The Price of an Accountant Shortage:
Evidence from Job Vacancy Duration and Internal Control Weaknesses

Rebecca N. Hann
Robert H. Smith School of Business
University of Maryland
rhann@umd.edu

Jingwen Yang
Robert H. Smith School of Business
University of Maryland
yjingwen@umd.edu

Yue Zheng
School of Business and Management
Hong Kong University of Science and Technology
aczheng@ust.hk

September 2023

Preliminary. Please do not cite or circulate without the authors' permission.

The Price of an Accountant Shortage:
Evidence from Job Vacancy Duration and Internal Control Weaknesses

Abstract

This study examines the impact of a shortage of accountants on the quality of internal control over financial reporting. Using a novel dataset that contains information on time-to-fill (hereafter, job vacancy duration) for a comprehensive sample of online accounting job postings in the US, we first document a substantial increase in accounting job vacancy duration over time, with the average duration increasing from 43 days in 2008 to 56 days in 2022, which suggests that firms face growing challenges in recruiting accounting talent. We further find that firms that take longer to fill their accounting vacancies are more likely to experience material internal control weaknesses. This effect is more pronounced for smaller firms and for firms with less human resources. We also find that accounting personnel tend to report lower job satisfaction when accounting positions at their firms are vacant for an extended period, consistent with existing employees being unhappy about assuming additional responsibilities or working overtime. Taken together, our findings provide the first large-sample archival evidence on the costs of accountant shortages, highlighting the importance of attracting and retaining accounting talent.

"Accountant shortage has companies big and small struggling."

<div align="right">Marketplace, NPR (July 11, 2023)</div>

1. Introduction

Accountants are indispensable to organizations as they help ensure high-quality internal control, accurate financial reporting, and regulatory compliance. However, a widespread shortage of accountants has emerged in recent years. According to the Bureau of Labor Statistics, more than 300,000 accountants and auditors have quit their jobs in the US in the past two years, resulting in a 17% industry-wide employment decline—a gap that is difficult to fill given the diminishing pipeline of college students choosing accounting (Ellis, 2022).[1] This national accountant shortage poses challenges for businesses large and small as managers struggle to fill accounting vacancies in a timely manner, which reduces their ability to maintain sufficient staffing for vital accounting functions.[2] Anecdotal evidence suggests that the shortage of accountants has begun to show up in financial statements, with even large companies such as Advance Auto Parts attributing material weaknesses in their internal control over financial reporting to the lack of accounting personnel (Maurer 2023). Are these isolated incidents, or does the shortage of accounting talent impose significant costs on companies?

Despite the importance of this topic, there is little empirical evidence on the consequences of an accountant shortage. In this study, we seek to shed light on this question by examining whether the time it takes to fill rank-and-file accounting positions (hereafter, accounting vacancy duration) impacts a firm's internal control quality. Understanding the effect of an accountant shortage on internal control effectiveness is particularly important because deficiencies in internal

---

[1] Accounting has long struggled with the stigma of being perceived as uncool, entailing tedious work and demanding hours. Even among those who major in accounting, many choose to work in other fields that do not require the extra 30 college credits but offer more competitive pay (Ellis 2022).

[2] According to a recent survey, 82% of managers responsible for filling accounting and financial positions at public companies find it difficult to attract or retain talent with financial skills (Deloitte 2022).

control are costly for firms—they can result in lower operational efficiency, increased regulatory scrutiny, and higher cost of capital (e.g., Beneish et al. 2008; Hammersley et al. 2008; Ashbaugh-Skaife et al. 2009; Dhaliwal et al. 2011; Cheng et al. 2018).

Ex ante, it is intuitive that a shortage of accountants can lead to ineffective internal control. The SEC (2007) considers internal control to be "a process that involves human diligence and compliance and is subject to lapses in judgment and breakdowns resulting from human failures." Rank-and-file accounting personnel typically bear direct responsibility for implementing and executing accounting systems (e.g., Choi et al. 2013; Guo et al. 2015; Gao et al. 2023). A lack of accounting personnel, therefore, may compromise the quality of internal control. Indeed, personnel-related issues such as "inadequate segregation of duties'' and "inadequate qualified staffing and resources" are frequently cited by firms as the cause of material internal control weaknesses (e.g., Ge and McVay 2005; Doyle, Ge, and McVay 2007; Gao et al. 2023). We therefore hypothesize that firms facing a more severe shortage of rank-and-file accounting personnel are more likely to experience deficiencies in internal control.

However, whether an accountant shortage will materially affect a firm's internal control effectiveness depends on the firm's ability to maintain control efficiency in the face of limited accounting personnel. Automation technologies such as Robotic Process Automation (RPA) and Enterprise Resource Planning (ERP) systems allow firms to automate repetitive and manual tasks and streamline internal control processes, reducing their dependence on rank-and-file accountants. Recent research even suggests that automation and AI can enhance audit efficiency (e.g., Chris, Emett, Summers, and Wood 2021). Given increasing adoption of technological tools into the audit and control process, the shortage of accounting personnel may not significantly affect a company's internal control. In addition, despite the recent surge in the accountant shortage, such shortages are

not new, and many firms have policies in place to ensure the continuity of essential functions when vacancies arise (e.g., redistributing work among existing employees or hiring temporary workers). Given these considerations, whether firms with a shortage of accounting personnel face a higher risk of internal control weakness (hereafter, ICW) is ultimately an empirical question.

