# Chief accounting officers and audit efficiency

Hsiao-Tang Hsu
*Department of Accounting, Finance, and Business Law,*
*Texas A&M University – Corpus Christi, Corpus Christi, Texas, USA, and*
Sarfraz Khan
*Department of Accounting, B.I. Moody III College of Business Administration,*
*University of Louisiana at Lafayette, Lafayette, Louisiana, USA*

## Abstract

**Purpose** – The purpose of this paper is to investigate the roles of chief accounting officer (CAO) on the efficiency of auditing process and to empirically examine the association between separate CAO appointment and audit report lag (ARL).

**Design/methodology/approach** – This study employs firms listed in the US market from 2004 to 2012. The firm year having a CAO who does not simultaneously take other executive position is specifically identified. Firm years with job titles similar to CAO, such as chief accounting executive, vice president of accounting or corporate accounting executive, are categorized into the CAO group.

**Findings** – The presence of a separate CAO significantly reduces ARL. With the appointment of a new auditor, the presence of a separate CAO is associated with lower ARL, suggesting the moderating effect of separate CAOs on the relationship between auditor change and audit delay.

**Practical implications** – This study shows the importance of CAO, an executive who is specifically responsible for carrying out accounting functions. The findings suggesting the positive effects of separate CAO on external audit process and the timeliness of information should be of interest to firms, financial reporting users, auditors and regulators.

**Originality/value** – While few studies address CAO-related issues, the roles of a CAO are not widely explored and how a separate CAO affects external audit process remains an open question. This study fills this gap and further documents the contribution of separate CAO in external audit work to enrich literature in executive roles and audit efficiency at the same time.

**Keywords** Audit efficiency, Audit report lag, Audit effort, Chief accounting officer

**Paper type** Research paper

## 1. Introduction

The primary goal of this study is to examine the roles of chief accounting officers (CAOs) in maintaining efficiency during the auditing process. A CAO is an executive in a top management team who is specialized in and specifically in charge of issues related to accounting and financial reporting. While the roles of a CAO may differ across firms, they can be categorized into: advisory and monitoring roles (Rhodes and Russomanno, 2013). CAOs not only oversee all aspects of an organization's accounting functions but also plan and direct various accounts, cost systems, internal control systems and the production of financial reporting. They summarize, process and provide information for other top management team members, investors and other stakeholders.

On the other hand, audit report lags (ARL) or audit delays measure audit efficiency, implying the timeliness of audited financial information disseminated to the public[1]. Specifically, the number of days between the fiscal year-end date and the date of the audit report defines ARL. According to prior literature, various factors influence the degree of ARL, such as the provision of certain non-audit services (Knechel and Payne, 2001), the presence of material internal control weaknesses (Munsif *et al.*, 2012) or the adoption of the new Auditing Standard No. 5 (AS5) (Mitra *et al.*, 2015). In effect since June 2007, AS5 allows auditors to rely on the information that firms' internal sources provide, such as internal auditors or management, to employ a top-down, risk-based approach to evaluate control

problems and to focus on internal control tests for high-risk areas. We therefore aim to determine whether the appointment of a separate CAO, who is responsible for processing and providing accounting information and capable of communicating with external auditors effectively, is beneficial to audit efficiency. Furthermore, we examine the role of CAO in improving audit efficiency in conditions when the release of audit reports is expected to be delayed and where auditors can use information provided from internal sources to finish the audit report in a timely manner. To test this, we use auditor change as an event, as existing research shows that audit lags are associated with auditor change (e.g. Tanyi *et al.*, 2010).

Using a sample of 28,010 firm-year observations from 2004 to 2012, we conclude that the appointment of separate CAOs is associated with lower ARL. This finding coincides with extant research suggesting that internal audit assistants can reduce the time to conduct an effective audit. In addition, we find that the presence of separate CAOs negatively moderates the positive relationship between auditor change and audit delay. This further highlights the incremental role CAO plays in improving audit efficiency in situations when larger audit lags are expected. Although we use several methods to address endogeneity concerns inherent in our research, we suggest that the results should be interpreted with caution.

This study offers a couple of contributions to the literature on CAOs and audit efficiency. While prior studies typically address the attributes and effects of some top executives, such as chief executive officers (CEO) and chief financial officers (CFO), the advantages or roles of a CAO, to our best knowledge, have not been widely explored. Rhodes and Russomanno (2013) document a positive association between separate CAOs and accounting quality. In addition, Russomanno (2014) finds that initiating a CAO position is related to improved internal control and reduced audit fees. However, how a separate CAO affects the external audit process and performance remains an open question. Our study addresses this question by examining and identifying the effects of a separate CAO on improving audit efficiency under conditions where delays in finishing audit reports are expected and where auditors rely heavily on information provided from inside sources to finish audit reports on time. One of the intended purposes of AS5 involves reducing inefficiencies related to the internal audit process. The result shows that the benefits of AS5, which allow auditors to rely on the information firms provide, accrue more to firms with separate CAOs.

These results should be of interest to firms, financial reporting users, auditors and regulators. Specifically, firms may discover the advantages of introducing a separate CAO position into their management team, such as its positive effects on the quality and timeliness of information. Financial reporting users may treat the appointment of a separate CAO as a signal to interpret and explain accounting information differently. Auditors can rely on the information a CAO provides to lower their workloads. In addition, regulators could consider requiring the appointment of a separate CAO to their top management team to improve work efficiency.

The remainder of this study is organized as follows. In Section 2, we incorporate the background and related literature on both CAO and audit efficiency to develop our two main hypotheses. In Section 3, we present our research design, empirical model and sample construction. Section 4 includes our descriptive statistics and a discussion of the main empirical results as well as additional tests. Section 5 provides results of additional analyses. Section 6 summarizes our main findings and conclusions.

## 2. Background and hypotheses
Timeliness is recognized as one of the fundamental characteristics and a quality measure of financial reporting, implying the usefulness of accounting information. Prior literature documents the effects of non-timely information, including negative market reaction (e.g. Chambers and Penman, 1984; Easton and Zmijewski, 1993) and the increase of information asymmetry (Hakansson, 1977). Regulators (the SEC) therefore consider the timeliness of financial information and require different groups of companies to file their annual report within a specific

period after the fiscal year-end date. Large accelerated filers (companies with public float of $700m or more) are required to file within 60 days. Accelerated filers (companies with public float between $75 and 700m) are required to file within 75 days, while non-accelerated filers are required to file within 90 days (effective December 2006) (SEC, 2005). Defined as the length of time from a company's fiscal year end to the audit report, researchers often use ARL as a measure of timeliness as well as a measure of auditing efficiency for financial information.

Prior research examines various determinants of ARL. For instance, Ashton *et al.* (1987) suggest that audit delay is significantly longer for firms receiving qualified audit opinions, or those with poorer internal control. Schwartz and Soo (1996) address the timing of auditor changes and find that both ARL and earnings announcement lags decrease for firms that change their auditors early in the fiscal year. Knechel and Payne (2001) conclude that ARL is negatively associated with the provision of management advisory services to audit clients. Abernathy *et al.* (2017) summarize company-specific and audit-related factors of ARL documented in prior studies, such as size, firm performance, complexity, industry classification, internal control quality, auditor tenure and industry specialist auditor. Habib *et al.* (2019) employ meta-analysis to group the determinants of ARL into three categories, including audit- and non-audit-related factors; corporate governance-related factors; and firm-specific determinants. They further find that ARL is negatively associated with board independence and the presence of financial expertise in an audit committee yet positively associated with CEO duality.

In addition, ARL is connected to regulative issues that may affect auditors' effort or workload in prior literature, such as Section 404 of the Sarbanes-Oxley Act of 2002 (SOX), Auditing Standard No. 2 (AS2) and Auditing Standard No. 5 (AS5). After a series of accounting scandals (Enron, Worldcom, etc.) around 2002, congress passed SOX, which specifically requires the assessment and certification of the effectiveness of the firms' internal control over financial reporting (ICFR), to protect investors from fraudulent accounting activities within corporations. Section 302 of the Act (SOX 302), effective August 2002, requires the senior management team to evaluate ICFR. Section 404 of the Act (SOX 404) requires managers of public firms to provide assessments of the effectiveness of the firms' internal control. Furthermore, SOX requires auditors of accelerated filers to provide an independent opinion of the firms' ICFR. However, the latter provision (SOX 404) has increased the workloads of auditors. Ettredge *et al.* (2006) analyze the impact of the SOX 404 on audit delay following its implementation (2003–2004) and conclude that the presence of material internal control weaknesses is associated with longer ARL.

Issued in 2007, AS5 introduced a top-down, risk-based approach to internal control audit-related work that replaced AS2, which required auditors to conduct inquiries, observations and inspections of relevant documents, and improved auditors' efficiency. Munsif *et al.* (2012) use different groups of companies (filers) in the post-AS5 period of 2008 and 2009 to confirm the relations between the presence of material internal control weaknesses and longer ARL. Mitra *et al.* (2015) conclude that ARL is lower in the post-AS5 period of 2007 and 2011. However, the presence of material internal control weaknesses still increases ARL significantly and AS5 does not affect this relation. Overall, these studies suggest a significant correlation between internal control quality and ARL.

Various factors, including firm-specific characteristics such as corporate governance or the qualification of top management, determine the internal control quality that affects financial reporting and audit workload. Hoitash *et al.* (2009) explore the association between corporate governance and disclosures of material weaknesses. They find that the likelihood of disclosing material weakness regarding SOX 404 is negatively associated with the number of audit committee members having accounting experience and the board strength. Li *et al.* (2010) examine the relations between CFOs' professional qualification and SOX 404 regarding internal control weaknesses. They document that firms receiving initial adverse SOX 404 opinions for 2004 have less qualified CFOs, experience more CFO turnover (as of 2005) and

tend to hire more qualified CFOs. Their findings therefore suggest that executives associated with a firm's internal control system should affect ARL. If CAO serves as a mechanism for influencing a firm's internal control system, then it should be reflected in the ARL.

Most studies examining the roles or effects of firm executives focus on CEOs and CFOs. A CEO assumes the most important role in managing a company, leading the strategic direction of a company and ensuring the implementation of the strategy through functional steps. As a financial steward of a company, a CFO acquires the second most important role in the corporate hierarchy next to the CEO (Chasan and Murphy, 2013; Hoitash *et al.*, 2016) and is the only executive qualified to certify financial statements other than the CEO. The general responsibilities of CFOs include overseeing financial reporting, managing internal control and ensuring compliance with accounting regulations. In addition, CFOs also act as a consultant to perform financial analyses and to provide recommendations for the CEO and the board of directors (Campello *et al.*, 2010; Johnson, 2015). Prior literature often links the characteristics of CFOs, such as turnover, experience, educational background or compensation, to different measures of financial reporting quality (Agrawal and Cooper, 2015; Geiger and North, 2006; Bedard *et al.*, 2014). For example, Hennes *et al.* (2008) suggest that CEO and CFO turnover rates will be higher for restatements due to irregularities than those due to errors. Accordingly, whether a CFO with an accounting background (accountant CFO) can perform his job better, such as maintaining effective internal control or improving financial reporting quality, poses another important question. Studies find that accountant CFOs are associated with higher financial reporting quality (Aier *et al.*, 2005) and improved quality in ICFR. However, as accountants tend to be more risk averse (Newton, 1977; Helliar *et al.*, 2002), the findings regarding the effects of accountant CFOs raise concerns about whether this type of executive behaves more conservative in their decision process and ultimately affects firm operations. For instance, Hoitash *et al.* (2016) investigate whether accountant CFOs are associated with more conservative corporate outcomes. They conclude that firms with accountant CFOs make less research and development and capital investments in high-growth industries while exhibiting greater cost efficiency in low-growth industries and confirm risk aversion involves accountant CFOs.

