

Changes in Firm Characteristics and the Impact on Material Internal Control Weaknesses

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Introduction

We examine changes in internal control weaknesses (ICWs) and firm characteristics compared to the period studied by prior researchers. We then evaluate firm characteristics associated with ICWs. We provide a needed updated study, as well as a more comprehensive analysis compared to prior research, since we explore ICWs in more detail by considering the most prevalent reasons for entity-level ICWs and the nature of ICWs in terms of entity-level and account-level.

The motivation for our study comes from the dated nature of prior studies. Numerous researchers (Akinyele, 2021; Bryan and Lilien, 2005; Chen et al., 2019; Doyle et al., 2007; Harris and Zhou, 2013; and Rice and Weber, 2012) focused on ICWs immediately following the 2002 Sarbanes Oxley Act (SOX). This period required substantial resources by organizations and may not be a representative time-period (Bakarich and Baranek, 2020). Furthermore, given the extensive paradigm shift in the way organizations operate in today's business environment with technology advancements, such as artificial intelligence (AI), cloud computing, blockchain, data analytics, and robotic process automation, these findings are dated and there is a need for an updated analysis of firm characteristics and ICWs.

This study is important especially given the association of certain types of ICWs and reported fraud risk (Donelson, Ege, McInnis, 2017). Bakarich and Baranek (2020) point out regulators have continued to have concerns over internal control over financial reporting (ICFR). In fact, there has been a renewed interest by regulators and there is likely some "deferred maintenance" since the passage of SOX (Anti-Fraud Collaboration, 2017). Internal controls often become stagnant. Companies may have become complacent in their evaluations of internal controls and may not be adequately considering new risks. Important for companies to continually update internal controls to keep up with changes. Yet, few companies disclose such changes (Anti-Fraud Collaboration, 2017). Also, decision makers likely underestimate the benefits of strong internal controls (Feng et al., 2015).

ICWs are associated with a higher risk of fraud (Donelson, Ege, and McInnis, 2007). The cost of financial statement fraud has increased approximately 29 percent over the last two years (ACFE, 2024). The ACFE (2024) stresses the importance of anti-fraud controls to reduce the risk of future fraud. ACFE (2024) notes nearly half of the instances of occupational fraud (i.e., financial statement fraud, asset misappropriation, and corruption) are due to lack of internal controls and overriding existing internal controls. Not surprisingly, the ACFE (2024) reports a lack of internal control (32 percent) and overriding existing internal controls (19 percent) are the most common weaknesses contributing to fraud. Approximately 59 percent of firms in the US and Canada are unsuccessful in recovering losses after fraud.

We identify and evaluate U.S. accelerated filers that include an auditors' report on their annual financial statements for the period 2014 to 2019. Doyle et al. (2007) noted firms are smaller, younger, financially weaker, more complex, growing rapidly, or undergoing restructuring. Chen et al., (2019), Donelson et al., (2017), Elder et al., (2008), Klammer and Watson (2009), Morris (2011), Weiss (2014), and Zhang et al., (2007) follow aspects of Doyle et al., (2007) during the period shortly after SOX. We first evaluate changes in the environment compared to the prior period. These changes justify a more updated study about firm characteristics as possible determinants of ICWs. Therefore, we re-evaluate the relationship between these firm characteristics and ICWs to determine any changes in the current business environment. Furthermore, Doyle et al. (2007) noted firms with entity-level ICWs are smaller, younger, and financially weaker, while firms with account-level ICWs are financially healthier but more complex and changing rapidly. Therefore, we examine ICWs overall, as well as entity-level and account-level ICWs. We also consider the most prevalent reasons for entity-level ICWs due to their pervasiveness and seriousness (i.e., accounting personnel resources/competency/training issues, non-routine transaction control issues, and foreign/related party/affiliated/subsidiary issues). Consistent with prior research, the firm characteristics we examine are 1) firm size, 2) Big 4 auditor, 3) firm age, 4) financial health, as measured by loss and risk of bankruptcy,

5) complexity, as measured by number of segments and foreign currency translation; 6) rapid growth, as measured by extreme sales growth and mergers and acquisitions; and 7) restructuring changes.

Our analysis reveals several new insights about the business environment compared to the period studied by prior researchers. We find that ICWs relating to accounting personnel resources/competency/training persist today and have likely worsened over time. We suggest globalization has increased the prevalence of non-routine transactions and foreign/related party/affiliated/subsidiary issues. We also find the industries with the most prevalent ICWs continue to be banks, computers, drugs, and services. Over time, the prevalence of ICWs has increased for banks and drugs, decreased for computers, and has remained fairly constant for services. The preponderance of account-level versus entity-level ICWs is particularly noticeable for banks, while the reverse is true for the drug industry. Lastly, we find companies are considerably larger, younger, financially healthier, and more complex. They are experiencing rapid growth and more restructuring. Overall, these findings suggest the need for more updated research on firm characteristics as possible determinants of ICWs.

Our analysis reveals that companies with ICWs tend to be smaller and not likely to be audited by Big 4 firms. They are financially weaker (with regard to losses), more complex (with regard to segments), and more involved with M&As. Size, losses, and M&As are associated with entity-level and account-level ICWs. These firm characteristics, among others, are also associated with the top three reasons for entity-level ICWs, consisting of accounting personnel resources/competency/training issues, non-routine transaction control issues, and foreign/related party/affiliated/subsidiary issues.

Our study contributes by highlighting changes in firm characteristics and the relationships with ICWs to help auditors, investors, managers, and other financial statement users gain a better understanding of firms more at risk of having an ICW in today's business environment. Additionally, we identify the top three entity-level ICWs and evaluate which firm characteristics are more likely to have these types of ICWs. More severe ICWs can impact the recruitment of qualified chief financial officers, (Khurana et al., 2021) and, ultimately, a company's operating performance (Feng et al., 2015). Therefore, it is important for companies to prevent or detect and correct these entity-level ICWs. Furthermore, auditors need to be aware of the specific firm characteristics associated with these pervasive ICWs and formulate a strategy to identify these ICWs. If auditors do not appropriately identify risk factors during audit planning, they may fail to make the necessary modifications to conduct an effective audit (Hammersley, 2011). Identifying fraud risk factors during an audit is, therefore, essential for fraud prevention (Hammersley et al., 2011).

Background and Hypothesis Development

The accounting profession has focused on the significance of strong internal controls for years. SOX was intended to protect investors from financial misrepresentation of the company by requiring public companies in the U.S. to disclose their assessment on internal controls and include an auditor's attestation within their annual reports. Section 404 (a) of SOX requires management to evaluate and report on the company's effectiveness of ICFR. Section 404(b) requires an auditor to attest to management's assessment of its internal controls (Act, 2002) and can be a helpful early warning signal of fraud (Donelson, Ege, and McInnis, 2007). The Public Company Accounting Oversight Board (PCAOB) was established to enforce this law by overseeing audits of public companies to ensure financial reporting is reliable and accurate.