We address this question by using a novel and comprehensive dataset of job vacancies that includes detailed job descriptions and job creation and deletion dates to create a sample of accounting vacancies. Measuring accountant shortages at the firm level is empirically challenging because such information is not observable. To overcome this challenge, we employ job vacancy duration for a firm's accounting positions as a proxy for the extent of shortages among rank-and-file accountants. Job vacancy duration (also known as time-to-fill) captures the time it takes for a company to fill a vacant position, generally from the time the vacancy is posted to the time when a suitable candidate is hired, which includes the time it takes to find the right match. When there is a shortage of labor in the market, that is, "when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to do that job," the search process tends to take longer, resulting in a longer vacancy duration (Veneri, BLS 1999). We therefore expect the shortage in accountants to result in longer accounting vacancy durations. [3,4]

Our sample includes 14,477 accounting job postings from 2,928 unique public firms in the US from 2008 to 2022. We identify accounting positions using the 6-digit O'NET Standard Occupation Code and measure vacancy duration as the number of days between a posting's

---

[3] The absolute number of vacancies is less informative about labor shortages as it primarily captures the demand for, not the supply of, workers, whereas vacancy duration is affected by both labor supply and demand. Moreover, a large number of vacancies may simply suggest that the position has a high turnover rate (Richardson 2007).

[4] It is worth noting that labor supply and demand are in general the key driver of labor shortages and vacancy durations. Various factors can affect labor supply and demand, including search frictions (e.g., Mortensen and Pissarides 1994), business cycles (Davis et al. 2013), and hiring intensity (Mongey and Violante 2020). Our study focuses on the costs associated with accountant shortages; we do not directly address or distinguish between the sources of such shortages.

opening and closing dates.[5] To measure vacancy duration at the firm level, we use the average duration of all accounting positions with a firm-year. To capture the effect on internal control quality, we use the mandatory material weakness disclosures made pursuant to Sections 302 and 404 of the Sarbanes-Oxley Act, which identify firms with material ICWs over financial reporting.

We begin by providing descriptive evidence on accounting vacancy duration for our sample. First, we observe an upward trend in vacancy duration over our sample period—the average (median) vacancy duration has increased gradually from 43 (38) days in 2008 to 56 (53) days in 2022, representing a 30% (39%) rise. This trend may be due in part to the general shortage of accountants that we observe nationwide. It is also consistent with employers increasingly demanding an expanded skillset that includes not only financial skills, but also analytic and social skills, which can result in an increase in the time necessary to find a suitable candidate with the right skills (Ham et al. 2023; Hershbein and Kahn 2018). Second, at the Metropolitan Statistical Area (MSA) level, we find a negative relationship between accounting vacancy duration and the employment-to-vacancy ratio, which captures the availability of accountants per vacancy, or the relative supply and demand of local accountants. This result validates the link between accounting vacancy duration and the accountant shortage at the aggregate level.

Turning to our main analysis, we examine the relation between accounting vacancy duration and ICW at the firm level. We include either industry or firm fixed effects to control for time-invariant industry or firm attributes as well as year fixed effects to account for year-over-year variation stemming from macroeconomic factors. We find that firms with longer accounting vacancy durations are more likely to experience ICWs in the year following vacancy postings, consistent with accountant shortages leading to a higher risk of internal control deficiencies. This

---

finding is economically significant—a one-standard-deviation increase in duration (roughly 25 days) from the mean is associated with an 8% to 10% increase in the likelihood of ICWs. We further find that longer accounting vacancy durations are associated with not only a higher likelihood of ICWs, but also more severe ICWs. Given that firms face significantly higher cost of capital following ICWs, our results suggest that the shortage of rank-and-file accounting personnel can pose significant costs to companies.

We next conduct two sets of cross-sectional tests on the relationship between accounting vacancy duration and ICWs. First, we expect a firm's financial and human capital resources to play a role as firms with more resources have greater ability to mitigate disruptions due to extended vacancies (e.g., by borrowing accounting personnel from other offices or hiring temporary workers), thereby reducing the likelihood of internal control deficiencies. Consistent with our expectations, we find that the relation between accounting vacancy duration and ICWs is stronger for smaller firms and for firms with less human capital resources. This finding suggests that the costs of ICWs stemming from accountant shortages and prolonged vacancy durations can be mitigated or even averted through improved resource planning. Second, we expect the scarcity of accounting personnel to have a more detrimental effect for firms with more complex financial statements and internal control systems that require more time and expertise to implement and execute. Contrary to our conjecture, we find that neither the number of XBRL tags (Hoitash and Hoitash 2018) nor the number of business segments has a significant effect, suggesting that basic internal control functions carried out by rank-and-file accountants are important across firms, regardless of the complexity of their business and financial functions.

Finally, we consider two additional potential costs of extended vacancy durations, namely, delayed filing of financial reports and unhappy employees. Several companies recently filed a

Notification of Late Filing (Form 12b-25), stating that the lack of accounting personnel due to turnover of accounting positions has resulted in a material ICW and consequently an inability to complete their SEC filings on time. Consistent with the anecdotal evidence, we find that firms with longer vacancy durations are more likely to delay their 10-K or 10-Q filings. In addition, we expect labor shortages to impose costs on not only the firm, but also its existing employees. When there is a job vacancy, existing rank-and-file employees often have to pick up the slack and work overtime, which can result in unhappy employees. Using accounting employees' ratings on Glassdoor to capture employee satisfaction, we find that longer vacancy durations are associated with lower work-life balance ratings. To the extent that employee satisfaction affects labor productivity and firm performance (e.g., Harter, Schmidt, and Hayes 2002; Edmans 2011; Oswald, Proto, and Sgroi 2015), this finding suggests that accountant shortages can have significant real costs. Moreover, the cost of extended vacancies can amplify over time if disgruntled employees mean more turnover.

