we control for survivorship bias, which we discuss later.
9. However, we include these younger and more frequently switching firms to test whether audit quality decreases in early years. As we find that audit quality does not decrease in early years, including these young firms may not be important for us to estimate the reference point which occurs during the declining stage of audit quality. Moreover, inclusion of these observations may bias our results if too many observations are in the early tenure years.

10. Brooks, Cheng, Johnston, and Reichelt (2013) use restatements as an alternative measure of audit quality, and they find consistent results that audit quality is an inverted-U function of audit firm tenure. Because restatements are not readily available for international data, we rely on Brooks et al.'s (2013) results to validate abnormal accruals as a measure of audit quality.
11. Our estimates have a range between 22 and 36 years (8 and 18 years) for the high (low) litigation risk countries, respectively, depending on the specification. Our main results are based on the methodology that has the largest sample available. Our results imply that the mandatory rotation term should not be shorter than 22 (8) years for the high (low) litigation risk countries.
12. See Stefaniak, Robertson, and Houston (2009); Lennox (2014); and Casterella and Johnston (2013), for a review of the mandatory auditor rotation literature.
13. As mentioned before, because the theoretical *reference point* does not take into account the client firm's out-of-pocket switching costs (e.g., the new auditor's start-up costs), the optimal rotation point is likely to be longer (toward the *crucial low point*) as out-of-pocket switching costs increase.
14. Compustat variable names are indicated in parentheses.
15. Cash flow from operations is calculated as income before extraordinary items (*ib*) plus depreciation and amortization (*dp*) plus change in deferred taxes (*txdb*) plus change in untaxed reserve (*rvutx*) plus change in other liabilities (*lo*) plus minority interest (*mib*) less change in non-cash working capital (as defined above).
16. Our results are not sensitive to alternative measures of abnormal accruals. See Section "Alternative measures of abnormal accruals" which discusses our results based on models from Kothari, Leone, and Wasley (2005) and Ecker, Francis, Olsson, and Schipper (2013). In a concurrent paper by Brooks et al. (2013) who examine audit quality and audit tenure in a U.S. setting, the authors use the accruals quality measure following Francis, LaFond, Olsson, and Schipper (2005); however, the measure is too restrictive for our sample because it requires at least 5 years of data for each firm-year observation.
17. Using 5.79 as a cutoff is based on the fact that it is the mean *LITIGATE* score for the countries in our sample. Our results are not sensitive to this choice.
18. Our results are not sensitive to alternative litigation risk measures (see Section "Alternative measures of legal liability regime").
19. In untabulated results, we add prior year's abnormal accruals, return on assets, and a loss indicator variable as further controls, and our main results still hold.
20. Ideally, we would like to add the square of age (Age^2) as a control variable. Unfortunately, for our sample, *Age* and *Tenure* are highly correlated, and including Age^2 in Equation 3 creates serious multicollinearity. We find that by including Age^2, the variance inflation factor (VIF) increases from about 10 to 20, which is well above acceptable levels (Kennedy, 2008). However, the turning point estimates are similar, but the statistical significance of the coefficients on *Tenure* and $Tenure^2$ variables decreases greatly, as expected with near perfect multicollinearity. Instead, we add $Size^2$, which is highly correlated with Age^2, and it still captures the non-linearity arising from firm growth, and without an increase in the VIF.
21. Country-level control variables do not include the country's legal liability regime, as we partition the sample by litigation risk group.
22. We begin with 1996 because the data for the low litigation risk group are very sparse before that time.
23. Some countries do not allow international auditors; rather, they only allow local affiliates to sign the audit report. These local affiliates normally are classified as "other" auditors by Compustat Global Vantage. Francis and Wang (2008) identify Japan, South Korea, India, and Pakistan as such countries. We contacted a Compustat representative, and they indicated that they plan to add additional categories in the future to reduce the number of "other" auditors.
24. After 2005, Compustat Global Vantage does not identify the name of the second audit firm. We have identified Denmark, France, and South Africa as countries that have or had provisions for

joint audits, according to a report published by the Institute of Chartered Accountants of Scotland (Ratzinger-Sakel, Audousset-Coulier, Kettunen, & Lesage, 2012). Algeria, Canada, Saudi Arabia, Sweden, and Tunisia have or had joint audits for financial industries, but these industries and three of these countries are excluded from our study. Although there are other countries that have joint audit provisions, they are excluded from our sample due to data availability. Some countries, such as Germany, have joint audit requirements on a voluntary basis, so we only exclude firms with a joint auditor and retain those without a joint auditor.