Globalization and technological advancements have created complexity within organizations. These deep transformations relating to globalization and digitalization impact organizational design, performance, and monitoring (Tzempelikos, 2021). As a result, companies are starting to implement new accounting information systems to provide quick responses to complex business issues (Teru et al., 2017). These changes likely require companies to strengthen internal controls, and managers may find it more challenging to identify, establish, and maintain efficient and effective internal controls within this environment.

COSO (2013) noted the business and operating environment had become increasingly complex, technology driven, and global. Accordingly, they updated the Internal Control - Integrated Framework (Framework) to help companies more successfully establish and maintain effective internal controls. More than a decade later, businesses operate in an even more competitive and changing global environment. Top priorities include AI, cloud migration, data analytics, and robotic process automation. In fact, approximately 65 percent of financial reporting leaders report incorporating AI (KPMG LLP, 2023). Innovative technology particularly impacts financial operations (Mchedlishvili et al., 2023) and is creating a paradigm shift in accounting (Vetter, 2023). One example of this innovative technology is real-time cloud accounting software, which allows multiple departments to simultaneously update and analyze data. As AI and blockchain technology in accounting

becomes more widespread, there is the potential to go beyond simply digitizing record-keeping to real-time auditing and predictive analytics (Vetter, 2023). These emerging technologies can potentially revolutionize industries. However, they also present major risks management must deal with going forward (Padmaavathy, 2023; Tzempelikos, 2021). Providing accurate financial statements has become more challenging in this increasingly complex business environment. Establishing effective internal controls can be challenging, especially for firms with complex features. Firms with complex features are also more likely to fail to remediate an ICW in future periods. This issue can lead to increased audit fees, modified audit opinions, missed filing deadlines, and increased cost of debt (Hammersley et al., 2012). Given these changes due to technological advancements, as well as complex operations and extensive growth due to globalization over the years, findings from earlier studies may no longer apply.

There had been a wave of studies (Bryan and Lilien, 2005; Doyle et al., 2007; Ge and McVay, 2005; Harris and Zhou, 2013; Morris, 2011; and Rice and Weber, 2012) to identify firm characteristics as determinants of ICWs immediately after the issuance of SOX in 2002 and prior to issuance of the updated Framework (COSO, 2013). There had been very limited research on the determinants of ICW prior to this period (Doyle et al., 2007). Except for Doyle et al. (2007), post SOX researchers focused on ICW in general and did not separately evaluate entity-level and account-level ICWs. Donelson et al., (2007) point out the importance of evaluating entity-level separately from account-level ICWs since entity-level ICWs provide the opportunity for fraud. Entity-level ICWs are more general, relate to the overall control environment, typically have a more pervasive effect on ICFR, and are considered more serious. These types of ICWs tend to create audit delays, require more resources, and are less likely to be remediated (Bakarich and Baranek, 2020; Doyle et al., 2007; Ettredge et al., 2006; Goh, 2009; Hammersley, 2011; Hammersley et al., 2012). They may damage credit ratings and result in higher interest costs (Hammersley et al., 2012). It is more challenging for auditors to audit around entity-level ICWs, there is more uncertainty about the reliability of the financial reporting process, and there is an increased risk of a going concern audit opinion (Goh et al., 2013). Account-level ICWs tend to be more account or transaction level specific and, as a result, less pervasive. Doyle et al. (2007) note that firm characteristics as determinants of ICWs vary based on the specific reason for the ICW since each company faces its own unique challenges. Accordingly, we also include in our analysis the most prevalent reasons for entity-level ICWs.

We first examine ICWs, and firm characteristics as compared to the period studied by prior researchers. Many studies, including Chen et al., (2019), Donelson et al., (2017), Elder et al., (2008), Klamm and Watson (2009), Morris (2011), Weiss (2014), and Zhang et al., (2007) follow aspects of Doyle et al., (2007), as it was one of the first significant study to evaluate determinants of ICWs. Accordingly, we provide comparisons with Doyle et al., (2007) where appropriate. Next, we evaluate firm characteristics as possible determinants of ICWs.

Changes Over Time

In 2013, COSO recognized changes within the business environment and updated the Framework to help companies more successfully establish and maintain effective internal controls. COSO noted the business and operating environment had become increasingly complex, technology driven, and global (COSO, 2013). Accordingly, findings from these earlier studies may no longer apply given the technological advancements, changes in the economy, and complex operations due to globalization over the years.

We anticipate reasons for specific entity-level ICWs, particularly those related to accounting personnel resources/competency, to continue to be problematic for companies. Post SOX has been characterized by increased CFO turnover and increased board involvement (Akinyele, 2021), among other things. Ge and McVay (2005) report ICWs are more prevalent in industries relating to computers, services, banking/insurance, and drugs. We anticipate reported ICWs will still be prevalent banking and drugs since these industries are subject to heavy regulations and are likely to be more scrutinized. Furthermore, banking and insurance experiences the most reported fraud (ACFE, 2024). We anticipate some shifts in ICWs by industry given the dynamic business environment. Based on the nature of changes in the business environment with regard to complexity, globalization, and technology, we anticipate companies are now larger, younger, more complex, financially healthier, and are experiencing rapid growth.

Firm Characteristics as Determinants of ICWs

We anticipate certain firm characteristics continue to be determinants of ICWs. There is, however, mixed research in certain instances, as we discuss below. We explore firm size, Big 4, age, financial health, complexity, rapid growth, and restructuring charges.

Firm Size, Big 4, and Age

Prior researchers (Bryan and Lilien, 2005, Chen et al., 2019, Doyle et al., 2007, Elder et al., 2008, and Rice and Weber, 2012) find that smaller companies experience more ICWs, although the results are mixed (Ge and McVay, 2005, Rice and Weber, 2012). Doyle et al., (2007) specify this relationship is true for account-level, but not entity-level ICWs. COSO (2013) recognizes that smaller firms often have a common burden of formally documenting and implementing internal controls. COSO provides additional guidance for smaller firms to help overcome some of the burdens identified with establishing and maintaining internal controls in the updated Framework. SOX requires significant resources and larger firms tend to have more resources to establish effective internal controls (Bryan and Lilien, 2005). Accordingly, we anticipate smaller companies experience more ICWs.

We anticipate firms with ICWs are less likely to be audited by Big 4 firms, as reported by prior researchers (Chen et al., 2009, Li et al., 2007, and Rice and Weber, 2012). Again, the evidence is mixed (Ge and McVay, 2005). Ge and McVay (2005) argue larger auditors significantly influence ICWs and have greater legal liabilities; therefore, larger auditors perform their diligence to capture more ICWs. Hammersley et al. (2012) conclude non-Big 4 auditors are more likely to resign in the presence of an entity-level ICW since they are more severe.

We anticipate younger companies are more likely to have ICWs, as reported by Doyle et al. (2007), despite the lack of relationship reported by Elder et al. (2008), Ge and McVay (2005), and Morris (2011). The presumption is that established companies are more experienced in developing and maintaining strong internal controls. Doyle et al. (2007) point out age impacts entity-level ICW but has no significant impact on account-level ICW.