Our results are subject to endogeneity concerns stemming from correlated omitted variables and potential reverse causality. We take several steps to alleviate these concerns and strengthen our identification. First, we include firm fixed effects in our main regressions to control for time-invariant firm attributes. Second, we vary the timing of ICWs relative to the timing of accounting job vacancies. We find that longer vacancy duration is associated with a higher likelihood of ICW in the year following the accounting job posting, but this association is not observed when we measure ICWs in the year prior to or two years subsequent to accounting job postings. Third, we explore the specific timing of the job vacancy within each fiscal year. We find that when accounting job postings are issued towards the end (beginning) of the fiscal year, their vacancy duration is positively associated with ICW in the subsequent (current) year and not in the

current (subsequent) year. Lastly, we repeat the main analysis using vacancy durations of a sample of IT positions (instead of accounting positions) and we do not find a significant relation between IT vacancy durations and ICWs. While we are cautious in drawing casual inferences, collectively our evidence is consistent with the duration of rank-and-file accounting vacancies having a significant negative effect on internal control quality.

Our study contributes to several literatures. First, it adds to the recent literature on the importance of human capital in the accounting profession. One branch of this literature focuses on human capital within accounting firms (e.g., Gul, Wu, and Yang 2013; Beck, Francis, and Gunn 2018; Ham, Hann, Rabier, and Wang 2023). Another branch examines the link between the human capital of rank-and-file employees and internal control quality. For instance, Guo et al. (2016) show that firms adopting employee-friendly policies experience fewer material weaknesses, while Gao et al. (2023) find that firms have stronger demand for rank-and-file employees with accounting skills following ICWs. Our study complements this research by showing that longer accounting vacancy durations are associated with a higher risk of ICWs and lower employee satisfaction, thereby highlighting the significant costs arising from a shortage of rank-and-file accountants.

Second, our study contributes to the extensive literature on the causes and consequences of ICWs. While prior research focuses primarily on firm attributes as key determinants of ICWs, we uncover a different source of deficiencies in internal control—the shortage of accounting personnel. This literature also offers ample evidence on the negative consequences of ICWs (e.g., Beneish et al. 2008; Hammersley et al. 2008; Ashbaugh-Skaife et al. 2009; Dhaliwal et al. 2011; Cheng et al. 2018). While we do not examine the consequences of ICWs or potential remediation strategies,

our finding that accountant shortages can lead to more frequent and severe ICWs suggests that attracting and retaining rank-and-file accounting talent is essential to avoid these costs.

Third, our study complements a nascent stream of research that examines the impact of technological advancements on human capital. The decline in the labor share of national income over the last decade has raised concerns about the potential negative effects of the increasing prevalence of digital technologies on employment, as workers face growing competition from machines (Karabarbounis and Neiman 2014; Oberfield and Raval 2014). Recent studies in labor economics incorporate technological changes into the canonical production model and suggest that technologies do not replace human workers but instead complement human capital and induce upskilling (e.g., Acemoglu, Daron, and Autor 2011; Acemoglu, Daron, and Restrepo 2017; Acemoglu and Restrepo 2018).[6] Empirical evidence from the labor economics and accounting literatures supports the view that certain skills such as social skills are invaluable human traits that are not easily replaced by and play an important complementary role to technology (e.g., Deming 2017; Deming and Kahn 2018; Ham et al. 2023). Our study complements this literature by highlighting the importance of accountants through a different lens. Our finding that accountant shortages can pose significant costs to organizations indicates that, despite technological advancements, accountants remain irreplaceable by automation and continue to play a vital role in maintaining high-quality internal control.

Finally, our study has practical implications for both corporations and educators. As the industry grapples with a scarcity of accounting professionals, our findings underscore the

---

[6] The canonical model draws no distinction between skills and occupations (tasks). Acemoglu and Autor (2011) expands the model with dynamic worker-task assignments—workers of a given skill level can perform a variety of tasks and change the set of tasks that they perform in response to technological changes.

significance of accountants in organizations and hence the urgency of building a robust pipeline to meet this demand.

The remainder of the paper proceeds as follows. Section 2 summarizes the related literature and develop the main hypothesis. Section 3 describes the sample, data, and research design. Section 4 presents our main empirical results. Section 5 discusses additional analyses. Finally, Section 6 concludes.

2. Literature Review and Hypotheses

2.1 Internal Control Weakness

A material weakness in internal control is ''a significant deficiency, or combination of significant deficiencies, that results in more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected'' (PCAOB, 2004). ICWs increase the risk of errors and misstatements in financial statements, consequently reducing reporting quality (Doyle et al. 2007b; Ashbaugh-Skaife et al. 2008). A rich literature has examined the determinants and consequences of ICWs.[7] With respect to the determinants, prior research finds that firms' fundamental characteristics (e.g., size, age, financial soundness, and complexity), firms' economic activities (e.g., foreign transactions, M&A), and auditor-related characteristics (e.g., Big4 auditor, audit fees, and auditor change) are key drivers of ICWs (e.g., Ashbaugh-Skaife et al. 2007; Doyle et al. 2007a). With respect to the consequences, the literature shows a range of adverse effects, including heightened regulatory scrutiny (Rice, Weber, and Wu 2015), negative market reactions (Beneish et al. 2008; Hammersley et al. 2008), an increase in the cost of capital (Ashbaugh-Skaife et al. 2009; Dhaliwal et al. 2011; Kim et al. 2011), and reduced operational efficiency (Cheng et al. 2018).

---

[7] See Schneider et al. (2009), Kinney et al. (2013), and Chalmers et al. (2019) for a thorough review of the literature on internal control.