25. If we relax this restriction, our main regression analysis results in similar estimates of the *turning point* and *reference point*, and the difference between the high and low litigation risk groups continues to be significant.
26. When we use other legal liability regime or accruals measures, our sample size differs because of available observations.
27. Many of the joint audits have one international firm and one local firm (classified as an "other" auditor). To the extent that these local firms are considered the primary auditor, they are excluded because they are not identifiable. In the robustness tests, we add back observations with joint auditors using various tenure measures, and our main results still hold.
28. Specifically, in Section "Stratified random sample," we randomly select firms within each year of *Tenure*, such that there is an equal number of firms in each year of *Tenure*.
29. We include fixed effects and use standard errors that are robust to arbitrary heteroscedasticity. There is often a concern that the standard errors might be overstated due to correlations of residuals among firms, countries, and years. We repeat our analysis using two-way clustering by country and year, and we also rerun our analysis clustering on firm (Petersen, 2009). In untabulated results, we find that our conclusions are unaltered when controlling for clustered standard errors.
30. Throughout the article, we refer to "significant" as statistically significant at the 1% level (two-tailed test), unless otherwise stated.
31. Note that the coefficient on *Tenure* (*Tenure*^{2}) is multiplied by 10 (100) for presentation purposes. Thus, the turning point for the high litigation risk group (15.71) is computed as [0.0423 / 10] / (−2 [−0.0135 / 100]).
32. As the *reference point* is a linear transformation of the *turning point*, the test statistics and the associated *p* values for the *reference point* are the same as those for the *turning point*. Despite the few observations after the *reference point* (see Panel C in Table 1), we can infer that our data are robust enough to estimate it. If we exclude observations that are greater than 24 (14) years for the high (low) litigation risk group, the reestimated *reference point* is 27 (9) years. We find similar results in estimating Equation 3 using signed abnormal accruals (rather than the absolute value) as the dependent variable. The *turning point* (significant) and the *reference point* are 14.77 years and 22.15 years for the high litigation risk group, respectively, and 9.21 years and 13.82 years for the low litigation risk group, respectively.
33. For years not reported by the World Bank, we use the prior year's ranking.
34. For all of our litigation measures, Australia, Canada, Ireland, New Zealand, and the United Kingdom are classified as high legal liability regime countries, whereas Argentina, Greece, Mexico, and Taiwan are all classified as low legal liability regime countries.
35. Of course, the decision to mandate audit firm rotation is complex. Regulators should consider the costs and benefits of such a mandate and the risks of any unintended economic consequences (e.g., whether auditors will become "lame ducks" in their last year of the rotation term that both audit effort and audit quality decrease), and they should consider any other methods for improving auditor independence and audit quality as part of a larger package of reforms (Lennox, 2014; Public Company Accounting Oversight Board, 2012). Nevertheless, our results provide important empirical evidence for regulators.

References

Anthony, J. H., & Ramesh, K. (1992). Association between accounting performance measures and stock prices: A test of the life cycle hypothesis. *Journal of Accounting & Economics, 15*, 203-227.

Auditor rotation: Musical chairs—Regulators are considering forcing companies to change their auditors. (2011, September 3). *The Economist*, p. 73.

Baginski, S. P., Hassell, J. M., & Kimbrough, M. D. (2002). The effect of legal environment on voluntary disclosure: Evidence from management earnings forecasts issued in U.S. and Canadian markets. *The Accounting Review, 77*, 25-50.

Ball, R., Kothari, S. P., & Robin, A. (2000). The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting & Economics, 29*, 1-51.