Financial Health

We anticipate poor financial health, as measured by loss (Chen et al., 2019; Doyle et al., 2007; Elder et al., 2008; Li et al., 2007, Morris, 2011 and Rice and Weber, 2012) and risk of bankruptcy (Chen et al., 2019; Doyle et al., 2007; Elder et al., 2008 and Morris, 2011), is a determinant of ICWs. Doyle et al., (2007) note companies with entity-level ICWs tend to be financially weaker. We speculate weaker firms may be more focused on performance at the expense of policy decisions such as internal controls.

Complexity

We anticipate complexity is a determinant of ICWs. Doyle et al., (2007) reports a relationship between complexity and ICWs (including account-level ICWs), whereas Morris (2011) reports otherwise. Doyle et al. (2007) refers to complexity as “the driver of internal control weaknesses” (p. 201) since the need for strong internal controls grows as companies become more complex and diverse. Prior research on the specific variables we use to measure complexity, foreign currency translations and segments, is mixed. Elder et al., (2008), Ge and McVay (2005), and Hammersley et al., (2012) report foreign currency translations as a determinant of ICWs, whereas Zhang et al., (2007) report otherwise. Ge and McVay (2005) report segments are a determinant of ICWs whereas Chen et al., (2019), Elder et al., (2008), and Li et al., (2007) note otherwise. Elder et al. (2008) do, however, report segments are a determinant of tax ICWs. Hammersley et al., (2012) reveals when there are more entity-level ICW, and operations are more complex (involving more segments and foreign operations) companies are less likely to remediate previously disclosed ICW.

Rapid Growth

Companies experiencing rapid growth may be more focused on performance and may not be able to keep up with internal policies impacting internal control. We anticipate rapid growth is a determinant of ICWs. While some research supports this prediction (Doyle et al., 2007, Morris, 2011, and Zhang et al., 2007), other research (Chen et al., 2019, Elder et al., 2008) does not. Doyle et al., (2007) reveals rapid growth influences account-level ICW more than entity-level ICW. Bryan and Lilien (2005) and Li et al. (2007), however, note otherwise. Hammersley et al., (2012) point out rapid growth has no significant impact on failing to remediate previously disclosed ICW.

Restructuring

We anticipate restructuring is a determinant of ICWs, as restructuring often involves downsizing and redesign. Some prior research (Chen et al., 2019, Doyle et al., 2007, Li et al., 2007 and Zhang et al., 2007) supports this view. Elder et al., (2008) reveal while restructuring has no effect on ICW, restructuring has a positive effect on ICW related to tax. Hammersley et al., (2012) reveal restructuring is not a significant determinant for failing to remediate previously disclosed ICW.

H1: There is a relationship between firm characteristics and ICW, including entity-level and account-level ICWs.

Given that entity-level ICWs typically have a more pervasive effect on ICFR, we identify the number of entity-level ICW by type in Figure 1. The majority (54 percent) of the entity-level ICWs are due to accounting personnel resources/competency/training issues. Additional ICWs relate to non-routine transaction control issues (14 percent) and foreign/related party/affiliated/subsidiaries issues (11 percent), among other weaknesses. [See Figure 1, pg. 238]

We re-evaluate firm characteristics with the most prevalent three entity-level ICWs to determine whether these characteristics are associated with these top three entity-level ICWs.

H2–4: There is a relationship between firm characteristics and ICW related to accounting personnel resources/competency/training issues (H_2), non-routine transaction control issues (H_3), and foreign/related party/affiliated/subsidiary issues (H_4).

Research Design

Sample Selection and Variables

We focus on U.S. companies with a market cap of over \$75 million (accelerated filers) that include an auditors' report on their annual financial statements (10-K and 10-K/A) between fiscal year 2014 to fiscal year 2019.¹ We extract data from Audit Analytics and Compustat² databases and exclude duplicated companies and years, missing data in both datasets, and non-accelerated filers for a final sample size of 17,115 observations. Table 1 presents firms with ICWs by industry following the same format as Ge, W, McVay (2005). We further examine ICWs by industry over time in the next section. [See Table 1, pg. 238]

We create a dummy variable for *ICW* and assign a one if a company reported an ICW, zero otherwise. For further analysis, we create dummy variables for entity-level (*ENTITY*) and account-level (*ACCOUNT*) ICWs, based on codes assigned by Audit Analytics like Chen et al., (2010) and Donelson et al., (2017) methods. An ICW marked as an entity-level ICW may also include an account-level ICW, but an account-level ICW will not involve an entity-level ICW (Chen et al., 2019 and Donelson et al., 2017). Then we create dummy variables for the top three types of entity-level ICWs related to accounting personnel resources/competency/training issues (*ICW_RESOURCE*), non-routine transaction control issues (*ICW_NON_ROUTINE*), foreign/related party/affiliated/subsidiary issues (*ICW_FOREIGN*).

Dichotomous variables in this study that are categorized as one or zero include the *Big 4*, foreign currency translation (*FOREIGN*), restructuring (*RESTR*), negative earnings before extraordinary items (*LOSS*), risk of bankruptcy (*BANKRUPTCY*), and merger and acquisition (*M_A*). Continuous variables³ include size (*SIZE*), age (*AGE*), number of segments (*SEGMENT*), and sales growth (*SALESGRW*). Controlling for the industry effect is important; therefore, we use the Fama-French industry classification within STATA to assign each observation an industry code. Additionally, we include the year effect to improve the variance in the dependent variable (R square value). See Table 2 for the definition of each variable. [See Table 2, pg. 239]

Research Models

In STATA, we create and analyze descriptive statistics, a correlation matrix, and logistic regression models. To understand if specific firm characteristics are determinants of an ICW, we perform logistic regressions. We test each hypothesis using a logit model to calculate the probability of disclosing an ICW.

$$\begin{aligned} \text{Prob (ICW)} = & \beta_0 + \beta_1 \text{SIZE} + \beta_2 \text{BIG4} + \beta_3 \text{LogAGE}_w + \beta_4 \text{FOREIGN} + \beta_5 \text{LogSEGMENT}_w + \beta_6 \text{RESTR} + \\ & \beta_7 \text{LOSS} + \beta_8 \text{BANKRUPTCY} + \beta_9 \text{M_A} + \beta_{10} \text{SALESGRW}_w + \text{INDUSTRY fixed effect} + \\ & \text{Year fixed effect} \end{aligned} \quad (1)$$

¹ Data from the latter annual report was utilized.

² To mitigate heteroscedasticity and the potential for the effect of within firm correlation, the firm ID (gvkey) variable from Stata was de-strung into a numerical variable. The resulting companies were sorted by gvkeynum and fiscal year.

³ Continuous variables in this study have a wide range of values and were winsorized at the level of 1% and 99% to control for the effect of potential outliers and ensure robust data.