One branch of this literature explores the role of human capital within this context. Krishnan (2005) finds that firms with audit committees that are more independent and with greater financial expertise are associated with a lower likelihood of ICWs. Goh (2009) shows that effective audit committees and boards of directors are associated with faster remediation of internal control deficiencies. Li et al. (2010) document that firms receiving adverse Section 404 opinions often have less qualified CFOs, and that hiring more qualified CFOs helps improve the firm's internal control. Expanding beyond senior management, Choi et al. (2013), by exploiting a small sample of firms in Korea mandated to disclose information about their internal control personnel, find that the proportion of employees involved with the implementation of internal controls are negatively associated with the disclosure of ICWs. Guo et al. (2016) find that firms with employee-friendly policies experience fewer ICWs. Gao et al. (2023) document an increase in firms' demand for accounting skills in their rank-and-file employees after the disclosure of an ICW. Our study complements this stream of research by examining the impact of a shortage of rank-and-file accountants on internal control deficiencies.

2.2 Labor Shortage and Job Vacancy Duration

According to BLS, "a shortage occurs when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions." Prior research focuses primarily on labor shortages at the aggregate level. Early studies in labor economics develop theoretical frameworks to understand the labor market dynamics from the lens of searching and matching (Diamond 1982; Pissarides 1985; Morrtensen and Pissarides 1994). Grounded on the theoretical framework, it is shown that vacancy creation is a central determinant of cyclical movement, which tightens the labor market and reduces vacancy-filling rate (e.g., Abraham, 1987; Shimer, 2001).

Intuitively, a high vacancy filling rate implies greater labor supply relative to demand. As the job vacancy duration is also driven by the equilibrium of labor supply (i.e., the number of applicants) and demand (i.e., the number of vacancies) (e.g., Weber, 2010), it captures the extent of worker shortage or surplus in a market. However, the availability of granulate data on job vacancy duration is limited. Hence, empirical evidence on the effects of labor shortages and extended vacancy durations is scarce.[8] Prior studies in labor economics primarily use the Job Openings and Labor Turnover Survey (JOLTS) data to examine vacancy duration at an aggregate level (e.g., Davis et al., 2013; Mongey and Violante, 2019). Two recent studies explore vacancy duration at the firm level. Muellet et al. (2023) use Austrian labor market data to measure firm-level job filling duration and find that vacancy durations are negatively associated with the starting wage. Chen and Li (2023) use job posting data to show that vacancy duration is informative of future firm profitability as a firm's hiring practice reflects manager's anticipation of future performance. Our study also use job posting data to study job vacancy durations. We differ in that we focus on the duration of a specific occupation, namely, rank-and-file accountants, which allows us to more directly study the costs associated with the shortage of accountants, namely the likelihood of ICWs.

2.3 Hypothesis Development

Internal control weaknesses are deficiencies in the design or implementation of internal controls that can lead to errors, omissions, or misstatements in financial reporting. Human capital is a critical component of an internal control system (Choi et al. 2013; Guo et al. 2016; Gao et al.

---

[8] A recent study by Harford, He, and Qiu (2023) employs a machine learning approach to develop a firm-level measure of labor-shortage exposure based on information from earnings conference call transcripts. They find that firms with a higher labor-shortage exposure, measured by the number of labor-shortage-related sentences identified by a BERT model divided by the total number of sentences in the conference call transcript, experience lower three-day cumulative abnormal returns following their earnings calls and worse stock returns and operating performance in the subsequent year.

2023). For example, the SEC (2007, 2) considers internal control as "a process that involves human diligence and compliance and is subject to lapses in judgment and breakdowns resulting from human failures." According to COSO (2013), "Internal control is a process effected by an entity's board of directors, management, and other personnel, designed to provide reasonable assurance regarding the achievement of objectives relating to operations, reporting, and compliance."

Accountants play a critical role among the personnel in carrying out internal control functions. Out of the five components (i.e., control environment, risk assessment, control activities, information and communication, monitoring activities) of internal control detailed in the COSO (2013) framework, accountants can contribute to the well-functioning of the components in different aspects. For example, under "risk assessment", accountants can use their specialized knowledge and skills in accounting principles to identify potential risks in the accounting process. In addition, under "control activities", accountants can help select and design control activities based on the identified risks as well as directly perform the activities in the financial reporting process. Moreover, under "information and communication", accountants can provide guidance and training to other employees and help their colleagues understand their respective roles and responsibilities in maintaining effective internal controls. Last but not least, under "monitoring activities", by monitoring and evaluating the effectiveness of internal controls over time, accountants can help identify issues and weaknesses and address them promptly.

Therefore, a lack of accounting personnel who are familiar with a firm's financial reporting procedures may compromise the quality internal control system and result in a higher the risk of internal control deficiency. In fact, an important cause of material ICWs stated by firms is personnel-related issues, including "inadequate segregation of duties'' and "inadequate qualified staffing and resources", which are sometimes associated with an insufficient number of accounting

staff (e.g., Ge and McVay 2005; Doyle, Ge, and McVay 2007; Gao, Merkley, Pacelli, and Schroeder 2023). We thus state our hypothesis in alternative form as follows:

H1: Firms facing a more severe shortage of rank-and-file accounting personnel are more likely to experience deficiencies in internal control.

However, it is unclear whether we will observe this relation as it is possible that firms can maintain control efficiency with a limited number of accounting personnel. By utilizing automation technologies such as Robotic Process Automation (RPA) and Enterprise Resource Planning (ERP) systems, firms can automate repetitive and manual tasks and streamline internal control processes, thereby mitigating the influence of accountant shortage. Recent research suggests that automation and AI can enhance audit efficiency (e.g., Chris, Emett, Summers, and Wood 2021). In addition, firms may adopt contingency plans, such as redistributing work among existing employees or hiring temporary workers, to ensure the continuity of essential functions when faced with staffing shortages. Given these considerations, whether the shortage of accounting personnel will significantly affect a firm's internal control is ultimately an empirical question.