In addition to investigating CEOs and CFOs, some studies investigate other executives. For example, Hambrick and Cannella (2004) examine the roles and interrelationships of CEOs and chief operating officers (COOs). They find that industry and organizational task demands as well as a CEO's ability will affect the propensity of a COO position. Kwak *et al.* (2012) investigate whether top management with general counsel changes a company's voluntary information disclosure and conclude that a general counsel in the top management structure is positively related to the likelihood of the issuance of management earnings forecasts. Liu *et al.* (2018) address the role of chief information officers (CIOs) in implementing new accounting standards and conclude that CIO compensation significantly increases after the mandatory adoption of International Financial Reporting Standards (IFRS), suggesting higher demand of information processing, managing information technology resources and CIOs' efforts in the post-IFRS period.

As the passage of SOX increased the importance of global reporting and compliance, prior literature and news releases document the increasing demand for accounting expertise and the creation and expanded role of a CAO in many public companies. Sammer (2006) emphasizes the importance of a CAO to the rest of the organization since he/she acts as an internal consultant on accounting matters. CAOs' general roles and responsibilities include tax, financial planning, corporate accounting, accounting policies and procedures, audit preparation, SOX compliance and monitoring, and maintaining ICFR. Prior studies discuss the advantages of initiating a separate CAO position in top management, such as higher accounting quality measured by the level of discretionary accruals and the likelihood or timeliness of restatement (Rhodes and Russomanno, 2013), improved internal control, and lower audit fees (Russomanno, 2014). In summary, the CAO assumes the roles of improving

the accounting system, internal control and financial reporting process, and may further benefit external auditors by lowering the control risk or providing accounting information efficiently to reduce auditors' workloads. Auditors therefore can rely on the information and assistance that CAOs provide to reduce ARL.

However, a separate CAO position may cause disadvantages or send negative signals to the market. When a CAO is equipped with accounting expertise and responsible for the financial reporting process, he/she possesses the capability and opportunities to misuse accounting standards or to manage earnings leading to lower financial reporting quality. In addition, the presence of a CAO may change the expectation or demand of internal control. As a result, auditors may take more time and need more effort to complete an audit. Considering the positive associations between CAO and higher accounting quality as well as improved internal control found in prior literature, we focus on the potential benefit of a CAO appointment and propose the first hypothesis as follows:

*H1.* After controlling for firm-level characteristics, a separate CAO is negatively associated with audit delay.

Existing research finds that the cost of auditor change is substantial to firms. For example, Chi and Huang (2005) argue that earnings quality is lower in the early years of audit tenure using Taiwanese data, implying the potential cost of mandatory auditor rotation. Carey and Simnett (2006) suggest that audit quality declines in the early years due to a lack of familiarity with the client's systems and risks. As a result, auditor change resetting auditor's familiarity and experience to a specific client creates disruption and the demand for additional effort in the auditing process. The US GAO (2003) report suggests that the client "spends a significant amount of resources-both financial and human-educating the new auditor about company operation and accounting matters" (p. 43). The challenge associated with learning about a new firm can cause incoming auditors to produce lower quality financial reporting. Indeed, Johnson *et al.* (2002) find that less client-specific knowledge results in lower quality of earnings (see also Carcello and Nagy, 2004).

The first year in the audit engagement requires auditors to familiarize themselves with factors such as client records, internal control or working papers from prior periods, resulting in audit delays (DeAngelo, 1981). In addition, a delay might occur because incoming auditors may spend a significant amount of time discussing with outgoing auditors about any adjustments needed in the interim reports filed earlier (Schwartz and Soo, 1996). Irrespective of the potential reasons, a body of work in auditing literature documents an increased audit delay during the first year of audit engagement (or the year of auditor change). For example, Schwartz and Soo (1996) examine ARL for firms that switched auditors and find that the time between auditor switch and fiscal year end is negatively associated with ARL. Additionally, the authors conclude that auditor switch is related to conflict over reporting issues, which further delays audit reporting. These results suggest that auditor switch results in a variety of accounting issues that lead to reporting delays. Tanyi *et al.* (2010) examine the impact of auditor change on ARL and find audit lag to be higher for a set of firms that change their auditors involuntarily when compared to firms that do so voluntarily.

Whether the presence of a CAO mitigates the impact of auditor change on audit delay poses an empirical question. As CAO is specialized in accounting and specifically in charge of financial reporting issues, we expect that CAO reducing information asymmetry is helpful for the incoming auditors to familiarize themselves with the existing systems and firm operations, which, in turn, reduces audit delays. This leads to the following hypothesis:

*H2.* After controlling for firm-level characteristics, the effect of CAO on audit delay is more pronounced when firm is going through auditor change.

## 3. Data, variable construction and empirical model

### 3.1 Data and sample description

Our sample period includes the years 2004–2012. We acquire data from several sources. The data regarding our primary interested variable, separate CAO, are retrieved from Capital IQ[2]. We base the data on person ID, title classification and job description to identify executives that hold a separate position for in-house accounting issues. The job titles sometimes vary across firms, such as CAO, chief accounting executive, vice president of accounting or corporate accounting executive. Considering the different responsibilities between CAO and CFO, we follow prior research (Rhodes and Russomanno, 2013) and do not include executives that fulfill CFO and CAO or similar positions simultaneously. We retrieve accounting and other financial variables from the fundamental annual database of Compustat North America and combine them with the managerial ability data Demerjian *et al.* (2012) developed[3]. We also collect other audit-related variables from audit analytics. We exclude firms in financial industries (SIC codes 6000 to 6999) due to different reporting requirements. After combining all different data sets and deleting firm years for missing variables, we retain 28,010 firm-year observations on 5,597 firms for our analysis.

### 3.2 Empirical methodology

*3.2.1 Regression model.* To address our research question, we estimate an ordinary least square (OLS) regression model. We follow existing literature to include our control variables. Specifically, we start with the ARL model used in Ettredge *et al.* (2006) and Munsif *et al.* (2012). We adjust the model by adding our dummy for a separate CAO, a proxy for managerial ability and other control variables correlated with ARL and suggested by prior literature. Abernathy *et al.* (2018) document that higher managerial ability is associated with shorter earnings announcement lag and shorter ARL, suggesting the incremental contribution of managerial ability to financial reporting timeliness. Accordingly, we include in the model an index of firm-specific managerial ability based on Demerjian *et al.* (2012). Abernathy *et al.* (2017) conclude from their review that ARL is correlated with Big N auditors and auditors with industry specialization. Habib *et al.* (2019) summarize the determinants of ARL in terms of audit- or non-audit-related factors, firm characteristics and corporate governance. We therefore follow prior research to include control variables, such as log of non-audit fees (NonAfee), auditor tenure (AudTenure), the indicator for auditor who is an industry specialist (AudExpert), the indicator for Big 4 auditor (Big4) and the magnitude (absolute value) of discretionary accruals based on the modified Jones (1991) model, which is calculated following Dechow *et al.* (1996). Finally, to control for corporate governance and board characteristics of the firm, we add an indicator variable identifying whether CEO is also the chair of the board (CEODuality). For brevity, we suppress firm and time subscripts, resulting in the following specification:

$$
\begin{aligned}
\ln(\text{Audit Lag}) = {} & \beta_0 + \beta_1 \text{CAO} + \beta_2 \text{AudChange} + \beta_3 \text{Afee} + \beta_4 \text{MA} + \beta_5 \text{Size} + \beta_6 \text{Lev} \\
& + \beta_7 \text{GC} + \beta_8 \text{ICMW} + \beta_9 \text{ROA} + \beta_{10} \text{Loss} + \beta_{11} \text{Segments} + \beta_{12} \text{Exord} \\
& + \beta_{13} \text{Aopin} + \beta_{14} \text{Restate} + \beta_{15} \text{NonAfee} + \beta_{16} \text{AudTenure} \\
& + \beta_{17} \text{CEODuality} + \beta_{18} \text{AudExpert} + \beta_{19} \text{Big4} \\
& + \beta_{20} \text{DACC} + \text{Industry and Time Dummies} + \varepsilon.
\end{aligned}
\tag{1}
$$

In Equation (1), ln(Audit Lag) is the natural log of ARL, which represents the number of calendar days between fiscal year end to the date of the auditor's report. The main variable of interest is CAO, which is an indicator equal to 1 if a separate CAO serves a firm during the

fiscal year, and 0 otherwise. All variables in the above equation are estimated in year $t$. We estimate Equation (1) by including industry- and year-fixed effects and calculate robust standard errors clustered by firm. Additionally, we also consider a firm-fixed effect model with standard errors adjusted for heteroskedasticity and clustered by firm. In this specification, we interpret that the changes in the presence of a separate CAO in a firm over time drive the coefficient on CAO. The model above is the same as that in Ettredge *et al.* (2006) and Munsif *et al.* (2012) with few exceptions: first, we delete firms in both financial and utilities sectors; we include industry- and year-fixed effects and drop the dummy for high growth industry (because the dummy for high growth industry is perfectly correlated with industry dummy); and we add our variable of interest (CAO) and control for firm-specific managerial ability following Demerjian *et al.* (2012). Prior literature documents that firms with more capable managers produce better earnings quality, have a lower likelihood of restatements and more efficient operations, and are generally more profitable (Demerjian *et al.*, 2012). As a result, these firms could complete most of the work related to generating financial reports during the year and thus need less time to file the annual report. If the appointment of a separate CAO is correlated with other firm-specific executives' ability, then excluding the control for managerial ability may produce bias in our results. Table AI includes the definitions of all variables in detail.

*3.2.2 Propensity score matching (PSM).* We also consider the PSM sample in addition to standard regression tests. We use PSM as an additional approach to address endogeneity concerns. This matching procedure may help mitigate the likelihood that our results are due to observable differences in CAO and non-CAO firms, such as those due to potential sample selection issues. We perform matching with replacement and restrict our matches within the caliper of 0.01 (Morgan and Harding, 2006). Armstrong *et al.* (2010) use a similar procedure. To implement the PSM tests, we employ a probit model to estimate the propensity score of a separate CAO appointment in order to construct a control sample without hiring a CAO. The dependent variable in this model acts as a dummy variable, which equals 1 for firm years when a separate CAO serves during the year, and 0 otherwise. We use standard controls of the ARL model to estimate this model and present the results in Table AII.