Balsam, S., Krishnan, J., & Yang, J. S. (2003). Auditor industry specialization and earnings quality. *Auditing: A Journal of Practice & Theory, 22*, 71-97.

Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. Hoboken, NJ: John Wiley.

Bhattacharya, U., Daouk, H., & Welker, M. (2003). The world price of earnings opacity. *The Accounting Review, 78*, 641-678.

Boone, J. P., Khurana, I. K., & Raman, K. K. (2008). Audit firm tenure and the equity risk premium. *Journal of Accounting, Auditing & Finance, 23*, 115-140.

Brooks, L. Z., Cheng, C. S. A., Johnston, J. A., & Reichelt, K. J. (2013, September 23). *Audit firm tenure and audit quality: Evidence from U.S. firms* (Working paper). Pullman: Washington State University.

Brown, P. R., Preiato, J. P., & Tarca, A. (2013, June 27). *Measuring country differences in enforcement of accounting standards: An audit and enforcement proxy* (FIRN research paper). Retrieved from http://ssrn.com/abstract=2286029

Bushman, R. M., & Piotroski, J. D. (2006). Financial reporting incentives for conservative accounting: The influence of legal and political institutions. *Journal of Accounting & Economics, 42*, 107-148.

Bushman, R. M., Piotroski, J. D., & Smith, A. J. (2004). What determines corporate transparency? *Journal of Accounting Research, 42*, 207-252.

Casterella, J. R., & Johnston, D. (2013). Can the academic literature contribute to the debate over mandatory audit firm rotation? *Research in Accounting Regulation, 25*, 108-116.

Chasan, E. (2012, April 20). Business groups: Forget mandatory auditor rotation. *The Wall Street Journal: CFO Journal*. Retrieved from http://blogs.wsj.com/cfo/2012/04/20/business-groups-forget-mandatory-auditor-rotation/

Chen, J. T., & Manes, R. P. (1985). Distinguishing the two forms of the constant percentage learning curve model. *Contemporary Accounting Research, 1*, 242-252.

Cheng, C. S. A., & Zhang, T. (2013, April). *On the optimal year of auditor rotation* (Working paper). Hung Hom: Hong Kong Polytechnic University.

Chi, W., & Huang, H. (2005). Discretionary accruals, audit-firm tenure and audit-partner tenure: Empirical evidence from Taiwan. *Journal of Contemporary Accounting & Economics, 1*, 65-92.

Choi, J.-H., Kim, J.-B., Liu, X., & Simunic, D. A. (2008). Audit pricing, legal liability regimes, and big 4 premiums: Theory and cross-country evidence. *Contemporary Accounting Research, 25*, 55-99.

The Conference Board. (2003). *Findings and recommendations of the commission on public trust and private enterprise*. Retrieved from https://www.conference-board.org/pdf_free/SR-03-04.pdf

Corona, C., & Randhawa, R. S. (2010). The auditor's slippery slope: An analysis of reputational incentives. *Management Science, 56*, 924-937.

Davis, L. R., Soo, B. S., & Trompeter, G. M. (2009). Auditor tenure and the ability to meet or beat earnings forecasts. *Contemporary Accounting Research, 26*, 517-548.

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

Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review, 77*(Suppl.), 35-59.

DeFond, M. L., & Jiambalvo, J. (1994). Debt covenant violation and manipulation of accruals. *Journal of Accounting & Economics, 17*, 145-176.

DeFond, M. L., & Park, C. W. (2001). The reversal of abnormal accruals and the market valuation of earnings surprises. *The Accounting Review, 76*, 375-404.

DeFond, M. L., & Subramanyam, K. R. (1998). Auditor changes and discretionary accruals. *Journal of Accounting & Economics, 25*, 35-67.

Ecker, F., Francis, J., Olsson, P., & Schipper, K. (2013). Estimation sample selection for discretionary accruals models. *Journal of Accounting & Economics, 56*, 190-211.