3. Data, Measures and Empirical Design

3.1. Data and Measures

3.1.1 Accounting Vacancy Duration

We obtain job vacancies data from Linkup, a novel database that includes nearly all online job postings collected from companies' websites.[9] The dataset includes detailed job descriptions

---

[9] The data provider is a leading company specializing in job market data and analytics. It compiles a comprehensive database of job postings by crawling company career websites and capturing information on job titles, location, job creation, and deletion dates. The dataset covers over 70% of US public firms and is updated monthly.

and job creation and deletion dates of job vacancies from August 2007.[10] Using its algorithm,

LinkUp matches each job with an O*NET (i.e., occupational network) standard occupation code.

Although firms may hire employees without posting the opening online, prior research has shown

that Linkup data have a broad coverage of the job vacancies of U.S. firms. For example, Campello

et al. (2020) conducted a comparison between LinkUp job posting data with administrative data

on employment from BLS and U.S. Census Bureau, and concluded that LinkUp data provide a

reasonable representation of corporate hiring activities. Chen and Li (2023) find that by 2018

LinkUP covered approximately 70% of U.S. public firms that account for 93% of total market

capital.

To capture the level of accountant shortage, we use the duration of accounting vacancy.

Vacancy duration refers to the time it takes for a company to fill a vacant job position, generally

from the time the job vacancy is posted to the time when a suitable candidate is hired. We identify

accounting job vacancies using 6-digit O'NET code. Specifically, a job position is classified as an

accounting or internal auditor job if 6-digit O'NET equals to 13-2011. Following Chen and Li

(2023), we exclude job postings with a duration greater than 180 days or less than 1 day.[11] To

construct a firm-level accounting vacancy duration measure, we average the vacancy duration of

accounting openings posted by a firm in a year (*Duration*).

3.1.2 Internal Control Weakness

We collect data on internal control weaknesses from Audit Analytics. We create an

indicator variable, *ICW*, that takes the value of 1 if a firm reveals an internal control weakness in

---

[10] This relatively new and rich dataset has a similar coverage to the job posting data from Lightcast (formerly Burning Glass), which has been used in prior labor economics research to capture skill demands for professionals in various occupations (e.g., Hershbein and Kahn 2018; Bai et al. 2021).
[11] About 10% of the accounting job postings from our sample firms have a duration that is either more than 180 days or less than 1 day.

one or more reports among Section 302 quarterly certifications, 404(a) management assessment, and 404(b) audit report, otherwise 0. We also obtain the count of internal control weaknesses identified by auditors or managers in a year to measure the severity of ICW.

3.2 Sample and Time-trend of Accounting Vacancy Duration

To assemble the final sample for our analyses, we require the firm-year observations to be covered by LinkUP, Audit Analytics and Compustat. Our final sample is comprised of 14,477 firm-year observations of 2,928 U.S. firms spanning over the sample period of 2008-2022. The firms posted a total of 549,620 accounting vacancies throughout the sample period.

Figure 1 plots the mean and median of the duration of accounting vacancies posted by our sample firms from 2008 to 2022. The mean (median) of accounting vacancy duration has gradually increased from 43 (38) days to 56 (53) days during the period of 2008-2022, representing a 30% (39%) rise. This trend is consistent with the general shortage of accountants nationwide. It may also reflect employers' increasing demand of an expanded skillset that includes not only financial skills, but also analytic and social skills, which can result in an increase in the time necessary to find a suitable candidate with the right skills (Ham et al. 2023; Hershbein and Kahn 2018).

3.3 MSA-level Analysis: Job Vacancy Duration and the Employment-to-Vacancy Ratio

Using job vacancy duration of the rank-and-file employees to capture the extent of labor shortage is relatively new to academic research. To ensure our vacancy duration measure captures the variations in accountant shortages, we validate the link between accounting vacancy duration and the accountant shortage at the aggregate level. In the event of a labor shortage, there is a greater demand for workers than there is supply. We use the total number of accountants employed in an MSA-year to proxy for accountant supply, and we use the total number of accounting vacancies

in an MSA-year to proxy for accountant demand. [12] A low employment-to-vacancy ratio flags a shortage of accountants in an MSA. We then examine the link between the average vacancy duration on the employment-to-vacancy ratio at the MSA-year level. Figure 2 provides a time-series graphical illustration of the relationship. Accountant employment-to-vacancy ratio and vacancy duration exhibit a negative correlation over the period of 2008-2022. Table 2 presents the results of a regression analysis. We find that, after controlling for MSA and year fixed effects, accounting employment-to-vacancy ratio is negatively and significantly associated with vacancy duration. These findings provide internal validity of using accounting vacation duration as a proxy for accountant shortage.

3.4 Empirical Design

To test our H1 on the relationship between accounting vacancy duration and internal control weaknesses, we model a firm's likelihood of having internal control weakness as a function of firm fundamentals and accounting vacancy duration. Our baseline regression model is as follows:

$$ICW_{i,t} = \beta_0 + \beta_1 Duration_{i,t-1} + \beta_2 Controls_{i,t} + \beta_3 Industry\ (Firm)FE \\ + \beta_4 Year\ FE + e_{i,t}, \tag{1}$$

where i indexes firm and t indexes year. $ICW_{i,t}$ is an indicator variable that equals to 1 if firm i has disclosed an internal control weakness in year t; $Duration_{i,t-1}$ is the natural logarithm of the average duration of all accounting job vacancies posted by firm i in year t-1. Following Doyle et al. (2007a) and Guo et al. (2016), we control for a set of firm fundamental characteristics. First, we control for *Firm Size*, measured as the natural logarithm of a firm's total assets. Larger firms

---

are more likely to have financial resources in hiring and ensuring appropriate segregation of duties in internal control functions. Second, as special events can affect a firm's control efficiency and employee flow decisions, we control for *Foreign Transactions*, *M&A* and *Restructure*, which are indicator variables that equal to 1 if there are any foreign transactions, M&A or restructuring activities in year *t*, respectively. Third, we control for a firm's financial performance, including aggregate loss year *t* and *t*-1 (*Aggregated Loss*), return on assets (*ROA*) and leverage (*Leverage*), because a firm's financial performance is associated with a firm's control efficiency and workers' job flow decisions (Choi et al.2023). Lastly, we control for auditor-related characteristics, *Big4*, *Audit Fee*, and *Auditor Change*. Specifically, *Big4* is an indicator variable that equals one if a firm is audited by one of the Big 4 audit firms in year *t* and zero otherwise; *Audit Fee* is the natural logarithm of total audit fee in year *t*; *Auditor Change* is an indicator variable that equals to 1 if a firm has experienced the auditor change in year *t* and zero otherwise.