We execute a second analysis to further explore the type of ICWs (entity-level and account-level) that might be significantly affected by these firm characteristics using the following equations:

$$Prob(ENTITY) = \beta_0 + \beta_1 SIZE + \beta_2 BIG4 + \beta_3 LogAGE_w + \beta_4 FOREIGN + \beta_5 LogSEGMENT_w + \beta_6 RESTR + \beta_7 LOSS + \beta_8 BANKRUPTCY + \beta_9 M_A + \beta_{10} SALESGRW_w + INDUSTRY\ fixed\ effect + Year\ fixed\ effect \quad (2)$$

$$Prob(ACCOUNT) = \beta_0 + \beta_1 SIZE + \beta_2 BIG4 + \beta_3 LogAGE_w + \beta_4 FOREIGN + \beta_5 LogSEGMENT_w + \beta_6 RESTR + \beta_7 LOSS + \beta_8 BANKRUPTCY + \beta_9 M_A + \beta_{10} SALESGRW_w + INDUSTRY\ fixed\ effect + Year\ fixed\ effect \quad (3)$$

Our last analyses evaluates if specific firm characteristics are determinants of the top three types of entity-level ICWs using the following equations:

$$Prob(ICW_RESOURCE) = \beta_0 + \beta_1 SIZE + \beta_2 BIG4 + \beta_3 LogAGE_w + \beta_4 FOREIGN + \beta_5 LogSEGMENT_w + \beta_6 RESTR + \beta_7 LOSS + \beta_8 BANKRUPTCY + \beta_9 M_A + \beta_{10} SALESGRW_w + INDUSTRY\ fixed\ effect + Year\ fixed\ effect \quad (4)$$

$$Prob(ICW_NON_ROUTINE) = \beta_0 + \beta_1 SIZE + \beta_2 BIG4 + \beta_3 LogAGE_w + \beta_4 FOREIGN + \beta_5 LogSEGMENT_w + \beta_6 RESTR + \beta_7 LOSS + \beta_8 BANKRUPTCY + \beta_9 M_A + \beta_{10} SALESGRW_w + INDUSTRY\ fixed\ effect + Year\ fixed\ effect \quad (5)$$

$$Prob(ICW_FOREIGN) = \beta_0 + \beta_1 SIZE + \beta_2 BIG4 + \beta_3 LogAGE_w + \beta_4 FOREIGN + \beta_5 LogSEGMENT_w + \beta_6 RESTR + \beta_7 LOSS + \beta_8 BANKRUPTCY + \beta_9 M_A + \beta_{10} SALESGRW_w + INDUSTRY\ fixed\ effect + Year\ fixed\ effect \quad (6)$$

We apply the Hausman test to identify if panel data with fixed effects or random effects should be used. We employ the Hausman test to overcome the endogenous bias problem by evaluating the consistency of an estimator when compared to an alternative solution and help identify if the model corresponds to the data (Griliches et al., 1978). Furthermore, to identify any multicollinearity problems, we evaluate the VIF values to ensure they are below ten. We evaluate each characteristic for significance based on a two-tailed test with sign predictions.

Results

Descriptive Statistics

We discuss ICWs by industry in this section. We also discuss firm characteristics over time and between companies with and without ICWs in this section.

ICWs by Industry

The top four industries reported in Table 1 are banks, computers, drugs, and services. We compare our results with Ge and McVay (2005) for ICWs only in general since they did not examine entity-level and account-level ICWs. Closer examination reveals banks and insurances represent 26.7 percent of the companies, but only 16.0 percent of ICWs. The banking industry is subject to heavy regulation. Accordingly, it is not surprising that ICWs relative to the proportion of companies represented is lower. However, the prevalence of ICWs in this industry has increased compared to the earlier period. Ge and McVay (2005) report 9.2 percent of ICWs relative to 22.1 percent of companies represented for banks and insurance. Interestingly, fraud is most prevalent in the banking and financial services industry (ACFE, 2024). The pharmaceutical industry is another heavily regulated industry. We observe a higher percentage of ICWs (relative to the percent of companies represented) of 12.5 percent (9.4 percent) and an increase in the prevalence of ICWs compared to the earlier period reported by Ge and McVay (2005), who report 8.8 percent (9.0 percent).

Computers and services also show a higher degree of ICWs relative to the proportion of companies represented of 13.7 percent (11.4 percent) for computers and 11.6 percent (7.2 percent) for services. In comparison, Ge and McVay (2005) report 21.4 percent (13.7 percent) for computers and 11.4 (8.6 percent) for services. Over time, the relative prevalence of ICWs has decreased considerably for computers and has remained fairly constant for services. Overall, the changes in ICWs over time support the need for a more updated study on firm characteristics as possible determinants of ICWs.

Regarding entity- and account-level ICWs, we notice similar findings for entity-level ICWs, but not necessarily account-level ICWs. Banks and insurances have a lower proportion of entity-level ICWs of 13.5 percent (26.7 percent), whereas computers, drugs and services have a higher proportion of 14.0 percent (11.4 percent), 14.9 percent (9.3 percent) and 11.8 percent (7.2 percent), respectively. Banks and insurances, and drugs also have a lower proportion of account-level ICWs of 21.0 (26.7 percent) and 7.9 percent (9.3 percent), respectively. The reverse is true for computers and services of 13.1 percent (11.4 percent) and 11.4 percent (7.2 percent) respectively. The preponderance of account-level vs. entity-level ICWs is particularly noticeable for banks, while the reverse is true for the drug industry. Donelson et al., (2007) and Doyle et al., (2007) advocate evaluating entity-level ICWs separately from account-level weaknesses given the pervasive nature of these ICWs. Our findings support this idea.

Firm Characteristics

The summary statistics of firm characteristics for companies with and without ICWs compared to Doyle et al. (2007) are included in Table 3. We first examine changes over time and then compare companies with and without ICWs. Firm characteristics have changed considerably compared to the earlier period. Companies are substantially larger, younger, more complex, financially healthier, and are experiencing rapid growth, as compared to the earlier period. These results support the need to reevaluate firm characteristics as possible determinants of ICWs. [See Table 3, pg. 240]

As predicted, companies with ICWs, as compared to companies without ICWs, are substantially smaller and less likely to be audited by the Big 4. These firms are slightly younger and more complex. They are substantially weaker financially, are experiencing slightly more mergers and acquisitions and have substantially less sales growth.

Table 4 reveals the difference in firm characteristics between companies with account-level and entity-level ICWs. We set our predictions similar to Doyle's et al. (2007) study. As predicted, companies with account-level ICWs are larger, audited by Big 4, financially stronger, undergoing less restructuring, and experiencing more sales growth as compared to companies with entity-level ICWs. However, different from Doyle's et al. (2007) study, companies with entity-level ICWs are more complex and more involved in a M&A, as compared to companies with an account-level ICW. [See Table 4, pg. 241]

Univariate Analysis

A correlation matrix, as shown in Table 5, reveals no significant multicollinearity problems since all significant correlations between the dependent and independent variables have VIF values less than ten. We report only the significant and meaningful correlations here. Not surprisingly, larger companies are likely audited by the Big 4, and companies experiencing losses are at risk of bankruptcy. Company size and sales growth are positively correlated, and segment and restructuring are positively correlated. Large companies have more sales growth, and companies with more segments are likely to undergo restructuring. [See Table 5, pg. 242]

Hausman Test

We execute the Hausman test to identify whether we should use panel data with fixed effects or random effects, and to overcome endogenous bias. For each Chi-square test value, the p-value indicated the test results were statistically significant. We conclude the fixed effects model (FEM) is appropriate for equations 1 through 6.