Considering the determinants of hiring a separate CAO, we find that managerial ability is negatively and significantly related to the presence of a CAO ($p < 0.01$). Prior research (Demerjian *et al.*, 2013) finds a positive association between managerial ability and financial reporting quality. Our results therefore suggest that firms may appoint a CAO to cope with the additional demand of financial reporting resulting from weaker managerial ability. The amount of audit fees is positively associated with the appointment of a CAO, implying that CAO requires additional effort from auditors, resulting in higher audit fees. We also suggest that smaller firms are more likely to appoint a CAO. Interestingly, loss (Loss), return on assets (ROA), auditor change (AudChange) and restatement (Restate) are positively and significantly associated with the presence of CAO, while leverage (Lev), material weakness in a firm's internal control (ICMW) and the presence of extraordinary income (Exord) lower the probability of a separate CAO appointment. Furthermore, our results indicate firms with Big 4 auditors are more likely to appoint a separate CAO. Additionally, we find that an appointment of a separate CAO is less likely when the CEO is the chairman of the board.

In Table AIII, we provide a post-matching covariate balance test. Armstrong *et al.* (2010) suggest that identification problems may arise due to a lack of an adequate degree of covariate balance. Therefore, to make proper inferences, an adequate covariate balance should be achieved between the treatment and control groups. We report two important statistics to show that a successful match is achieved following prior research (Hoitash *et al.*, 2016). First, we report a $p$-value of the difference between the means of the treatment and control samples. The $p$-values of all the mean differences of all covariates are greater than

0.10, indicating no significant difference between the two groups. Second, we calculate the normalized difference between the two groups. Imbens and Wooldridge (2009) suggest a cut-off point of less than 0.25 to achieve a covariate balance. The normalized difference is calculated as the difference in means of two samples divided by the square root of the average variance of the two groups. The results show that the normalized difference for all the variables is less than 0.25, with 0.026 being the highest, suggesting that the CAO sample is identical to that of the non-CAO sample in terms of several key characteristics[4].

*3.2.3 Separate chief accounting officer, auditor change and audit delay regression.* To address our *H2* regarding the moderating effect of CAO appointment, we modify Equation (1) to include an interaction between the dummy for a separate CAO (CAO) and the dummy for auditor change (AudChange). All other variables from Equation (1) remain in our model. Specifically, we estimate the following model:

$$\ln(\text{Audit Lag}) = \beta_0 + \beta_1 \text{CAO} + \beta_2 \text{AudChange} + \beta_3 \text{CAO} \times \text{AudChange}$$

$$+ \beta_i \text{Other Controls} + \text{Industry and Time Dummies} + \varepsilon. \quad (2)$$

The coefficient $\beta_3$ reflects the impact of a separate CAO on audit delay as the demand for audit effort changes with auditor switch. Specifically, we investigate whether the sign on $\beta_3$ is negative. That is, if the presence of a separate CAO reduces the time needed to finish an audit report during the first year of audit engagement as CAO facilitates incoming auditor's knowledge and understanding of new client's operations, internal control and financial reporting.

## 4. Results
### 4.1 Univariate results
*4.1.1 Descriptive statistics.* In Table I, we show the summary statistics of the variables used in the audit delay analysis. First, we present descriptive statistics in Panel A. We report mean, median and standard deviation for the full sample, firm years that are served by a separate CAO and firm-year observations that are not served by a separate CAO during the fiscal year. In the last column of Panel A, CAO vs non-CAO, we report the difference in means of respective variables between our firm years with a separate CAO and firm years without a separate CAO. We use a *t*-test to denote whether the difference is statistically significant.

Our univariate results show that the mean and median of ARL for the full sample are 73.26 and 69.00 days, respectively. In our main analysis, we adopt ln(Audit Lag), the natural log of ARL, as the dependent variable. In our full sample, the mean and median of ln(Audit Lag) are 4.24 and 4.23, respectively. The mean (median) of the indicator for auditor change is 0.06 (0.00) and the average (median) log of audit fee paid by our sample firms is 13.66 (13.72). We find that the firm years selected in our sample have an average managerial ability of 0.55 with a median of 0.60. Additionally, we find that the average size of our sample firms (measured in terms of the natural log of total assets reported in millions of dollars) is 6.04. In total, 6 percent of firm years received going concern (GC) opinion during the fiscal year. The analysis further reveals that 11 and 1 percent of sample firm years report material internal control weaknesses and extraordinary items, respectively.

When we compare our firm years with a separate CAO to those that do not have a separate CAO, we find that the average log of ARL for firm years with a separate CAO is 4.22 compared to 4.24 for observations without a separate CAO; the difference is statistically significant ($p < 0.01$). We also find that firms that appoint a separate CAO pay a lower audit fee ($p < 0.01$). However, when we compare the size (using total assets) of the two sets of firms, we find that separate CAO firms are smaller than their counterparts ($p < 0.01$).

Table I.
Summary statistics

*Panel A: descriptive analyses*

| Variables | Full sample (n = 28,010) | | | CAO (n = 6,891) | | | Non-CAO (n = 21,119) | | | CAO vs non-CAO | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Mean | Median | SD | Mean | Median | SD | Mean | Median | SD | Mean diff | p-value |
| Audit report lag (days) | 73.26 | 69.00 | 31.79 | 71.31 | 68.00 | 27.35 | 73.90 | 69.00 | 33.08 | −2.59 | 0.00 |
| CAO | 0.25 | | 0.43 | | | | | | | | |
| ln(Audit Lag) | 4.24 | 4.23 | 0.31 | 4.22 | 4.22 | 0.27 | 4.24 | 4.23 | 0.32 | −0.02 | 0.00 |
| AudChange | 0.06 | 0.00 | 0.24 | 0.07 | 0.00 | 0.26 | 0.06 | 0.00 | 0.24 | 0.01 | 0.00 |
| Afee | 13.66 | 13.72 | 1.37 | 13.58 | 13.67 | 1.15 | 13.68 | 13.74 | 1.43 | −0.10 | 0.00 |
| MA | 0.55 | 0.60 | 0.28 | 0.54 | 0.50 | 0.27 | 0.55 | 0.60 | 0.29 | −0.01 | 0.01 |
| Size | 6.04 | 6.11 | 2.31 | 5.79 | 5.89 | 1.97 | 6.13 | 6.20 | 2.41 | −0.34 | 0.00 |
| Lev | 0.27 | 0.17 | 0.39 | 0.26 | 0.15 | 0.38 | 0.28 | 0.18 | 0.39 | −0.01 | 0.01 |
| GC | 0.06 | 0.00 | 0.24 | 0.07 | 0.00 | 0.25 | 0.06 | 0.00 | 0.24 | 0.01 | 0.01 |
| ICMW | 0.11 | 0.00 | 0.31 | 0.10 | 0.00 | 0.31 | 0.11 | 0.00 | 0.31 | 0.00 | 0.71 |
| ROA | −0.07 | 0.03 | 0.41 | −0.08 | 0.02 | 0.41 | −0.06 | 0.04 | 0.41 | −0.02 | 0.00 |
| Loss | 0.34 | 0.00 | 0.48 | 0.39 | 0.00 | 0.49 | 0.33 | 0.00 | 0.47 | 0.07 | 0.00 |
| Segments | 1.42 | 1.00 | 0.54 | 1.41 | 1.00 | 0.53 | 1.43 | 1.00 | 0.54 | −0.02 | 0.00 |
| Exord | 0.01 | 0.00 | 0.11 | 0.01 | 0.00 | 0.09 | 0.01 | 0.00 | 0.12 | −0.01 | 0.00 |
| Aopin | 0.34 | 0.00 | 0.47 | 0.34 | 0.00 | 0.47 | 0.35 | 0.00 | 0.48 | −0.01 | 0.35 |
| Restate | 0.09 | 0.00 | 0.28 | 0.10 | 0.00 | 0.29 | 0.08 | 0.00 | 0.28 | 0.01 | 0.01 |
| NonAfee | 10.22 | 11.53 | 4.39 | 9.99 | 11.37 | 4.34 | 10.30 | 11.60 | 4.41 | −0.31 | 0.00 |
| AudTenure | 6.67 | 6.00 | 4.92 | 6.68 | 6.00 | 4.85 | 6.66 | 6.00 | 4.94 | 0.02 | 0.72 |
| CEODuality | 0.13 | 0.00 | 0.34 | 0.10 | 0.00 | 0.30 | 0.14 | 0.00 | 0.35 | −0.04 | 0.00 |
| AudExpert | 0.22 | 0.00 | 0.41 | 0.22 | 0.00 | 0.41 | 0.22 | 0.00 | 0.41 | 0.00 | 0.98 |
| Big4 | 0.72 | 1.00 | 0.45 | 0.70 | 1.00 | 0.46 | 0.72 | 1.00 | 0.45 | −0.02 | 0.00 |
| DACC | 0.13 | 0.08 | 0.18 | 0.13 | 0.08 | 0.17 | 0.13 | 0.08 | 0.18 | 0.00 | 0.72 |

*Panel B: time-series of audit report lag and chief accounting officer*

| Year | Audit report lag (days) | | | ln(Audit Lag) | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Mean | Median | SD | Mean | Median | SD |
| t−3 | 73.61 | 69 | 47.07 | 4.22 | 4.23 | 0.33 |
| t−2 | 77.99 | 66 | 49.05 | 4.27 | 4.18 | 0.36 |
| t−1 | 72.12 | 61 | 38.27 | 4.21 | 4.11 | 0.31 |
| t | 69.39 | 60 | 39.09 | 4.18 | 4.09 | 0.28 |
| t+1 | 65.60 | 60 | 26.53 | 4.14 | 4.09 | 0.24 |
| t+2 | 63.04 | 60 | 14.84 | 4.12 | 4.09 | 0.20 |
| Total | 70.29 | 62 | 37.95 | 4.19 | 4.13 | 0.29 |

(*continued*)

*Panel C: test of equality between pre- and post-chief accounting officer appointment in audit report lag*

| | | Audit report lag (days) | *t*-test ln(Audit Lag) |
|---|---|---|---|
| Pre-appointment year (−3, −1) vs | Pre | 74.57 | 4.23 |
| Post-appointment year (0, +2) | Post | 66.01 | 4.15 |
| | Difference | 8.56 | 0.08 |
| | *p*-value | <0.01 | <0.01 |
| Pre-appointment year (−1) vs | Pre | 72.12 | 4.21 |
| Post-appointment year (+1) | Post | 65.60 | 4.14 |
| | Difference | 8.71 | 0.07 |
| | *p*-value | 0.08 | 0.03 |

**Notes:** All variables are defined in Table AI. The table provides summary statistics for all, CAO and non-CAO firm observations in Panel A. The CAO vs non-CAO column in Panel A presents the mean difference (Mean diff) between variables in CAO and non-CAO groups. Panel B presents time-series analyses of raw audit report lag days and ln(Audit Lag) in the pre- and post-CAO's appointment period. Panel C reports means and *p*-values from parametric *t*-tests of change in raw audit report lag days and ln(Audit Lag) from non-CAO period (years *t*−3, *t*−1) to post-CAO period (years *t*, *t*+2), and from year before (*t*−1) to year after (*t*+1) the CAO appointment

**Table I.**

www.