We augment the model with two sets of alternative fixed effects. First, we include 2-digit SIC industry and year fixed effects to control for static industry effects as well as economy-wide time varying effects, respectively. Second, we include firm and year fixed effects. The inclusion of firm fixed effects controls for firm-level unobservable characteristics, thereby allowing us to exploit the variation within a firm over time. β_1 is our main coefficient of interest. We expect β_1 to be positive, i.e., longer accounting vacancy duration leads to higher likelihood of having internal control deficiency.

3.5 Descriptive Statistics

Table 1 Panel A reports the descriptive statistics for the variables used in our main analyses. On average, it takes 48 days to fill an accounting position for our sample firms. 8.5% of firm-years disclosed ICWs. The mean (median) size of our sample firms is 21,966 million (3,273 million).

Among the firms, 15.9% experienced aggregate loss in the past two years, and 3.7% underwent auditor change. The average firm has a return on assets of 1.2% and leverage of 0.251. 72% of firm-years has foreign transactions, while 65.2 % and 43.1% of firm-years experienced M&A and restructuring, respectively.

Panel B of Table 1 reports the Pearson and Spearman correlation matrices of the variables. Univariately, *ICW* is positively correlated with *Duration*, with the correlation being significant at the 5% level. *Duration* does not exhibit high correlations with any of the control variables, indicating that multicollinearity is not a severe concern.

4. Empirical Results

4.1 Accounting Vacancy Duration and Internal Control Weaknesses

Table 3 presents the regression results of Model (1), which tests H1 on the relationship between accounting vacancy duration and the likelihood of internal control weaknesses. Column 1 (2) reports the results based on a specification in which we control for industry (firm) and year fixed effects. In both columns, the coefficients on *Duration* are positive and statistically significant at the 1% level, consistent with a higher likelihood of ICWs when it takes longer for a firm to fill accounting positions. In Columns (3) and (4), we augment the specification used in Columns (1) and (2) by controlling for firm attributes, respectively. We continue to find a positive and significant association between *Duration* and *ICW*.[13] The effect of *Duration* is also economically meaningful. Based on the results in Column (4), a one-standard-deviation increase in *Duration* from the mean is associated with an 8.0% to 9.5% increase in the likelihood of *ICW*.

The impacts of the control variables are generally consistent with the findings of prior literature (e.g., Doyle et al. 2007). For example, there is a higher propensity of internal control

---

[13] Our results are robust to using the raw value of durations (number of filling days) as the independent variable and robust to using a logistic model augmented with industry and year fixed effects.

deficiency if the firm has weaker financial performance (as captured by *Aggregated Loss*) or experienced auditor change. Overall, the findings in Table 3 support our prediction in H1 and suggest that firms with longer accounting vacancy durations are at a higher risk of experiencing internal control weaknesses.

4.2 Cross-sectional Tests

Moderating Effects of Firm Resources

Next, we examine whether the costs of accountant shortage vary with various firm attributes. We expect a firms' financial and human capital resources to play a role in this relation as the firms with less resources have lower ability to employ alternative means (such as borrowing accounting and financial personnel from other offices or hiring temporary workers) to mitigate disruptions from extended vacancies, thereby increasing the likelihood of internal control deficiencies. To test this posit, we capture firms' financial and human capital resources by firm size and labor intensity, respectively. In particular, firms of smaller size are less capable of reallocating financial personnel and recruiting temporary workers. Firms with lower labor intensity may have less human capital resources serving as a cushion for accountant shortage. For better interpretation, we define an indicator variable, *Small Size*, that takes the value of one if a firm's market capitalization is lower than the sample mean and zero otherwise. Similarly, we construct an indicator variable, *Low Labor Resource*, that takes the value of one if a firm's labor intensity (i.e., total number of employees scaled by total assets) is lower than the sample mean and zero otherwise. We then modify Model (1) by adding teach of the moderating variables and its interaction with the main effects, $Duration_{i,t-1}$. If the lack of resources exacerbates the negative impact pf accountant shortages on a firm's internal control quality, the coefficients on the interaction terms will be positive.

Table 4 Panel A reports the regression results. We find that the coefficients on the interactions of *Duration* and the measures of firm resources (i.e., *Small Size* or *Low Labor Resource*) are positive and statistically significant at the 5% level or higher, suggesting that the likelihood of ICW increases with accounting vacancy duration to a greater extent when the firm has less financial or human capital resources. Economically, the effect of *Duration* on *ICW* is 2.5% (2.1%) higher for smaller firms (firms with less human capital resources) than that for larger firms (firms with more human capital resources).