Regression Analysis

Table 6 presents the empirical results for Equations 1, 2, and 3. The second column presents the predicted sign of each relationship between the independent variables and an ICW, including an entity-level and account-level ICW. Our results support our hypotheses that size, Big 4, segment, loss, and M&A are determinants of an ICW. Age, foreign currency translation, restructuring, bankruptcy, and sales growth are not found to be determinants of ICWs. There is no significant relationship between the types of ICWs (i.e., entity-level and account-level), and Big 4 and segment. Size, loss, and M&A; however, are determinants of entity-level and account-level ICWs. [See Table 6, pg. 243]

Table 7 reveals the results for equations 4, 5, and 6. Our results support our hypotheses that size, loss, and M&A are determinants of an ICW related to accounting personnel resources/competency/training issues. Foreign currency translation, restructuring, and sales growth are not determinants. Regarding non-routine transaction control issues, size, loss, M&A, and sales growth are determinants. Again, foreign currency translation, and restructuring are not. Lastly, size, foreign currency transactions, restructuring, loss, and M&A are determinants of an ICW related to foreign, related party, affiliated or

subsidiary issues. Sales growth, Big 4, age, segments, and risk of bankruptcy are not determinants for any of the ICW types. [See Table 7, pg. 244]

Conclusion and Implications

This study reveals changes in ICWs and firm characteristics over time. These changes support the need for an updated analysis of firm determinants of ICWs. A lack in accounting personnel resources/competency/training remains consistent over time. This entity wide ICW persisted in 2004 to 2007 (Donelson et al., 2017), although Calderon et al. (2012) noted this fact as only the third common type of ICW from 2004 to 2010. Ettredge et al. (2006) point out companies with ICWs relating to personnel experience longer audit delays. The prevalence of certain entity-level ICWs reveals this problem continues in today's environment and is worsening over time. The shortage of competent employees is likely even more widespread post-COVID-19. The U.S. Chamber of Commerce reports that more than 50 million and 47.8 million workers quit their jobs in 2022 and 2021, respectively (Ferguson, 2023).

Akinyele (2021) noted a significant increase in CFO turnovers shortly after the release of SOX 404 and suggested CFOs are not willing to endure the increased stress of the position or risk their reputation. Additionally, lack of accounting personnel could be due to increased involvement of boards of directors after the implementation of SOX 404 and letting go of CFOs struggling in their position (Akinyele, 2021). Similarly, Lee et al., (2018) found inexperience in complying with Statement of Financial Accounting Standard (SFAS) No. 133, lack of oversight and review of (SFAS), and insufficient technical expertise caused ICWs related to SFAS 133. These ICWs resulted in costly financial restatements. These earlier findings, along with the findings of this study, highlight the importance of obtaining and maintaining competent accounting personnel, hiring external experts, offering continuous training to adhere to SOX 404 standards and minimize the costs.

While there is a need for companies to focus on improving accounting personnel resources, attracting competent personnel, and training employees to try to minimize the risk of entity-level ICW, the solution likely entails more resources, such as time and money. Smaller companies have more limited resources. Additional research is needed to explore ways in which companies can arrive at feasible solutions that fit within budgetary and resource constraints.

We suggest that globalization has increased the prevalence of some other entity-wide ICWs; particularly non-routine transaction controls, foreign/related party/affiliated/subsidiary issues, and journal entry control issues. Again, Donelson et al. (2017) had similar results, but Calderon et al. (2012) did not. The difference in findings suggest these entity wide ICWs have become more prevalent over time.

We find differences in characteristics between entity-level and account-level ICWs, as well as changes compared to over a decade ago. When comparing our results with Doyle et al. (2007), we note characteristics of firms with entity-level ICWs have changed due to complexity and growth. Our study does reveal some differences in relationships as compared to Doyle et al. (2007), which are most likely due to changes in the business environment and the characteristics of businesses. Public companies are required to adhere to more standards and, accordingly, have more guidance on adhering to these standards compared to years ago. Additionally, the rapid growth of technology has made it easier for companies to partake in globalization and reach a larger audience for their businesses. This change likely explains why firms are now considerably larger, younger, financially healthier (less risk of bankruptcy), more complex (foreign currency transactions and segments), undergoing restructuring, and are experiencing rapid growth in sales and M&As compared to years ago.

PCAOB Auditing Standard No. 2, An Audit of ICFR Performed in Conjunction with an Audit of Financial Statements provides guidance and helps companies with complex information system environments (Chan et al., 2018). With the evolving technology and issuance of new laws annually, it can be more difficult for companies to establish and maintain internal controls. Companies undergoing restructuring likely face more challenges when they are changing their organizational structure.

The similar relationships between firm characteristics and the top three entity-level ICWs are not surprising since these ICWs are often related to one another. These results indicate employees may not understand how to implement internal controls related to non-routine transactions and handle foreign, related party, and affiliated entities due to the lack resources, competency, and training. The business environment is more complex with advancements in technology and globalization; therefore, it's more important than ever for employees to understand how to implement and maintain internal controls related to these areas. These results suggest the need for more training and guidance for implementing and maintaining non-routine transactions, as well as issues relating to foreign, related parties, affiliates, and subsidiaries.

Furthermore, foreign companies may have different policies and procedures. It is important for organizations to closely monitor the culture of foreign subsidiaries and especially consider local customs and tone at the top (Anti-Fraud Collaboration, 2017). Ensuring foreign entities are establishing and maintaining internal controls may be difficult since these entities are located far away and top management may not have complete oversight. Management may have a harder time establishing tone at the top when entities are in other countries. The business environment has changed dramatically, and auditors need a greater understanding of these firms and their risk of an ICW. Moreover, companies need to understand what characteristics put them at risk of an ICW and which type of ICW are more likely to occur in their company.

In summary, this study can help businesses, managers, and auditors identify firm characteristics that increase the likelihood of ICWs. Preventing ICWs can help diminish the risk of fraud and the risk of capital loss. This research can help those who are involved in assessing companies' financial reporting since the findings provide a more complete understanding of the relationship between complex firm characteristics and ICWs. While it is not feasible for companies to change certain characteristics, companies can use this information to try to create compensating controls to create a stronger internal control system and reduce the risk of capital loss. Furthermore, the research findings may assist external and internal auditors in identifying areas of concern and developing strategies for dealing with risk. Auditors can use this information in this study to address risk assessment and adjustment audit procedures based on the presence of these firm characteristics.