Additionally, we suggest that firms that do not appoint separate CAOs are slightly better in terms of managerial ability. To some extent, this may indicate that appointing a separate CAO may fulfill some of the demand for internal accounting-related resources resulting from the lack of managerial ability. We also find that firm years with a CAO are more likely to report a GC opinion. Finally, we do not find any significant difference in the reporting of material internal control weaknesses between the two sub-samples.

Table I (Panel B) shows a trend in ARL where $t$ is the first year of a separate CAO being in position. We show our trend for both the actual number of days between the fiscal year end and the date of the audit report and the natural log of audit delay (ln(Audit Lag)). This analysis, however, is conducted on the firms that appoint a separate CAO during the sample years. That is, only firms that appoint a separate CAO observe this trend and that data are available for at least three years prior to the appointment and three years after the appointment (including the year of appointment). Additionally, we discard firms from this analysis if they do not have a complete time-series data (i.e. unbalanced panel). Panel C of Table I reveals that ARL generally increases leading up to the appointment of a CAO but declines subsequently.

In Table I, Panel C, we compare the change in ARL from the pre-CAO appointment period to the post-CAO appointment period. To achieve this, we use the same subsample, described in the preceding paragraph, as in Panel C. We first show the difference in the average three-year period ARL prior to the CAO appointment $(-3, -1)$ to the average three-year ARL in the post-CAO appointment period $(0, +2)$. The results show a difference of around 8.56 days; ARL decreases in the post-appointment period by around 11.48 percent (8.56/74.57). The $t$-test of the difference in the log of ARL, ln(Audit Lag), between the two periods further confirms ($p < 0.01$) our results of untransformed audit delay. We next provide the $t$-tests of change in both the raw ARL and the natural log of ARL from the year before the appointment (year $t-1$) to the full year after the appointment (year $t+1$). We exclude the year of change. Again, we find that the change between the two periods in ARL is statistically significant. However, our univariate results may not account for the effect of confounding variables that may bias our results; we use multivariable regression approach to overcome this problem.

*4.1.2 Correlation analysis.* We present the Pearson correlations among the variables in Table II. The table shows that the correlation between the log of ARL and a separate CAO is negative (coefficient $= -0.025$) and significant. This indicates that the time to complete an audit report is less when separate CAOs serve firms during the fiscal year. We find that ln (Audit Lag) is negatively associated with the log of audit fees (Afee, coefficient $= -0.352$), suggesting that firms with separate CAOs pay lower audit fees. Additionally, ln(Audit Lag) is negatively associated with managerial ability (MA, coefficient $= -0.029$) and firm size (Size, coefficient $= -0.419$). We also find the log of ARL to be positively associated with auditor change, AudChange (coefficient $= 0.118$), GC (coefficient $= 0.267$), ICMW (coefficient $= 0.370$), Loss (coefficient $= 0.258$) and Restate (coefficient $= 0.111$).

*4.2 Regression results*
Table III reports the results of regressions with the log of ARL, ln(Audit Lag), as the dependent variable. Columns 1–3 report results of OLS regression with industry and year effects along with independent variables, including CAO. In Column 1, the results from the full sample show that the coefficient on CAO is significantly negative (coefficient $= -0.037$, $p < 0.01$), suggesting that separate CAO appointments significantly reduce the number of days to file an audit report. In terms of economic magnitude, firm year with a separate CAO reduces audit delay by around 4 percent, which roughly translates into around three days. In Column 2, we report results with an accelerated and large accelerated sample (market float greater than $75m) and continue to find results similar to those reported in Column 1.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. ln(Audit Lag) | 1 | | | | | | | | | |
| 2. CAO | -0.025* | 1 | | | | | | | | |
| 3. AudChange | 0.118* | 0.020* | 1 | | | | | | | |
| 4. Afee | -0.352* | -0.031* | -0.114* | 1 | | | | | | |
| 5. MA | -0.029* | -0.015* | -0.014* | -0.046* | 1 | | | | | |
| 6. Size | -0.419* | -0.064* | -0.082* | 0.867* | -0.027* | 1 | | | | |
| 7. Lev | 0.113* | -0.015* | -0.009 | -0.067* | -0.048* | -0.074* | 1 | | | |
| 8. GC | 0.267* | 0.015* | 0.018* | -0.307* | -0.038* | -0.397* | 0.309* | 1 | | |
| 9. ICMW | 0.370* | -0.002 | 0.089* | -0.137* | -0.025* | -0.221* | 0.106* | 0.238* | 1 | |
| 10. ROA | -0.248* | -0.022* | -0.017* | 0.332* | 0.125* | 0.479* | -0.355* | -0.561* | -0.203* | 1 |
| 11. Loss | 0.258* | 0.061* | 0.057* | -0.271* | -0.176* | -0.378* | 0.142* | 0.306* | 0.166* | -0.497* |
| 12. Segments | -0.092* | -0.017* | -0.022* | 0.319* | 0.038* | 0.304* | -0.015* | -0.113* | -0.033* | 0.139* |
| 13. Exord | 0.008 | -0.025* | 0.003 | 0.076* | -0.012* | 0.066* | 0.006 | -0.010 | 0.019* | 0.019* |
| 14. Aopin | -0.074* | -0.006 | -0.035* | 0.272* | -0.018* | 0.235* | -0.030* | -0.185* | -0.005 | 0.115* |
| 15. Restate | 0.111* | 0.017* | 0.058* | 0.010 | -0.029* | -0.027* | 0.021* | 0.031* | 0.189* | -0.035* |
| 16. NonAfee | -0.263* | -0.030* | -0.094* | 0.515* | -0.019* | 0.493* | -0.049* | -0.205* | -0.129* | 0.208* |
| 17. AudTenure | -0.195* | 0.002 | -0.145* | 0.264* | 0.013* | 0.273* | -0.050* | -0.119* | -0.138* | 0.118* |
| 18. CEODuality | -0.266* | -0.051* | -0.071* | 0.423* | 0.084* | 0.469* | -0.016* | -0.094* | -0.108* | 0.127* |
| 19. AuditorExpert | -0.135* | 0.000 | -0.041* | 0.247* | -0.009 | 0.246* | -0.033* | -0.090* | -0.068* | 0.095* |
| 20. Big4 | -0.306* | -0.018* | -0.160* | 0.617* | -0.051* | 0.590* | -0.075* | -0.259* | -0.189* | 0.254* |
| 21. DACC | 0.202* | 0.002 | 0.021* | -0.316* | 0.016* | -0.388* | 0.295* | 0.364* | 0.196* | -0.493* |

| Variables | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|
| 11. Loss | 1 | | | | | | | | | |
| 12. Segments | -0.147* | 1 | | | | | | | | |
| 13. Exord | -0.011 | 0.046* | 1 | | | | | | | |
| 14. Aopin | -0.077* | 0.090* | 0.096* | 1 | | | | | | |
| 15. Restate | 0.054* | 0.008 | 0.030* | 0.028* | 1 | | | | | |
| 16. NonAfee | -0.186* | 0.181* | 0.046* | 0.149* | -0.013* | 1 | | | | |
| 17. AudTenure | -0.105* | 0.057* | -0.012* | 0.032* | -0.050* | 0.193* | 1 | | | |
| 18. CEODuality | -0.194* | 0.153* | 0.021* | 0.089* | -0.045* | 0.258* | 0.194* | 1 | | |
| 19. AuditorExpert | -0.079* | 0.048* | 0.025* | 0.092* | -0.004 | 0.161* | 0.124* | 0.117* | 1 | |
| 20. Big4 | -0.211* | 0.148* | 0.041* | 0.211* | -0.020* | 0.404* | 0.346* | 0.232* | 0.309* | 1 |
| 21. DACC | 0.175* | -0.105* | -0.015* | -0.106* | 0.031* | -0.193* | -0.129* | -0.105* | -0.103* | -0.270* |

**Notes:** This table provides Pearson's correlations between variables used in the base model. Numbers that are statistically significant at 5 percent are denoted with *.
See Table AI for variable definitions

**Table II.**
Correlations

**Table III.**
Separate chief
accounting officer
appointment and
audit report lag

| Dependent variable | | | ln(Audit Lag) | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Variables | Full | Accelerated | Non-accel. | Full | Accelerated | Non-accel. |
| CAO | −0.037*** (−6.73) | −0.037*** (−5.69) | −0.030*** (−2.61) | −0.039*** (−3.52) | −0.048*** (−3.95) | 0.017 (0.57) |
| AudChange | 0.065*** (6.91) | 0.058*** (4.77) | 0.100*** (6.05) | 0.027*** (3.56) | 0.020** (2.11) | 0.049*** (3.53) |
| Afee | 0.009 (1.64) | 0.016* (2.25) | 0.005 (0.59) | 0.046*** (7.09) | 0.061*** (7.19) | 0.018 (1.59) |
| MA | −0.012 (−1.33) | 0.002 (0.22) | −0.071*** (−3.73) | −0.020*** (−2.94) | −0.018** (−2.32) | −0.024 (−1.36) |
| Size | −0.039*** (−10.62) | −0.034*** (−6.61) | −0.030*** (−5.52) | −0.045*** (−8.04) | −0.061*** (−9.37) | −0.010 (−0.75) |
| Lev | 0.027*** (3.84) | 0.026** (2.37) | 0.013 (1.33) | 0.031*** (4.01) | 0.056*** (5.68) | 0.007 (0.56) |
| GC | 0.089*** (7.59) | 0.096*** (4.47) | 0.081*** (4.82) | 0.109*** (8.91) | 0.101*** (4.26) | 0.114*** (7.03) |
| ICMW | 0.250*** (26.25) | 0.296*** (20.97) | 0.190*** (13.47) | 0.211*** (22.69) | 0.242*** (19.71) | 0.163*** (10.91) |
| ROA | 0.036*** (4.50) | 0.005 (0.35) | 0.034*** (3.16) | −0.003 (−0.31) | 0.003 (0.20) | −0.009 (−0.70) |
| Loss | 0.054*** (10.21) | 0.035*** (5.30) | 0.032*** (3.14) | 0.027*** (6.04) | 0.021*** (3.99) | 0.037*** (3.72) |
| Segments | 0.021*** (3.80) | 0.017*** (2.63) | 0.039*** (3.06) | 0.007 (1.02) | 0.007 (0.90) | −0.009 (−0.48) |
| Exord | 0.050*** (2.85) | 0.035* (1.92) | 0.174*** (2.63) | 0.055*** (3.75) | 0.047*** (3.07) | 0.133** (2.39) |
| Aopin | 0.008 (1.49) | 0.004 (0.72) | 0.017 (1.29) | 0.016*** (5.58) | 0.013*** (4.27) | 0.022** (2.48) |
| Restate | 0.041*** (6.36) | 0.041*** (5.32) | 0.035*** (2.56) | 0.049*** (7.56) | 0.052*** (6.90) | 0.045*** (3.29) |
| NonAfee | −0.003*** (−4.61) | −0.003*** (−2.88) | −0.003*** (−2.95) | 0.001*** (2.61) | 0.002** (2.49) | 0.000 (0.49) |
| AudTenure | −0.002*** (−2.97) | −0.001 (−1.56) | −0.005*** (−2.59) | −0.005*** (−7.05) | −0.006*** (−7.57) | 0.001 (0.68) |
| CEODuality | −0.070*** (−7.77) | −0.072*** (−7.19) | −0.262*** (−5.33) | −0.022*** (−2.34) | −0.018* (−1.86) | −0.106*** (−3.32) |
| AudExpert | −0.012* (−1.73) | −0.006 (−0.79) | −0.061** (−2.32) | −0.008 (−1.13) | −0.002 (−0.33) | −0.030 (−1.28) |
| Big4 | −0.024*** (−2.67) | −0.017 (−1.58) | 0.055*** (3.15) | 0.026*** (2.17) | 0.015 (1.09) | 0.045* (1.70) |
| DACC | 0.004 (0.35) | 0.026 (1.38) | 0.007 (0.40) | 0.013 (1.17) | 0.002 (0.16) | 0.031* (1.83) |
| Intercept | 4.210*** (44.24) | 3.998*** (33.91) | 4.442*** (41.27) | 3.836*** (48.26) | 3.710*** (35.71) | 4.140*** (30.21) |
| n | 28,010 | 20,166 | 6,201 | 28,010 | 20,166 | 6,201 |
| Adj. $R^2$ | 0.298 | 0.214 | 0.214 | 0.136 | 0.165 | 0.105 |
| Fixed effects | Industry year | Industry year | Industry year | Firm | Firm | Firm |