Moderating Effects of Financial Statement Complexity

In addition, the costs of accountant shortage may depend on the complexity of a firm's financial statement. Specifically, it requires more expertise and coordination to implement and execute the internal control systems of firms with more complex financial statements. Hence, the control system is more likely to break down for firms with more complex financial statements in the event of an accountant shortage. To test this conjecture, we capture a firm's financial statement complexity by (1) its number of business segments and (2) the number of XBRL tags in its annual reports. Correspondingly, we define two indicator variables, *High Business Segment*, which equals to one if a firm's number of business segments is higher than the sample mean and zero otherwise, and *High Accounting Complexity*, which equals to one if the number of XBRL tags in a firm's 10-K filing is above the sample mean and zero otherwise.[14] We then modify Model (1) by adding each of the complexity measures and its interaction with the main effects, $Duration_{i,t-1}$. A positive coefficient on the interaction term would indicate a larger cost of accountant shortage for firms with more complex financial statements.

---

[14] It has been documented in the prior literature that the number of XBRL tags on a firm's 10-K or 10-Q captures the complexity degree of a firm's business (Hoitash and Hoitash 2018). The data is publicly available at https://www.xbrlresearch.com.

Panel B reports the regression results. In contrast to our prediction, we find that the coefficients on the interactions of *Duration* and measures of financial statement complexity are not significantly different from zero. The results indicate that accounting personnel plays a consistently important role in maintaining the internal control quality regardless of the complexity of firms' financial statements.

5. Additional Analyses

We perform four sets of additional analyses to corroborate our main findings on the relationship between accounting vacancy duration and ICWs, strengthen the identification of the effect of accounting vacancy duration, and explore other costs of accountant shortage.

5.1 Accounting Vacancy Duration and the Severity of Internal Control Weakness

Our main findings suggest that prolonged accounting vacancy increases the likelihood that an ICW exists. Deficiencies in internal controls can arise in various forms and with varying degrees of severity. (Gao et al. 2023). Hence, we further examine whether longer accounting vacancy duration is associated with the more severe internal control deficiency. In capturing the severity of ICWs, we use the number of weaknesses for each ICW, *ICW Severity* (Costello and Wittenberg-Moerman 2011).[15] Then we estimate Model (1) replacing *ICW* with *ICW Severity*. Table 5 reports the regression results. We find a positive and statistically significant coefficient on *Duration*, suggesting that extended accounting vacancy provokes more severe internal control weaknesses. In terms of economic significance, a one-standard-deviation increase of *Duration* from the mean is associated with an 10% increase in the number of weaknesses. Therefore, longer accounting vacancy durations are associated with not only a higher likelihood of ICWs, but also more severe ICWs.

---

[15] Specifically, we use the variable Count Weakness in Audit Analytics, which indicates the number of material weaknesses identified.

5.2 Accounting Vacancy Duration, Late Filings, and Employee Satisfactions

We further consider two additional potential costs associated with a shortage of accounting personnel, namely late filings of financial reports and unhappy employees. Public companies are mandated to file annual and quarterly reports with the SEC based on filer status. Specifically, large-accelerated, accelerated, and non-accelerated filers are granted 60 (40), 75 (40), and 90 (45) days, respectively, to file the annual (quarterly) report. When a registrant is unable to file a report "without unreasonable effort or expense", the firm can request an automatic 15-day extension (5 days for a 10-Q) by filing a Form 12b-25 with the SEC no later than one business day after the statutory due date and stating the reason for the delay. Cao et al. (2016) find that late-filing firms have lower financial reporting quality and a higher likelihood of subsequent restatements for previously delayed filings. Moreover, firms that delayed their filings experience negative market returns (Alford et al. 1994; Griffin 2003; Feldman 2006; Impink et al. 2012).

As accountants play a central role in preparing timely financial statement, a lack of accountants may result in a delay in filing financial reports. Anecdotal evidence is consistent with link. For example, in a recent Notification of Late Filing, Advance Auto Parts stated that the lack of accounting personnel due to turnover of accounting positions has resulted in a material ICW and consequently an inability to complete their SEC filings on time.

We estimate Model (1) replacing *ICW* with an indicator variable for late filing (*Late Filing*), which equals to one if a firm disclosed on Form 12b-25 that it could not file its 10-K or 10-Q by the statutory due date and zero otherwise. Table 6 Panel A reports the regression results. The coefficient on *Duration* is positively and statistically significant, consistent with a higher propensity of late filing when firms need to spend more time filling accounting vacancies.

Economically, a one-standard-deviation increase in *Duration* from the mean corresponds to a 4.5% to 6.8% increase in the likelihood of delayed filings.

Moreover, we examine whether the time to fill accounting vacancies has an effect on current accounting employees' satisfaction. Prolonged job vacancy may require the current rank-and-file employees to work overtime and take on additional responsibilities, which can lead to employee dissatisfaction. We capture accounting employee satisfaction using the average Glassdoor ratings on a firm's Work-Life Balance rated by employees who serve accounting or internal auditor roles (*Work-Life Balance*).

We then regress *Work-Life Balance* on *Duration*, controlling for firm fundamental characteristics, including *Firm Size, ROA, Market-To-Book, Sales Growth, and Leverage*. Table 6 Panel B presents the regression results. In Column (1), which controls for industry and year fixed effects, the coefficient on *Duration* is negative and significantly at the 5%, suggesting that lengthy duration of unfilled accounting positions reduces the remaining accounting employees' satisfaction on their work-life balance. Likely due to a smaller sample size and the persistence of employee ratings, the effect of *Duration* is not statistically significant after we replace industry fixed effects with firm fixed effects, as shown in Column (2). To the extent that employee satisfaction affects labor productivity and firm performance (e.g., Harter et al. 2002; Edmans 2011; Oswald et al. 2015), our finding suggests that accountant shortages can be costly to firms through their impact existing employees. Additionally, if dissatisfied employees result in increased turnover, the cost of prolonged job vacancies can amplify over time.