European Commission. (2010, October 13). *Green paper—Audit policy: Lessons from the crisis* (Com(2010) 561 final). Brussels. Retrieved from http://ec.europa.eu/internal_market/consultations/docs/2010/audit/green_paper_audit_en.pdf

European Parliament. (2014, May 27). *Regulation (EU) no. 537/2014 of the European parliament and of the council of 16 April 2014 on specific requirements regarding statutory audit of public-interest entities and repealing commission decision 2005/909/EC*. Official Journal of the European Union. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.158.01.0077.01.ENG

Experts question Deloitte's role in Nortel accounting problems. (2007, March 16). *National Post*. Retrieved from http://www.canada.com/story.html?id=f685a824-c8c6-4b2d-81e4-16b274dc9379

Francis, J., LaFond, R., Olsson, P., & Schipper, K. (2005). The market pricing of accruals quality. *Journal of Accounting & Economics, 39*, 295-327.

Francis, J. R., Michas, P. N., & Yu, M. D. (2013). Office size of big 4 auditors and client restatements. *Contemporary Accounting Research, 30*, 1626-1661.

Francis, J. R., & Wang, D. (2008). The joint effect of investor protection and big 4 audits on earnings quality around the world. *Contemporary Accounting Research, 25*, 157-191.

Francis, J. R., & Yu, M. D. (2009). Big 4 office size and audit quality. *The Accounting Review, 84*, 1521-1552.

Frankel, R. M., Johnson, M. F., & Nelson, K. K. (2002). The relation between auditors' fees for nonaudit services and earnings management. *The Accounting Review, 77*(Suppl.), 71-105.

Ghosh, A., & Moon, D. (2005). Auditor tenure and perceptions of audit quality. *The Accounting Review, 80*, 585-612.

Guedhami, O., Pittman, J. A., & Saffar, W. (2009). Auditor choice in privatized firms: Empirical evidence on the role of state and foreign owners. *Journal of Accounting & Economics, 48*, 151-171.

Hail, L., & Leuz, C. (2006). International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research, 44*, 485-531.

Hill, R. C., Griffiths, W. E., & Lim, G. C. (2011). *Principles of econometrics* (4th ed.). Hoboken, NJ: John Wiley.

Hung, M. (2000). Accounting standards and value relevance of financial statements: An international analysis. *Journal of Accounting & Economics, 30*, 401-420.

International Monetary Fund. (2012, April). *World economic outlook database*. Retrieved from http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx

Johnson, V. E., Khurana, I. K., & Reynolds, J. K. (2002). Audit-firm tenure and the quality of financial reports. *Contemporary Accounting Research, 19*, 637-660.

Jones, J. J. (1991). Earnings management during import relief investigations. *Journal of Accounting Research, 29*, 193-228.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2009, June). *Governance matters VIII: Aggregate and individual governance indicators, 1996-2008* (Working paper, WPS 4978). Washington, DC: Development Research Group, The World Bank.

Kennedy, P. (2008). *A guide to econometrics* (6th ed.). Malden, MA: Blackwell.

Kohlbeck, M., Mayhew, B. W., Murphy, P., & Wilkins, M. S. (2008). Competition for Andersen's clients. *Contemporary Accounting Research, 25*, 1099-1136.

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting & Economics*, *39*, 163-197.

La Porta, R., Lopez-De-Silanes, F., & Shleifer, A. (2006). What works in securities laws? *Journal of Finance*, *61*, 1-32.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *Journal of Finance*, *52*, 1131-1150.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy*, *106*, 1113-1155.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *Journal of Law, Economics, and Organization*, *15*, 222-279.

Lennox, C. (2014). Auditor tenure and rotation. In D. Hay, W. R. Knechel, & M. Willekens (Eds.), *The Routledge companion to auditing* (pp. 89-106). Oxon, UK: Routledge.

Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: An international comparison. *Journal of Financial Economics*, *69*, 505-527.

Lobo, G. J., & Zhao, Y. (2013). Relation between audit effort and financial report misstatements: Evidence from quarterly and annual restatements. *The Accounting Review*, *88*, 1385-1412.

Maggin, D. L. (1989). *Bankers, builders, knaves, and thieves: The $300 million scam at ESM.* Chicago, IL: Contemporary Books.