**Notes:** This table reports results where the dependent variable, ln(Audit Lag), is the natural log of audit report lag and the variable of interest, CAO, is an indicator variable that equals 1 for firm years when a separate chief accounting officer (CAO) serves during the year and 0 otherwise. Column 1 (4) report results from full sample, while Columns 2 (5) and 3 (6) report results for accelerated and non-accelerated (non-accel.) filers, respectively, using OLS (fixed effect) model. For all specifications, *t*-statistics estimated with standard errors robust to heteroscedasticity (White, 1980) and clustered by firms and are presented in parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively (all tests are two-sided)

In Column 3, we report results for non-accelerated filers. Our results show that audit delay decreases even for non-accelerated filers for firms in which a separate CAO serves during the fiscal year. Overall, the first three columns present consistent results. The coefficients on CAO are consistently and significantly negative, suggesting that, after controlling for other factors affecting audit delay, ARL is lower for the firm years that a separate CAO serves, consistent with *H1*.

The effect of firm-specific manager ability is negative but insignificant based on the full sample (Column 1). However, when we run our regression separately for accelerated filers and non-accelerated filers, the coefficient on MA becomes negative and significant for non-accelerated filers ($p < 0.01$) in Column 3. This result indicates that the benefits of superior managerial ability in improving timeliness of audit report are largely concentrated in smaller firms. Perhaps, bigger firms have other firm-related characteristics, such as better control systems, that positively influence the timeliness of earnings release and therefore render the additional benefits of a superior managerial ability immaterial.

With respect to other control variables, as expected we find that size, measured by the log of total assets, is negatively significant with audit delay ($p < 0.01$), suggesting that large firms file their audit reports earlier on average. Consistent with existing literature, we find that leverage and GC opinion are positively associated with audit delay (Munsif *et al.*, 2012). We also find that ICMW is significantly and positively related to audit delay in the first three columns. This result is consistent with reports from the existing literature (Mitra *et al.*, 2015; Munsif *et al.*, 2012). The coefficients on other control variables are generally consistent with findings from the existing literature as well.

Because OLS may suffer from potential endogeneity, we use fixed effect regressions (with standard error clustered by firm) to confirm the relation between CAO and ARL in Columns 4–6. Our results with fixed effect model remain similar to those reported in the first three columns, with one exception. While we find CAO to be negatively significant with audit delay in the non-accelerated filers subsample in Column 3, the results disappear with fixed-effect model in Column 6. That is, some of the variation in audit delay reported in Column 5 results from unobserved firm characteristics. In addition, the associations between managerial ability and audit delay are significantly negative ($p < 0.01$) for the full sample and accelerated filers.

### 4.3 Propensity-score matched regressions
Table IV presents the results of the propensity-score matched sample. The dependent variable is a natural log of ARL. In Column 1, we report coefficients on independent variables for the sample including all types of filers, while Columns 2 and 3 report coefficients for a subsample consisting of accelerated filers and non-accelerated filers, respectively. The *t*-statistics are reported below the coefficients. We expect the coefficient on CAO to be negative and significant.

For the sample including all firms in Column 1, we find the coefficient on CAO to be negative and significantly different from 0 (coefficient $= -0.038$, $p < 0.01$). Similar to results reported in Column 1, for the subsample consisting of accelerated filers, CAO firms exhibit a significant decline in audit lag. Overall, the results in Table IV confirm the results reported in Table III and suggest that firms that appoint a separate CAO exhibit a significant decline in audit delay in the post-appointment period.

### 4.4 CAO, auditor change and audit delay
In Table V, we report results for our *H2*. Our variable of interest in Table V is the interaction between separate CAO appointment and auditor change (CAO×AudChange). Column 1 reports the regression results of our base model. We find the interaction term to be negative and significant at less than the 1 percent level (coefficient $= -0.057$, $p < 0.01$). The results suggest that the presence of a separate CAO reduces the time to finish the audit report and

| Dependent variable | | ln(Audit Lag) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Variables | Full | Accelerated | Non-accelerated |
| CAO | −0.038*** (−5.79) | −0.040*** (−5.25) | −0.033** (−2.38) |
| AudChange | 0.058*** (4.07) | 0.051*** (2.93) | 0.090*** (3.65) |
| Afee | 0.018*** (2.65) | 0.032*** (3.61) | 0.019 (1.62) |
| MA | −0.035*** (−3.06) | −0.014 (−1.11) | −0.062** (−2.38) |
| Size | −0.050*** (−11.89) | −0.050*** (−8.89) | −0.026*** (−3.25) |
| Lev | 0.029*** (3.24) | 0.038*** (2.77) | 0.013 (0.84) |
| GC | 0.086*** (5.73) | 0.102*** (3.58) | 0.093*** (4.01) |
| ICMW | 0.237*** (16.51) | 0.281*** (15.04) | 0.203*** (10.01) |
| ROA | 0.041*** (3.87) | 0.039** (2.15) | 0.047*** (2.80) |
| Loss | 0.049*** (7.02) | 0.038*** (4.26) | 0.047*** (3.13) |
| Segments | 0.022*** (3.57) | 0.022*** (3.20) | 0.018 (1.11) |
| Exord | 0.057* (1.88) | 0.048 (1.54) | 0.238* (1.79) |
| Aopin | 0.018** (2.53) | 0.007 (0.95) | 0.029 (1.52) |
| Restate | 0.030*** (3.02) | 0.053*** (4.65) | 0.060*** (2.68) |
| NonAfee | −0.002*** (−2.64) | −0.002** (−2.40) | −0.003* (−1.77) |
| AudTenure | −0.001 (−0.79) | −0.001** (−2.01) | −0.003 (−1.64) |
| CEODuality | −0.065*** (−5.85) | −0.051*** (−4.48) | 0.000 (.) |
| AudExpert | −0.012 (−1.52) | −0.004 (−0.45) | −0.086*** (−3.09) |
| Big4 | −0.032*** (−2.83) | −0.028** (−2.08) | 0.018 (0.85) |
| DACC | 0.005 (0.27) | 0.020 (0.74) | 0.038 (1.26) |
| Intercept | 4.509*** (47.92) | 4.183*** (39.02) | 4.422*** (28.09) |
| n | 13,776 | 10,072 | 3,084 |
| Adj. $R^2$ | 0.317 | 0.249 | 0.218 |
| Fixed effects | Industry year | Industry year | Industry year |

**Table IV.**
Propensity score
matching analysis of
chief accounting
officer and audit
report lag

**Notes:** This table reports results using propensity score match sample with no replacement and within a caliper of 0.01. Columns 1–3 report results from full sample, accelerated filers and non-accelerated (Non. Accel.) filers, respectively. For all specifications, $t$-statistics estimated with standard errors robust to heteroscedasticity (White, 1980) and clustered by firms and are presented in parentheses. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (all tests are two-sided)

helps the incoming auditor familiarize with the client's operations. Column 2 reports the results of our fixed effect model and results continue to remain similar. In particular, the coefficient on the interaction term (CAO×AudChange) remains negative and significant (coefficient = −0.030, $p < 0.10$). Finally, we report results using the propensity match sample in Column 3. The results in this column are similar to those reported in the first two columns, i.e., the role of a separate CAO becomes even more important when the demand for audit effort increases with the incoming auditors' learning about the client. Additionally, the main effect on auditor change is positive and significant in all three columns, suggesting that, consistent with the existing literature, the year of auditor change delays the publication of audit reports. Overall, our results indicate that while the first year of audit engagement reduces the timely publication of an audit report, which may reduce the relevance of a financial statement, the presence of a separate CAO functions as internal audit assistance and reduces auditors' workloads, resulting in earlier completion of an audit report. That is, the higher the need for audit assistance, the greater the benefits auditors receive from firms having a separate CAO to complete audit reports.

## 5. Additional analyses
### 5.1 Robustness tests
We consider a few additional tests to confirm the robustness of our analysis. In our first test, we include additional corporate governance variables. It is possible that the presence of a

| Dependent variable | | ln(Audit Lag) | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Variable | Primary | Fixed effect | PSM |
| CAO | −0.034*** (−6.02) | −0.037*** (−3.36) | −0.034*** (−5.19) |
| AudChange | 0.081*** (6.78) | 0.035*** (3.92) | 0.089*** (3.48) |
| CAO*AudChange | −0.057*** (−3.27) | −0.030* (−1.91) | −0.061** (−2.13) |
| Afee | 0.009* (1.68) | 0.046*** (7.10) | 0.018*** (2.67) |
| MA | −0.012 (−1.33) | −0.020*** (−2.93) | −0.035*** (−3.05) |
| Size | −0.039*** (−10.65) | −0.045*** (−8.03) | −0.050*** (−11.91) |
| Lev | 0.027*** (3.83) | 0.031*** (3.99) | 0.028*** (3.19) |
| GC | 0.090*** (7.62) | 0.109*** (8.91) | 0.086*** (5.74) |
| ICMW | 0.249*** (26.23) | 0.210*** (22.68) | 0.236*** (16.56) |
| ROA | 0.036*** (4.48) | −0.003 (−0.34) | 0.040*** (3.80) |
| Loss | 0.054*** (10.17) | 0.027*** (6.02) | 0.049*** (6.99) |
| Segments | 0.021*** (3.79) | 0.007 (1.00) | 0.022*** (3.58) |
| Exord | 0.050*** (2.85) | 0.055*** (3.76) | 0.056* (1.85) |
| Aopin | 0.008 (1.48) | 0.016*** (5.60) | 0.018*** (2.56) |
| Restate | 0.042*** (6.42) | 0.049*** (7.59) | 0.030*** (3.08) |
| NonAfee | −0.003*** (−4.59) | 0.001*** (2.63) | −0.002*** (−2.63) |
| AudTenure | −0.002*** (−2.99) | −0.005*** (−7.05) | −0.001 (−0.78) |
| CEODuality | −0.069*** (−7.76) | −0.022** (−2.34) | −0.066*** (−5.88) |
| AudExpert | −0.012* (−1.76) | −0.008 (−1.16) | −0.013 (−1.55) |
| Big4 | −0.024*** (−2.68) | 0.026** (2.17) | −0.032*** (−2.84) |
| DACC | 0.005 (0.36) | 0.013 (1.16) | 0.005 (0.29) |
| Intercept | 4.208*** (44.20) | 3.836*** (48.31) | 4.501*** (48.21) |
| n | 28,010 | 28,010 | 13,776 |
| Adj. $R^2$ | 0.299 | 0.137 | 0.318 |
| Fixed effects | Industry year | Firm | Industry year |