Limitations, Implications, and Future Research

While the present study included a longer time frame than prior studies, future research can be performed with a longer term perspective to compare the influence of firm characteristics over time. We recommend ongoing research to help evaluate these firm characteristics as the business environment continues to change due to technological advancements, globalization, changing laws, operational disruptions, and, more recently, the pandemic. Although AI has been around for several decades, in the most recent years AI has become integrated into applications, including accounting and auditing software, and rapidly evolving with natural language processing and autonomous systems. Furthermore, the pandemic has significantly impacted businesses and markets and has added a new level of uncertainty and volatility. The unpredictability also impacts auditors and creates more risk of material misstatements (IAASB, 2020). Changes will likely continue (Bauer et al., 2022). The pandemic has caused several operational disruptions including cyberattacks, supply chain issues, or staff shortages from retirements, etc. It is possible changes in the environment due to the pandemic may have increased the likelihood of an ICW. Approximately 53 percent of the cases examined by ACFE (2024) had at least one pandemic related factor contributing to the fraud. Internal control changes and technology are among the factors considered. We limited our time period prior to the pandemic so as not to distort the data. As firms continue to adjust to these changes, it will be helpful to continually understand the impact of firm characteristics on ICWs.

Doyle et al. (2007) reports acquisitions have a positive and significant effect on ICW and, specifically, account-level ICW. Doyle et al. (2007) evaluated only acquisitions, while we also included mergers and acquisitions into one variable. We find a more significant and positive relationship with ICWs, including entity-level and account-level ICW. This relationship suggests mergers may have a more significant impact on ICW than acquisitions. We recommend further research evaluate mergers and acquisitions separately to determine the relationship, if any, between each of these variables and type of ICW. Furthermore, we recommend evaluating the effect of firm characteristics, if any, on ICWs related to specific areas, such as IT and tax, as well as other entity-level or account-level ICWs. Li et al. (2007) noted internal and external governance serve important roles in IT controls and found more IT-experienced senior managers are less likely to have IT material weaknesses. Klammer et al. (2012) noted ICWs related to senior management, training, and IT control environment can have the strongest impact on future ICWs. Therefore, we recommend further investigating how advancements in technology have affected IT ICWs, corporate governance, and managers' roles in the current business environment.

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Figure 1: Frequency of Firm Reported Entity-level ICWs as Indicated by Audit Analytics between 2014 to 2019

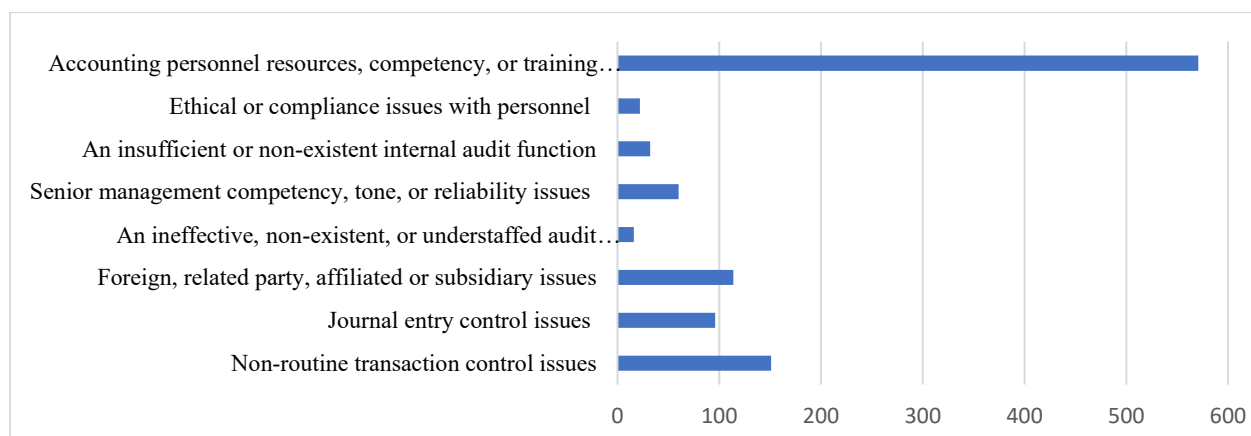


Table 1: Distribution of Sample Size by Industry

	# of ICWs	% of ICW	# of Entity ICWs	% of Entity ICW	# of Account ICWs	% of Account ICWs	# of Companies	% of Companies
Banks and Insurance	159	16.00	87	13.38	72	20.97	4549	26.68
Computers	136	13.68	91	14.00	45	13.11	1944	11.37
Drugs	124	12.50	97	14.93	27	7.86	1588	9.31
Services	116	11.64	77	11.84	39	11.35	1225	7.23
Retail	71	7.13	43	6.59	28	8.12	1495	8.76
Miscellaneous Equipment	58	5.81	40	6.14	18	5.22	775	4.55
Transportation	52	5.22	39	5.99	13	3.77	816	4.79
Rubber	43	4.30	26	3.99	17	4.93	605	3.58
Utilities	41	4.11	28	4.31	13	3.78	740	4.33
Industrial	37	3.70	30	4.62	7	2.03	620	3.63
Refining	36	3.62	17	2.61	19	5.53	716	4.20
Textiles	29	2.90	19	2.91	10	2.90	504	3.00
Food	27	2.70	14	2.14	13	3.77	351	2.05
Chemicals	22	2.20	17	2.61	5	1.45	436	2.58
Mining	20	2.00	13	1.98	7	2.03	402	2.35
Electrical	19	1.90	11	1.69	8	2.33	207	1.22
Agriculture	1	0.10	0	0	1	0.29	50	0.30
Miscellaneous	2	0.20	1	0.15	1	0.29	38	0.22
Total Observations	993		650		343		17,061	

Industry classifications are compiled using the following SIC codes: Mining: 1000–1299, 1400–1999; Food: 2000–2199; Textiles: 2200–2799; Drugs: 2830–2839, 3840–3851; Chemicals: 2800–2829, 2840–2899; Refining: 1300–1399, 2900–2999; Rubber: 3000–3499; Industrial: 3500–3569, 3580–3659; Electrical: 3660–3669, 3680–3699; Miscellaneous Equipment: 3700–3839, 3852–3999; Computers: 3570–3579, 3670–3679, 7370–7379; Transportation: 4000–4899; Utilities: 4900–4999; Retail: 5000–5999; Banks: 6000–6999; Services: 7000–7369, 7380–8999.