Mansi, S. A., Maxwell, W. F., & Miller, D. P. (2004). Does auditor quality and tenure matter to investors? Evidence from the bond market. *Journal of Accounting Research*, *42*, 755-793.

Myers, J. N., Myers, L. A., & Omer, T. C. (2003). Exploring the term of the auditor-client relationship and the quality of earnings: A case for mandatory auditor rotation? *The Accounting Review*, *78*, 779-799.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies*, *22*, 435-480.

PricewaterhouseCoopers. (2002). *Mandatory rotation of audit firms: Will it improve audit quality?* New York, NY: Author.

Public Company Accounting Oversight Board. (2011). *Concept release on auditor independence and audit firm rotation* (PCAOB Release No. 2011-06). Retrieved from http://pcaobus.org/rules/rulemaking/docket037/release_2011-006.pdf

Public Company Accounting Oversight Board. (2012, October 18). *Statement on public meeting on auditor independence and audit firm rotation* (Jeannette M. Franzel, Board Member, PCAOB public meeting, Houston, TX). Retrieved from http://pcaobus.org/News/Speech/Pages/10182012_FranzelOpeningStatement.aspx

Ratzinger-Sakel, N., Audousset-Coulier, S., Kettunen, J., & Lesage, C. (2012). *What do we know about joint audit?* Institute of Chartered Accountants of Scotland. Retrieved from https://www.icas.com/__data/assets/pdf_file/0004/7672/58-What-Do-We-Know-About-Joint-Audit-ICAS.pdf

Republic of Italy. (1975). *Presidential decree d.p.r. no. 136 of 1975.* Retrieved from http://www.normattiva.it/uri-res/N2Ls?urn:nir:presidente.repubblica:decreto:1975;136

Securities and Exchange Commission. (2003). *Strengthening the commission's requirements regarding auditor independence* (RIN 3235-AI73). Retrieved from http://www.sec.gov/rules/final/33-8183.htm

Seetharaman, A., Gul, F. A., & Lynn, S. G. (2002). Litigation risk and audit fees: Evidence from UK firms cross-listed on US markets. *Journal of Accounting & Economics*, *33*, 91-115.

Simunic, D. A., & Stein, M. T. (1987). *Product differentiation in auditing: Auditor choice in the market for unseasoned new issues.* Vancouver, British Columbia: The Canadian Certified General Accountants Research Foundation.

Stefaniak, C. M., Robertson, J. C., & Houston, R. W. (2009). The causes and consequences of auditor switching: A review of the literature. *Journal of Accounting Literature*, *28*, 47-121.

Stulz, R. M. (2009). Securities laws, disclosure, and national capital markets in the age of financial globalization. *Journal of Accounting Research*, *47*, 349-390.

Tysiac, K. (2012, December 4). Obstacles make PCAOB's Hanson skeptical about mandatory audit firm rotation. *Journal of Accountancy*. Retrieved from http://www.journalofaccountancy.com/news/2012/dec/20126956.html

Tysiac, K. (2013a, July 8). Bill prohibiting mandatory audit firm rotation passes U.S. house. *Journal of Accountancy*. Retrieved from http://www.journalofaccountancy.com/news/20138294.htm

Tysiac, K. (2013b, December 17). EU member states approve mandatory audit firm rotation. *Journal of Accountancy*. Retrieved from http://www.journalofaccountancy.com/news/2013/dec/20139300.html

U.S. Congress. (2013). *Audit integrity and job protection act* (House of Representatives, Committee on Financial Services, 113th Cong. 1st sess. Rep. 113–142). Retrieved from https://www.congress.gov/113/crpt/hrpt142/CRPT-113hrpt142.pdf

Weber, J., & Willenborg, M. (2003). Do expert informational intermediaries add value? Evidence from auditors in microcap IPOs. *Journal of Accounting Research*, *41*, 681-720.

Wingate, M. L. (1997). An examination of cultural influence on audit environments. *Research in Accounting Regulation*, Suppl. 1, pp. 129-148.

Yelle, L. E. (1979). The learning curve: Historical review and comprehensive survey. *Decision Sciences*, *10*, 302-328.