**Notes:** This table reports the regression results of ln(Audit Lag), the natural log of audit report lag, on the firm-year indicator for separate chief accounting officer (CAO) appointment, CAO, and the interaction between CAO and auditor change indicator (AudChange). The results are based on full sample. Column 1 reports results primary specification, while Columns 2 and 3 report results from fixed effect and PSM models. For all specifications, *t*-statistics estimated with standard errors robust to heteroscedasticity (White, 1980) and clustered by firms and are presented in parentheses. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (all tests are two-sided)

**Table V.**
Chief accounting
officer, auditor change
and audit report lag

separate CAO and ARL are both affected by board characteristics. Although we include CEODuality as a control in our main analysis, we add a few additional variables related to board and audit committee characteristics and rerun regressions. Existing research demonstrates the role of audit committee on the effective oversight of financial reporting quality and audit efficiency. For example, Klein (2002) shows that audit committee financial expertise and independence influence the quality of financial reporting, which may systematically affect not only the presence of CAO but also audit delays. Habib *et al.* (2019) document that the presence of financial expertise on audit committee is negatively associated with ARL. To control for financial expertise and audit committee independence, we retrieve data from the ASSET4 ESG database and add the percentage of financial experts in the audit committee (AC_FinExpert) and the percentage of independent members in the audit committee (AC_Independence) to our main model. In addition, we include the percentage of female directors (Perc_Female) and the number of directors on board (Boardsize) as the proxies for gender diversity on board and board size, respectively, in our model. Knippen (2014) suggests that women are more ethical than men, and therefore, gender diversity may influence organizational outcomes. Consistent with this argument, Lanis *et al.* (2017) find that board gender diversity is related to less tax aggressiveness.

The inclusion of these variables substantially reduces our sample size, resulting in 5,607 observations. However, our results remain consistent even for the smaller sample. We report the results in Columns 1 and 2 of Table VI and the definitions of additional control variables for corporate governance in the footnote of the same table. Specifically, we find that the coefficient on CAO remains negative and significant (Column 1, coefficient $= -0.031$, $p < 0.01$). The coefficient on the interaction term, CAO×AudChange, is negative and significant (Column 2, coefficient $= -0.103$, $p < 0.05$), consistent with our findings in the main analyses. Additionally, we find that all three variables are negative and significant (consistent with the existing literature). We also test our *H2* with the smaller sample. Again, we find consistent results (untabulated), i.e., the coefficient on CAO×AudChange remains negative and significant (coefficient $= -0.102$, $p < 0.05$). The coefficient on CAO remains negative and significant (coefficient $= -0.029$, $p < 0.05$), while the coefficient on AudChange remains positive and significant (coefficient $= 0.114$, $p < 0.01$), consistent with results reported in Table V.

In the second robustness test, we withdraw the control variable AudExpert in the model and use alternative measures to define auditor industry expertise (or specialization). Following Balsam *et al.* (2003), we define industry specialist auditor as the auditors with market dominance (DOMI, defined as auditors who have the largest market shares with the difference between the largest and the second largest auditors' market shares totaling more than 10 percent in the industry year) or the auditors with the most number of clients in the industry year (MOSTCL). We also use the number of clients the auditor has in the industry year (NCLIENT) as another alternative control variable. We report the empirical results in Columns 3–5 of Table VI and include the definitions of alternative control variables for industry specialist auditors in the footnote of the same table. The estimated coefficients of our interested variables, CAO and CAO×AudChange, are consistently negative and significant at the 1 percent level across different models. Overall, the results with these alternative measures remain consistent with our findings in the main analyses.

### 5.2 Mediation effect

It can reasonably be argued that the presence of a separate CAO affects the quality of financial reporting and internal control, which in turn affect ARL. To assess this possibility, we evaluate, but not report, the extent to which the effects of CAO on ARL are mediated by accounting quality measured by the levels of discretionary accruals and weakness in the company's internal control. In order to test the mediation effect, we use approach suggested by Sobel (1982). While we find that the presence of an internal control weakness mediates the relationship between CAO and ARL ($p < 0.01$, $Z = -2.579$), we do not find any mediating effect of discretionary accruals ($p > 0.10$, $Z = -1.69$). Specifically, the results of the Sobel (1982) test provide evidence that the presence of a CAO reduces ARL through reducing internal control weakness.

## 6. Conclusion

While CEOs and CFOs play important roles in establishing and implementing accounting and financial policies, CAOs are specifically responsible for carrying out accounting functions. Thus, CAOs possibly are more directly involved with day-to-day accounting activities than CFOs. Business-related media has highlighted the growing role of CAOs in overseeing accounting-related activities specifically as the costs and efforts to comply with regulatory requirements have increased (e.g. Johnson, 2015). Considering the increasing role of CAOs in maintaining accounting systems, we hypothesize that the presence of a separate CAO within the company will result in a better accounting system and in the completion of audit work within the fiscal year, therefore resulting in a shorter time to complete the audit report. Additionally, we also hypothesize and examine whether

| Dependent variable | | | In(Audit Lag) | | |
| | Governance measures | | | Industry specialist measures | |
| Variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| CAO | −0.031** (−2.58) | −0.029** (−2.39) | −0.034*** (−6.07) | −0.033*** (−5.98) | −0.034*** (−6.06) |
| AudChange | 0.091*** (3.07) | 0.114*** (3.17) | 0.081*** (6.78) | 0.082*** (6.86) | 0.080*** (6.75) |
| CAO*AudChange | | −0.103** (−2.00) | −0.057*** (−3.26) | −0.057*** (−3.27) | −0.056*** (−3.22) |
| Afee | 0.035** (2.40) | 0.035** (2.39) | 0.009* (1.68) | 0.009 (1.60) | 0.009 (1.64) |
| MA | 0.016 (0.88) | 0.016 (0.86) | −0.012 (−1.34) | −0.012 (−1.33) | −0.013 (−1.41) |
| Size | −0.027** (−2.52) | −0.027** (−2.52) | −0.039*** (−10.64) | −0.039*** (−10.70) | −0.039*** (−10.69) |
| Lev | 0.040 (1.57) | 0.039 (1.53) | 0.027*** (3.83) | 0.027*** (3.83) | 0.027*** (3.88) |
| GC | 0.184*** (2.88) | 0.182*** (2.84) | 0.090*** (7.62) | 0.088*** (7.54) | 0.090*** (7.61) |
| ICMW | 0.256*** (7.33) | 0.256*** (7.32) | 0.249*** (26.23) | 0.249*** (26.19) | 0.249*** (26.24) |
| ROA | −0.069 (−1.02) | −0.066 (−0.98) | 0.036*** (4.47) | 0.036*** (4.49) | 0.036*** (4.50) |
| Loss | −0.004 (−0.26) | −0.004 (−0.24) | 0.054*** (10.20) | 0.054*** (10.32) | 0.053*** (10.08) |
| Segments | 0.019* (1.68) | 0.019* (1.71) | 0.021*** (3.76) | 0.021*** (3.74) | 0.022*** (3.87) |
| Exord | −0.020 (−0.78) | −0.020 (−0.78) | 0.050*** (2.84) | 0.048*** (2.77) | 0.050*** (2.85) |
| Aopin | −0.003 (−0.22) | −0.003 (−0.22) | 0.008 (1.48) | 0.008 (1.45) | 0.008 (1.44) |
| Restate | 0.072*** (4.21) | 0.072*** (4.21) | 0.042*** (6.41) | 0.041*** (6.32) | 0.042*** (6.43) |
| NonAfee | −0.011*** (−3.37) | −0.011*** (−3.34) | −0.003*** (−4.61) | −0.003*** (−4.61) | −0.003*** (−4.61) |
| AudTenure | 0.001 (0.69) | 0.001 (0.69) | −0.002*** (−3.02) | −0.002*** (−2.85) | −0.002*** (−3.03) |
| CEODuality | −0.035** (−2.58) | −0.035** (−2.58) | −0.069*** (−7.76) | −0.070*** (−7.86) | −0.069*** (−7.75) |
| AudExpert | −0.010 (−0.82) | −0.010 (−0.85) | | | |
| Big4 | 0.009 (0.16) | 0.010 (0.18) | −0.025*** (−2.74) | −0.017* (−1.77) | −0.029*** (−2.91) |
| DACC | 0.032 (0.70) | 0.033 (0.71) | 0.005 (0.37) | 0.004 (0.31) | 0.005 (0.36) |
| AC_FinExpert | −0.057** (−2.51) | −0.057** (−2.50) | | | |
| AC_Independence | −0.002* (−1.91) | −0.002* (−1.90) | | | |
| Perc_Female | −0.003*** (−4.27) | −0.003*** (−4.28) | | | |
| Boardsize | 0.002 (0.49) | 0.002 (0.49) | | | |

*(continued)*

**Table VI.**
Audit report lag
model with alternative
controls for
governance and
industry specialist

| Dependent variable | | | ln(Audit Lag) | | |
| --- | --- | --- | --- | --- | --- |
| | Governance measures | | | Industry specialist measures | |
| Variable | (1) | (2) | (3) | (4) | (5) |
| DOMI | | | −0.018** (−2.22) | | |
| MOSTCL | | | | −0.032*** (−4.90) | |
| NCLIENT | | | | | 0.000 (0.60) |
| Intercept | 4.078*** (16.04) | 4.075*** (16.02) | 4.211*** (44.82) | 4.217*** (46.34) | 4.214*** (43.13) |
| n | 5,607 | 5,607 | 28,010 | 28,010 | 28,010 |
| Adj. $R^2$ | 0.167 | 0.167 | 0.299 | 0.300 | 0.298 |
| Fixed effects | Industry year | Industry year | Industry year | Industry year | Industry year |

**Notes:** This table reports the regression results of ln(Audit Lag), the natural log of audit report lag, on the firm-year indicator for separate chief accounting officer (CAO) appointment, CAO, and the interaction between CAO and auditor change indicator (AudChange) with alternative control variables in corporate governance (Columns 1 and 2) and industry specialist (Columns 3 and 5). The definitions of alternative control variables are as follows: AC_FinExpert = the percentage of financial experts in the audit committee; AC_Independence = the percentage of independent members in the audit committee; Perc_Female = the percentage of female directors on the board; Boardsize = total number of directors on the board; DOMI = dummy variable that equals 1 if the auditor is the largest supplier in the industry year and its market share is at least 10 percent greater than the second supplier, and 0 otherwise; Industry classification is based on two-digit SIC code; MOSTCL = dummy variable that equals 1 if the auditor has the most client in the industry, and 0 otherwise; Industry classification is based on two-digit SIC code; NCLIENT = the number of clients the auditor has in the industry year based on two-digit SIC industry classification; For all specifications, t-statistics estimated with standard errors robust to heteroscedasticity (White, 1980) and clustered by firms and are presented in parentheses. *, **, ***Significant at the 10, 5 and 1 percent levels, respectively (all tests are two-sided)

**Table VI.**

the CAO plays an even more important role by disseminating relevant firm-specific information to the incoming auditors in the years of transition. During the transition period, the incoming auditors may need more information to familiarize themselves with the client and establish their audit strategy. Communicating with the CAO should help the incoming auditors improve working efficiency and complete audit reports on time.