Table 2: Definition of Variables

Variable:	Description
<i>Dependent variables for Hypothesis 1:</i>	
<i>ICW</i>	An indicator variable equal to 1 if a firm reports an internal control weakness, 0 otherwise. Data from Audit Analytics.
<i>ENTITY</i>	An indicator variable that is equal to 1 if a firm disclosed at least one material entity-level control weakness over financial reporting as reported by Audit Analytics, 0 otherwise. Material entity-level control weaknesses are those where Audit Analytics identifies (1) non-routine transaction control issues (code 77); (2) journal entry control issues (code 76); (3) foreign, related party, affiliated or subsidiary issues (code 38); (4) an ineffective, non-existent, or understaffed audit committee (code 11); (5) senior management competency, tone, or reliability issues (code 13); (6) an insufficient or non-existent internal audit function (code 18); (7) ethical or compliance issues with personnel (code 21); or (8) accounting personnel resources, competency, or training issues (code 44). Data from Audit Analytics and their codes are in parentheses.
<i>ACCOUNT</i>	An indicator variable that is equal to 1 if a firm disclosed at least one material account-level ICW and no entity-level ICW reported, 0 otherwise. Data from Audit Analytics.
<i>Dependent variables for Hypothesis 2:</i>	
<i>ICW_RESOURCE</i>	An indicator variable that is equal to 1 if a firm disclosed at least one material entity-level ICW related to accounting personnel resources, competency, or training issues, 0 otherwise. Data from Audit Analytics.
<i>Dependent variables for Hypothesis 3:</i>	
<i>ICW_NON_ROUTINE</i>	An indicator variable that is equal to 1 if a firm disclosed at least one material entity-level ICW related to non-routine transaction control issues, 0 otherwise. Data from Audit Analytics.
<i>Dependent variables for Hypothesis 4:</i>	
<i>ICW_FOREIGN</i>	An indicator variable that is equal to 1 if a firm disclosed at least one material entity-level ICW related to foreign, related party, affiliated or subsidiary issues, 0 otherwise. Data from Audit Analytics.
<i>Independent Variables for Hypotheses 1–4:</i>	
<i>SIZE</i>	Natural logarithm of market capitalization of shareholder's equity; winsorized at 1% and 99% level. Data from Audit Analytics.
<i>BIG 4</i>	An indicator variable equal to 1 if the firm is audited by Deloitte, Ernst and Young, KPMG, or PricewaterhouseCoopers, 0 otherwise (computed from Compustat data item AU).
<i>AGE</i>	Natural logarithm of Age based on IPO Date (computed from Compustat data item IPODATE); winsorized at 1% and 99% level.
<i>Complexity – Independent Variables:</i>	
<i>FOREIGN</i>	An indicator variable equal to 1 if a company has a nonzero foreign currency translation, 0 otherwise (Compustat data item FCA).
<i>SEGMENT</i>	Natural logarithm of the sum of the number of operating and geographic segments (computed from Compustat data item STYPE); winsorized at 1% and 99% level.
<i>Restructuring – Independent Variable:</i>	
<i>RESTR</i>	An indicator variable equal to 1 if a company has restructuring charges, 0 otherwise (Compustat data items RCP, RCA, RCEPS, RCD).
<i>Poor Financial Health – Independent Variables:</i>	
<i>LOSS</i>	An indicator variable equal to 1 if earnings before extraordinary items are less than 0, 0 otherwise (Compustat data items IB).

<i>BANKRUPTCY</i>	An indicator variable equal to 1 if a company is at risk for bankruptcy (has an Altman Z-score of less than 1.8), 0 otherwise (Calculated using data from Compustat, see formula for details). Altman Z-Score = $1.2A + 1.4B + 3.3C + 0.6D + 1.0E$ Where: • A = working capital / total assets • B = retained earnings / total assets • C = earnings before interest and tax / total assets • D = market value of equity / total liabilities • E = sales / total assets
<i>Growth – Independent Variables:</i>	
<i>M_A</i>	An indicator variable equal to 1 if the company is engaged in a merger or acquisition, 0 otherwise (Compustat data item AQP and AQEPS).
<i>SALESGRW</i>	Sales change year over year (computed from Compustat data item SALE); winsorized at 1% and 99% level.
<i>Fixed Effect Variables for Hypotheses 1–4:</i>	
<i>INDUSTRY fixed effect</i>	Fama and French 12 industry variables (classified using STATA code ffi12) utilized to control for the industry fixed effect.
<i>YEAR fixed effect</i>	A variable utilized to control for the year fixed effects.

Table 3: Descriptive Statistics for Companies With and Without ICWs

	Companies with ICWs 2014–2019 (1,000 observations) 2003–2005 (779 observations)					Predictive Difference	Companies without ICWs 2014–2019 (16,115 observations) 2003–2005 (5,047 observations)				
	Mean	Median	SD	25%	75%		Mean	Median	SD	25%	75%
Size (\$M)	733.986	658.187	0.000	232.407	1,825.281	<	1,750.207	1,623.743	0.000	489.551	5,184.815
	180.082	224.420	7.862	49.242	660.317		204.196	214.022	12.584	36.795	1186.259
Big 4	0.672	1.000	0.470	0.000	1.000	>	0.779	1.000	0.415	1.000	1.000
	*	*	*	*	*		*	*	*	*	*
Age	3.854	3.001	3.908	1.000	16.996	<	3.900	3.001	3.924	1.000	17.993
	8.274	8.000	2.557	5.000	17.000		9.105	10.000	2.620	5.000	19.000
Complexity Foreign	0.439	0.000	0.497	0.000	1.000	>	0.436	0.000	0.496	0.000	1.000
	0.208	0.000	0.406	0.000	0.000		0.156	0.000	0.363	0.000	0.000
Complexity Segment	4.764	6.001	3.028	2.450	12.001	>	4.354	3.001	3.083	1.000	12.001
	3.440	4.000	2.048	2.000	6.000		2.752	3.000	2.213	0.000	5.000
Restructuring	0.392	0.000	0.488	0.000	1.000	>	0.316	0.000	0.465	0.000	1.000
	0.032	0.000	0.106	0.000	0.008		0.013	0.000	0.064	0.000	0.000
Financial Health Loss	0.445	0.000	0.497	0.000	1.000	>	0.230	0.000	0.421	0.000	0.000
	0.497	0.000	0.500	0.000	1.000		0.373	0.000	0.484	0.000	1.000
Financial Health Bankruptcy	0.322	0.000	0.468	0.000	1.000	>	0.199	0.000	0.399	0.000	0.000
	4.875	5.000	2.945	2.000	7.000		4.437	4.000	2.855	2.000	7.000
Growth M&A	0.414	0.000	0.493	0.000	1.000	>	0.343	0.000	0.475	0.000	1.000
	0.033	0.000	0.105	0.000	0.000		0.023	0.000	0.081	0.000	0.000
Growth Sales	90.040	13.777	698.344	-14.807	105.291	>	179.950	31.139	897.932	-3.922	166.238
	0.222	0.000	0.416	0.000	0.000		0.196	0.000	0.397	0.000	0.000

Maximum of 17,115 firm observations have available data from Compustat and Audit Analytics from 2014 to 2019.

The first row for each variable reveals the results from our study, while the second row includes the results from Doyle et al. (2007) study.

* No data is available. Variable not included in Doyle et al. (2007) study.