Overall, we find that the presence of a separate CAO significantly reduces ARL. Additionally, we find that the presence of a separate CAO negatively moderates audit delays in the years of auditor change, thus highlighting the benefits of having separate CAOs as auditors' need for internal audit assistance increases. We contribute to the existing literature by highlighting the importance of firms acquiring separate CAOs. Specifically, our results show that firms that employ a separate CAO provide timelier financial reporting, thereby increasing the value relevance of accounting numbers. This is important since timely reporting is one of the two major components of the usefulness of financial reporting based on FASB's Statement of Financial Accounting Concepts (SFAC) No. 5. Our results are also important regarding the implementation of AS5, which allows auditors to rely on the work of internal auditors to enhance audit efficiency. Additionally, the existing literature also documents the reduced effectiveness of internal control following AS5 (e.g. Acito *et al.*, 2014; Schroeder and Shepardson, 2016). If the presence of CAO improves the effectiveness of internal control, then the intended objectives of AS5 will be achieved more when firms have a separate CAO.

## Notes

1. In this work, we use the terms "audit report lags (ARL)" and "audit delay" interchangeably to refer to the timeliness of audited financial reports disseminated to the public following prior literature.

2. The sample period is determined by Capital IQ data available for authors and could be a research limitation of this study.

3. The managerial ability score is available at http://faculty.washington.edu/pdemerj/data.html

4. For brevity, we only report statistics related to the full model. We estimate a probit model separately for accelerated and non-accelerated filer samples. The results from post-matching covariate balance tests suggest that the matching samples are identical to treatment samples for both accelerated and non-accelerated samples.

## References

Abernathy, J.L., Kubick, T.R. and Masli, A. (2018), "Evidence on the relation between managerial ability and financial reporting timeliness", *International Journal of Auditing*, Vol. 22 No. 2, pp. 185-196.

Abernathy, J.L., Barnes, M., Stefaniak, C. and Weisbarth, A. (2017), "An international perspective on audit report lag: a synthesis of the literature and opportunities for future research", *International Journal of Auditing*, Vol. 21 No. 1, pp. 100-127.

Acito, A.A., Hogan, C.E. and Imdieke, A.J. (2014), "Auditing Standards No. 2 versus Auditing Standard No. 5: implications for integrated audits and financial reporting quality", working paper, Michigan State University, East Lansing, MI, May.

Agrawal, A. and Cooper, T. (2015), "Insider trading before accounting scandals", *Journal of Corporate Finance*, Vol. 34 No. C, pp. 169-190.

Aier, J., Comprix, I., Gunlock, M. and Lee, D. (2005), "The financial expertise of CFOs and accounting restatements", *Accounting Horizons*, Vol. 19 No. 3, pp. 123-135.

Armstrong, C., Jagolinzer, A. and Larcker, D. (2010), "Chief executive officer equity incentives and accounting irregularities", *Journal of Accounting Research*, Vol. 48 No. 2, pp. 225-271.

Ashton, R.H., Willingham, J.J. and Elliott, R.K. (1987), "An empirical analysis of audit delay", *Journal of Accounting Research*, Vol. 25 No. 2, pp. 275-292.

Balsam, S., Krishnan, J. and Yang, J.S. (2003), "Auditor industry specialization and earnings quality", *Auditing: A Journal of Practice & Theory*, Vol. 22 No. 2, pp. 71-97.

Bedard, J., Gonthier-Besacier, N. and Schatt, A. (2014), "Costs and benefits of reporting key audit matters in the audit report: the French experience", working paper, HEC Lausanne, Lausanne.

Campello, M., Graham, J.R. and Harvey, C.R. (2010), "The real effects of financial constraints: evidence from a financial crisis", *Journal of Financial Economics*, Vol. 97 No. 3, pp. 470-487.

Carcello, J. and Nagy, A. (2004), "Audit firm tenure and fraudulent financial reporting", *Auditing: A Journal of Practice & Theory*, Vol. 23 No. 2, pp. 55-69.

Carey, P. and Simnett, R. (2006), "Audit partner tenure and audit quality", *The Accounting Review*, Vol. 81 No. 3, pp. 653-676.

Chambers, A.E. and Penman, S.H. (1984), "Timeliness of reporting and the stock price reaction to earnings announcements", *Journal of Accounting Research*, Vol. 22 No. 1, pp. 21-47.

Chasan, E. and Murphy, M. (2013), "New job, new steppingstones", *Wall Street Journal*, June 11, p. B7.

Chi, W. and Huang, H. (2005), "Discretionary accruals, audit-firm tenure and audit-partner tenure: empirical evidence from Taiwan", *Journal of Contemporary Accounting and Economics*, Vol. 1 No. 1, pp. 65-92.

DeAngelo, L. (1981), "Auditor independence, 'low balling', and disclosure regulation", *Journal of Accounting and Economics*, Vol. 3 No. 2, pp. 113-127.

Dechow, P., Sloan, R. and Sweeney, A. (1996), "Causes and consequences of earnings manipulation: an analysis of firms subject to enforcement actions by the SEC", *Contemporary Accounting Research*, Vol. 13 No. 1, pp. 1-36.

Demerjian, P., Lev, B. and McVay, S. (2012), "Quantifying managerial ability: a new measure and validity tests", *Management Science*, Vol. 58 No. 7, pp. 1229-1248.

Demerjian, P., Lewis, M., Lev, B. and McVay, S. (2013), "Managerial ability and earnings quality", *The Accounting Review*, Vol. 88 No. 2, pp. 463-498.

Easton, P. and Zmijewski, M. (1993), "Sec Form 10k/10q reports and annual reports to shareholders: reporting lags and squared market model prediction errors", *Journal of Accounting Research*, Vol. 31 No. 1, pp. 113-129.

Ettredge, M., Li, C. and Sun, L. (2006), "The impact of SOX Section 404 internal control quality assessment on audit delay in the SOX era", *Auditing: A Journal of Practice & Theory*, Vol. 25 No. 2, pp. 1-23.

GAO (2003), *Public Accounting Firms: Mandated Study on Consolidation and Competition*, GAO-03-864, General Accounting Office, Washington, DC.

Geiger, M. and North, D. (2006), "Does hiring a new CFO change things? An investigation of changes in discretionary accruals", *The Accounting Review*, Vol. 81 No. 4, pp. 781-809.

Habib, A., Bhuiyan, M.B., Huang, H. and Miah, M.S. (2019), "Determinants of audit report lag: a meta-analysis", *International Journal of Auditing*, Vol. 23 No. 1, pp. 20-44.

Hakansson, N.H. (1977), "Interim disclosure and public forecasts: an economic analysis and framework for choice", *The Accounting Review*, Vol. 52 No. 2, pp. 396-416.

Hambrick, D.C. and Cannella, A.A. (2004), "CEOs who have COOs: contingency analysis of an unexplored structural form", *Strategic Management Journal*, Vol. 25 Nos 1-3, pp. 959-979.

Helliar, C.V., Lomie, A.A., Power, D.M. and Sinclair, C.D. (2002), "Managerial attitudes to risk: a comparison of Scottish chartered accountants and UK managers", *Journal of International Accounting, Auditing & Taxation*, Vol. 11 No. 2, pp. 156-190.

Hennes, K.M., Leone, A.J. and Miller, B.P. (2008), "The importance of distinguishing errors from irregularities in restatement research: the case of restatements and CEO/CFO turnover", *The Accounting Review*, Vol. 83 No. 6, pp. 1487-1519.

Hoitash, R., Hoitash, U. and Kurt, A. (2016), "Do accountants make better chief financial officers?", *Journal of Accounting and Economics*, Vol. 61 Nos 2-3, pp. 414-432.

Hoitash, U., Hoitash, R. and Bedard, J.C. (2009), "Corporate governance and internal control over financial reporting: a comparison of regulatory regimes", *The Accounting Review*, Vol. 84 No. 3, pp. 839-867.

Imbens, G. and Wooldridge, J. (2009), "Recent developments in the econometrics of program evaluation", *Journal of Economic Literature*, Vol. 47 No. 1, pp. 5-86.

Johnson, K.S. (2015), "As regulatory costs grow, the accounting chief's duties add up", *The Wall Street Journal*, available at: www.wsj.com/articles/as-regulatory-costs-grow-the-accounting-chiefs-duties-add-up-1440474094 (accessed August 25, 2015).

Johnson, V., Khurana, I. and Reynolds, J. (2002), "Audit-firm tenure and the quality of financial reports", *Contemporary Accounting Research*, Vol. 19 No. 4, pp. 637-660.

Jones, J. (1991), "Earnings management during import relief investigations", *Journal of Accounting Research*, Vol. 29 No. 2, pp. 193-228.

Klein, A. (2002), "Audit committee, board of director characteristics, and earnings management", *Journal of Accounting and Economics*, Vol. 33 No. 3, pp. 375-400.

Knechel, W. and Payne, J. (2001), "Additional evidence on audit report lag", *Auditing: A Journal of Practice & Theory*, Vol. 20 No. 1, pp. 137-146.

Knippen, J. (2014), "Ruminating at the top: the effects of gender bias on strategic choice", presented at the 2014 Academy of Management Conference, Philadelphia, PA.

Kwak, B., Byung, R. and Suk, I. (2012), "The composition of tip management with general counsel and voluntary information disclosure", *Journal of Accounting and Economics*, Vol. 54 No. 1, pp. 19-41.

Lanis, R., Richardson, G. and Taylor, G. (2017), "Board of director gender diversity and corporate tax aggressiveness: an empirical analysis", *Journal of Business Ethics*, Vol. 44 No. 3, pp. 577-596.

Li, C., Sun, L. and Ettredge, M. (2010), "Financial executive qualifications, financial executive turnover, and adverse SOX 404 opinions", *Journal of Accounting and Economics*, Vol. 50 No. 1, pp. 93-110.

Liu, F., Hsu, H. and Yen, D. (2018), "Technology executives in the changing accounting information environment: impact of IFRS adoption on CIO compensation", *Information and Management*, Vol. 55 No. 7, pp. 877-889.

Mitra, S., Song, H. and Yang, J. (2015), "The effect of Auditing Standard No. 5 on audit report lags", *Accounting Horizons*, Vol. 29 No. 3, pp. 507-527.

Morgan, S.L. and Harding, D.J. (2006), "Matching estimators of casual effects: prospects and pitfalls in theory and practice", *Sociological Methods and Research*, Vol. 35 No. 1, pp. 3-60.

Munsif, V., Raghunanadan, K. and Rama, D. (2012), "Internal control reporting and audit report lags: further evidence", *Auditing: A Journal of Practice & Theory*, Vol. 31 No. 3, pp. 203-218.

Newton, L.K. (1977), "The risk factor in materiality decisions", *The Accounting Review*, Vol. 52 No. 1, pp. 97-108.

Rhodes, A. and Russomanno, D. (2013), "One person can make a difference: the positive association between chief accounting officers (CAO) and accounting quality", working paper, The Pennsylvania State University, University Park, PA, January 3.

Russomanno, D. (2014), "Changes in internal control and audit effort around the initiation of a chief accounting officer (CAO) position", unpublished PhD dissertation, The Pennsylvania State University, University Park, PA.

Sammer, J. (2006), "New kids on the block: more companies hiring chief accounting officers", *Journal of Accountancy*, Vol. 201 No. 2, pp. 46-49.

Schroeder, J.H. and Shepardson, M.L. (2016), "Do SOX 404 control audits and management assessments improve overall internal control system quality?", *The Accounting Review*, Vol. 91 No. 5, pp. 1513-1541.

Schwartz, K.B. and Soo, B.S. (1996), "The association between auditor changes and reporting lags", *Contemporary Accounting Research*, Vol. 13 No. 1, pp. 353-370.

SEC (2005), "Revision to accelerated filer definition and accelerated deadlines for filing periodic reports", Securities and Exchange Commission, Washington, DC, available at: www.sec.gov/rules/final/33-8644.pdf (accessed December 21, 2005).

Sobel, M.E. (1982), "Asymptotic confidence intervals for indirect effects in structural equations", *Sociological Methodology*, Vol. 13, pp. 290-312.

Tanyi, P., Raghunandan, K. and Barua, A. (2010), "Audit report lags after voluntary and involuntary auditor changes", *Accounting Horizons*, Vol. 24 No. 4, pp. 671-688.

White, H. (1980), "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity", *Econometrica*, Vol. 48 No. 4, pp. 817-838.

## Appendix 1

| Variable | Definition |
| --- | --- |
| *Dependent variable* | |
| ln(Audit Lag) | The natural log of audit report lags (ARL), which is the number of calendar days between fiscal year end and the date of auditor's report |
| *Independent variable* | |
| CAO | An indicator variable that equals 1 for firm years when a separate chief accounting officer (CAO) serve during the year |
| *Control variables* | |
| AudChange | Dummy variable that equals 1 if there is change in auditor, and 0 otherwise |
| Afee | Log of audit fee |
| MA | The decile rank (by industry and year) of managerial efficiency from Demerjian *et al.* (2012). The estimation of managerial ability is a two-step process. The model begins with estimating total firm efficiency using data envelopment analysis (DEA). In the second stage, managerial ability is separated from total firm efficiency by regressing total firm efficiency on various firm characteristics (i.e. size, market share, cash availability, life cycle, operational complexity, and foreign operations). See Methodology section for detail |
| Size | Log of total assets |
| Lev | Leverage ratio, calculated as short-term debt plus long-term debt, scaled by total assets |
| GC | Dummy variable that equals 1 if the audit opinion is modified for going concern, and 0 otherwise |
| ICMW | Dummy variable that equals 1 if there is material weakness in internal control, and 0 otherwise |
| ROA | Return on assets |
| Loss | Dummy variable that equals 1 if the firm reports a loss in the year, and 0 otherwise |
| Segments | Square root of the number of business segments |
| Exord | Dummy variable that equals 1 if the firm reports any extraordinary loss or gains during the year, and 0 otherwise |
| Aopin | Dummy variable that equals 1 if auditor's opinion is modified for other than going concern opinion, and 0 otherwise |
| Restate | Dummy variable that equals 1 if the firm restates its reported earnings for current year, and 0 otherwise |
| NonAfee | Log of non-audit fee |
| AudTenure | Number of years where the auditor provides auditing service for the firm |
| CEODuality | Dummy variable that equals 1 if a firm's CEO is the chairman of the board and 0 otherwise |
| AudExpert | Dummy variable that equals 1 if auditor is the first (largest) auditor in the industry year based on client's market share of sales, and 0 otherwise. Industry classification is based on two-digit SIC code |
| Big4 | Dummy variable that equals 1 if the firm-year's auditor is a Big 4 firm, and 0 otherwise |
| DACC | Absolute value of discretionary accruals calculated using modified Jones (1991) model |

**Table AI.**
Variable definitions

**Appendix 2**

| Dependent variable | CAO | |
|---|---|---|
| | (1) | |
| Variables | Coefficient | (*t*-value) |
| AudChange | 0.145*** | (4.19) |
| Afee | 0.146*** | (10.17) |
| MA | −0.064** | (−2.08) |
| Size | −0.128*** | (−13.41) |
| Lev | −0.049** | (−2.02) |
| GC | −0.020 | (−0.47) |
| ICMW | −0.073** | (−2.48) |
| ROA | 0.121*** | (3.94) |
| Loss | 0.106*** | (5.03) |
| Segments | 0.023 | (1.36) |
| Exord | −0.192** | (−2.31) |
| Aopin | 0.093*** | (4.42) |
| Restate | 0.077*** | (2.60) |
| NonAFee | 0.001 | (0.42) |
| AudTenure | −0.001 | (−0.67) |
| CEODuality | −0.113*** | (−3.79) |
| AudExpert | 0.041* | (1.92) |
| Big4 | 0.078*** | (3.05) |
| DACC | −0.099* | (−1.72) |
| Intercept | −1.797*** | (−9.83) |
| $n$ | 28,004 | |
| $\chi^2$ | 844.47*** | |
| Dummies | Industry year | |
| Log likelihood | −15,203.395 | |

**Notes:** This table reports coefficients from a probit regression of having a separate CAO in a given fiscal year. Propensity score use to match CAO and non-CAO firm years. *,**,***Significant at the 10, 5 and 1 percent levels, respectively (all tests are two-sided)

Table AII.
Probit model
estimation of
CAO presence
(i.e. propensity
score matching)

**Appendix 3**

| Variables | CAO = 1 (n = 6,888) | | | CAO = 0 (n = 6,888) | | | Mean diff. | Norm diff. |
| | Mean | Median | Var | Mean | Median | Var | p-value | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| AudChange | 0.07 | 0.00 | 0.06 | 0.07 | 0.00 | 0.07 | 0.69 | −0.01 |
| Afee | 13.58 | 13.66 | 1.95 | 13.58 | 13.67 | 1.33 | 0.73 | −0.01 |
| MA | 0.55 | 0.50 | 0.08 | 0.54 | 0.50 | 0.08 | 0.63 | 0.01 |
| Size | 5.77 | 5.83 | 5.57 | 5.79 | 5.89 | 3.87 | 0.76 | −0.01 |
| Lev | 0.26 | 0.16 | 0.15 | 0.26 | 0.15 | 0.15 | 0.50 | −0.01 |
| GC | 0.07 | 0.00 | 0.06 | 0.07 | 0.00 | 0.06 | 0.87 | 0.00 |
| ICMW | 0.10 | 0.00 | 0.09 | 0.10 | 0.00 | 0.09 | 0.76 | −0.01 |
| ROA | −0.08 | 0.03 | 0.16 | −0.08 | 0.02 | 0.16 | 0.41 | 0.01 |
| Loss | 0.40 | 0.00 | 0.24 | 0.39 | 0.00 | 0.24 | 0.77 | 0.01 |
| Segments | 1.42 | 1.00 | 0.28 | 1.41 | 1.00 | 0.28 | 0.31 | 0.02 |
| Exord | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.70 | −0.01 |
| Aopin | 0.34 | 0.00 | 0.22 | 0.34 | 0.00 | 0.22 | 0.77 | 0.00 |
| Restate | 0.10 | 0.00 | 0.09 | 0.10 | 0.00 | 0.09 | 0.91 | 0.00 |
| NonAfee | 9.94 | 11.36 | 20.52 | 9.99 | 11.37 | 18.82 | 0.53 | −0.01 |
| AudTenure | 6.70 | 6.00 | 25.16 | 6.69 | 6.00 | 23.50 | 0.86 | 0.00 |
| CEODuality | 0.10 | 0.00 | 0.09 | 0.10 | 0.00 | 0.09 | 0.45 | −0.01 |
| AudExpert | 0.22 | 0.00 | 0.17 | 0.22 | 0.00 | 0.17 | 0.95 | 0.00 |
| Big4 | 0.70 | 1.00 | 0.21 | 0.70 | 1.00 | 0.21 | 0.64 | −0.01 |
| DACC | 0.13 | 0.08 | 0.03 | 0.13 | 0.08 | 0.03 | 0.48 | −0.01 |

**Table AIII.**
Propensity score
matching covariate
balance test

**Notes:** This table reports means of PSM model for treatment (CAO = 1) and control (CAO = 0) firm-year observations. Mean diff. is the difference in means between treatment and matched samples. Normalized difference (norm diff.) is the difference between the means for treatment and matched samples divided by the square root of the average of the group variance. A normalized difference of 0.25 indicates an acceptable balance (Imbens and Wooldridge, 2009)

**About the authors**
Hsiao-Tang Hsu is Assistant Professor of Accounting at Texas A&M University – Corpus Christi. He received his PhD Degree in Accounting from Temple University in 2014 and his LLM Degree from London School of Economics in 2007. His dissertation at Temple University has received the 2015 AAA Outstanding International Accounting Section Dissertation Award. His current research interests include international accounting, financial accounting and corporate governance. He serves as an *ad hoc* reviewer for multiple journals, including *Journal of International Accounting Research* and *Information & Management*. His articles have appeared in prestigious journals including *Information & Management* and *The Accounting Review*. Hsiao-Tang Hsu is the corresponding author and can be contacted at: tom.hsu@tamucc.edu

Sarfraz Khan is Assistant Professor of Accounting at the University of Louisiana at Lafayette. He received the PhD Degree in Accounting from the University of Texas at San Antonio. His main research interests include the role of corporate law and governance on financial reporting outcomes, and auditing. His teaching interests include financial and managerial accounting. He serves as an *ad hoc* reviewer for several journals, including *Review of Quantitative Finance and Accounting*, *Applied Economics Letters* and *Asian Review of Accounting*. He has published articles in multiple journals, such as *Accounting and Business Research*, *Corporate Governance: An International Review* and *Accounting Horizons*.