Table 4: Descriptive Statistics for Companies Account-level and Entity-level ICWs

Variables	Companies with Account-level ICWs 2014–2019 (345 observations) 2003 (49 observations)		Predictive Difference	Companies with Entity-level ICWs 2014–2019 (655 observations) 2003 (286 observations)	
	Mean	Median		Mean	Median
SIZE (\$M)	821.794	756.339	>	689.861	548.666
	208.819	264.407		142.836	179.408
BIG 4	0.676	1.000	>	0.669	1.000
	*	*		*	*
AGE	3.740	3.001	>	3.916	3.001
	8.617	8.000		7.695	8.000
COMPLEXITY FOREIGN	0.431	0.000	>	0.443	0.000
	0.226	0.000		0.178	0.000
COMPLEXITY SEGMENT	4.482	3.999	>	4.918	6.001
	3.458	4.000		3.438	4.000
RESTRUCTURING	0.353	0.000	<	0.412	0.000
	0.031	0.000		0.034	0.000
FINANCIAL HEALTH LOSS	0.388	0.000	<	0.475	0.000
	0.420	0.000		0.627	1.000
FINANCIAL HEALTH BANKRUPTCY	0.294	0.000	<	0.337	0.000
	4.770	5.000		5,079.000	5.000
GROWTH M&A	0.391	0.000	>	0.426	0.000
	0.035	0.000		0.029	0.000
GROWTH SALES	96.813	19.527	>	86.432	11.088
	0.226	0.000		0.213	0.000

The sample includes a total of 1,000 firm observations with one or more ICWs extracted from Audit Analytics from 2014 to 2019.

The first row for each variable reveals the results from our study, while the second row includes the results from Doyle et al. (2007) study.

* No data is available. Variable not included in Doyle et al (2007) study.

Table 5: Pearson Correlation Matrix

Panel A													
Variables	1a	2a	3a	4	5	6	7	8	9	10	11	12	13
(1a) ICW	1.000	0.801*	0.576*	-0.123*	-0.060*	-0.001	0.002	0.019*	0.038*	0.118*	0.072*	0.035*	-0.041*
(2a) ENTITY		1.000	0.029*	-0.106*	-0.049*	0.002	0.003	0.021*	0.039*	0.108*	0.065*	0.033*	-0.036*
(3a) ACCOUNT			1.000	-0.061*	-0.033*	-0.004	-0.001	0.003	0.010	0.049*	0.031*	0.013	-0.020*
(4) SIZE				1.000	0.463*	-0.019*	-0.020*	0.254*	0.117*	0.297*	-0.098*	0.125*	0.391*
(5) BIG 4					1.000	0.027*	-0.078*	0.248*	0.178*	0.037*	0.0580*	0.096*	0.151*
(6) AGE						1.000	0.011	0.062*	0.013	0.032*	-0.013	0.040*	0.011
(7) FOREIGN							1.000	0.166*	0.059*	0.068*	-0.097*	0.024*	-0.025*
(8) SEGMENT								1.000	0.359*	0.002	0.056*	0.212*	0.065*
(9) RESTRUC-TURING									1.000	0.076*	0.115*	0.273*	-0.049*
(10) LOSS										1.000	0.345*	0.009	-0.225*
(11) BANK-RUPTCY											1.000	0.069*	-0.078*
(12) M&A												1.000	0.171*
(13) SALES GROWTH													1.000
Panel B													
Variables	1b	2b	3b	4	5	6	7	8	9	10	11	12	13
(1b) ICW_RESOURCE	1.000	0.376*	0.325*	(0.100)*	(0.041)*	0.000	0.004	0.016*	0.034*	0.104*	0.063*	0.026*	(0.033)*
(2b) ICW_NON_ROUTINE		1.000	0.177*	(0.059)*	(0.033)*	0.015*	(0.011)	0.003	0.007	0.057*	0.043*	0.023*	(0.011)
(3b) ICW_FOREIGN			1.000	(0.041)*	(0.023)*	(0.009)	0.032*	0.019*	0.038*	0.043*	0.014	0.022*	(0.014)

Panel A includes the variables in RQ 1. Panel B includes variables in RQs 2-4. Variables (4) – (13) are not repeated in Panel B to avoid duplication.

* Findings are significant at $p < 0.05$

Table 6: Logistic Regression Results for Hypothesis 1

Variable	Est.	ICW	ENTITY	ACCOUNT
SIZE	-	-0.325***	-0.342***	-0.268***
		-9.23	-7.86	-5.55
BIG 4	-	-0.201*	-0.21	-0.154
		-1.86	-1.63	-1.01
AGE	-	-0.045	-0.033	-0.064
		-1.34	-0.80	-1.32
FOREIGN	+	0.085	0.137	-0.012
		0.92	1.17	-0.10
SEGMENT	+	0.094*	0.093	0.081
		1.78	1.38	1.22
RESTRUCTURING	+	0.144	0.173	0.07
		1.58	1.56	0.50
LOSS	+	0.513***	0.585***	0.317*
		5.25	5.02	1.91
BANKRUPTCY	+	0.153	0.121	0.187
		1.48	1.00	1.13
M&A	+	0.304***	0.334***	0.222*
		3.59	3.27	1.71
SALES GROWTH	+	0.00006	0.00008	0.00002
		1.12	1.24	0.23
Constant	+	3.727***	3.246***	1.974**
		5.17	3.55	2.07
Industry Fixed Effect		Yes	Yes	Yes
Year Fixed Effect		Yes	Yes	Yes
Mean dependent var		0.058	0.037	0.02
pseudo R-sq		6.50%	7.60%	4%
Likelihood Ratio Chi-squared		340.724	306.44	138.023
N		16,593	16,593	16,593

***, **, * Findings are significance at the $p < .01$, $p < .05$, and $p < .10$ levels, respectively (two-tailed tests).

The coefficient is reported above while the t-statistics is reported below for each variable.

Table 7: Logistic Regression Results for Hypotheses 2–4

Variables	ICW_ RESOURCE	ICW_ NON_ROUTINE	ICW_ FOREIGN
SIZE	-0.356***	-0.368***	-0.313***
	-7.73	-4.48	-3.58
BIG 4	-0.099	-0.387	-0.369
	-0.72	-1.59	-1.5
AGE	-0.039	0.087	-0.132
	-0.9	1.09	-1.63
FOREIGN	0.188	-0.331	0.853***
	1.52	-1.48	3.22
SEGMENT	0.083	0.124	0.069
	1.19	1.08	0.55
RESTRUCTURING	0.137	-0.128	0.621***
	1.15	-0.53	2.6
LOSS	0.569***	0.639***	0.742***
	4.58	2.62	3.01
BANKRUPTCY	0.112	0.484**	-0.192
	0.87	1.97	-0.69
M&A	0.292***	0.579***	0.473**
	2.58	2.95	2.08
SALES GROWTH	0.00008	0.0003***	0.00004
	1.2	3.21	0.33
Constant	3.293***	1.456	0.032
	3.45	0.84	0.02
Industry Fixed Effect	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes
Mean dependent var	0.032	0.008	0.007
pseudo R-sq	7.50%	9.60%	9.20%
Likelihood Ratio Chi-squared	298.692	202.261	167.385
N	16,593	16,593	16,038

***, ** Findings are significance at the $p < .01$ and $p < .05$, respectively (two-tailed tests).

The coefficient is reported above while the t-statistics is reported below for each variable.