5.3 Timing of Vacancy Duration

Our findings are subject to endogeneity concerns stemming from reverse causality and omitted correlated variable. For example, accounting professionals may choose not to join the

firms with higher ex-ante risk of internal control deficiency, which leads to the observed positive correlation between accounting vacancy duration and ICWs. Although we control for a battery of firm characteristics and firm fixed effects in our main specification, they do not completely rule out the endogeneity concern. To strengthen our identification, we explore the specific timing of the job vacancy and conduct the two following tests. First, we regress a firm's internal control deficiency indicator in year t-2 and year t+2 on the average accounting vacancy duration in year t-1. Table 7 Panel A reports the results. As shown, the accounting vacancy duration in year t-1 is not significantly associated with the internal control deficiency in year t-2 or year t+2, suggesting our findings are less likely to be driven by reverse causality or omitted variable bias.

Second, we examine the contemporaneous effects of accounting vacancy duration on internal control efficiency. For public companies, the process of training new accountants and acquainting them with the firm's financial reporting system is a time-intensive undertaking. Most likely, accountants recruited in the last fiscal year or at the beginning of the current fiscal year tend to be highly involved in the internal control functions for the current year. Therefore, we expect the duration of the vacancies posted at the beginning of a fiscal year is more associated with the contemporaneous internal control efficiency, while the duration of the vacancies posted towards the end of a fiscal year is more associated with the internal control efficiency in the next year.

To test this prediction, we perform two sets of analyses. First, we regress a firm's ICW indicator in year t on the average duration of accounting vacancies posted in the first three months of year t or the average duration of accounting vacancies posted in the last three months of year t. Second, we regress a firm's ICW indicator in year t+1 on the average duration of accounting vacancies posted in the first three months of year t or the average duration of accounting vacancies posted in the last three months of year t. Panel B and Panel C of Table 7 report the results. We find

that accounting vacancy duration is positively associated with ICW in the current year and the subsequent year when the job postings are issued in the early fiscal year, while accounting vacancy duration is positively associated with ICW in the subsequent year but not in the current year when the job postings are issued towards the end of the fiscal year. These findings provide further support on the effect of accounting vacancy duration on ICW.

5.4 Placebo Test: Effect of IT Vacancy Duration on Internal Control Weakness

Lastly, to mitigate the concern that our findings reflect a general impact of labor scarcity rather than a specific effect of accountant shortage, we conduct a placebo test using the vacancy duration of IT positions. We classify a position as an IT job if the first two digit of O*NET code equals to 15. We then regress *ICW* on the average duration of all IT vacancies for a firm-year, *IT Duration*, and the control variables used in Model (1). Table 8 reports the regression results. It is shown that IT vacancy duration is not significantly associated with ICW. The results suggest that our main findings are less likely to be driven by a general labor shortage and lend further support to importance of accounting personnel in firms' internal control. Although we are cautious in drawing casual inferences, collectively our findings are consistent with the duration of rank-and-file accounting vacancies having a significant negative effect on internal control quality.

6. Conclusion

Accountants, often the unsung heroes of financial stability, are integral to the functioning of the capital market. However, over the past decade we have witnessed a growing shortage of accounting professionals, which raises concerns about the potential impact on businesses. Accounting firms and educators describe this as an "all-hands-on-deck" situation (Hart 2022). Should Corporate America also be alarmed? The purpose of this study is to shed light on the costs of the recent accountant shortage and enhance our understanding of the gravity of this trend.

Using the duration (or time-to-fill) of accounting job vacancies as a measure of an accountant shortage, we first document that vacancy durations have increased by over 40% over the past decade. We find that firms with longer accounting vacancy durations are more likely to experience material internal control weaknesses, with this relation more pronounced for firms with less financial and labor resources. We further show that accounting personnel tend to report lower job satisfaction when accounting positions at their firms are vacant for an extended period. Taken together, our results suggest that an accountant shortage comes at a significant price—a scarcity of accounting talent can lead to an increased risk of internal control deficiencies and disgruntled employees, ultimately impairing financial reporting quality, reducing firm value, and increasing the cost of capital. These consequences are particularly stark for firms with limited resources to buffer themselves from shocks related to staffing shortages. In sum, our study indicates that the accountant shortage across the nation is not merely a recruitment challenge—it has real and significant consequences for businesses. Corporations, accounting firms, and educators alike should respond to this critical challenge by collaborating to ensure an adequate supply of accounting professionals.

Appendix: Variable Definitions

	Outcome Variables
ICW	An indicator variable equals to 1 if a firm discloses an internal control weakness in one or more of the following reports in year t: Section 302 quarterly certifications, 404(a) management assessment, and 404(b) audit report, otherwise 0.
ICW_{t-2}	An indicator variable equals to 1 if a firm discloses an internal control weakness in one or more of the following reports in year t-2: Section 302 quarterly certifications, 404(a) management assessment, and 404(b) audit report, otherwise 0.
ICW_{t+2}	An indicator variable equals to 1 if a firm discloses an internal control weakness in one or more of the following reports in year t+2: Section 302 quarterly certifications, 404(a) management assessment, and 404(b) audit report, otherwise 0.
ICW Severity	Logged value of the number of Internal Control Weaknesses identified in the following reports: Section 302 quarterly certifications, 404(a) management assessment, and 404(b) audit report.
Late Filing	An indicator variable equals to 1 if a firm disclosed on Form 12b-25 that it could not file its 10-K or 10-Q by the statutory due date, otherwise 0.
$Work\text{-}Life\ Balance_t$	Average Glassdoor ratings on a firm's Work-Life Balance rated by employees who serve accounting or internal auditor roles in year t.
MSA Duration	Average number of days to fill an accountant job vacancy in an MSA in a year.

	Independent Variables
Employment to Vacancy	The ratio of total number of accountants employed to total number of accountant job vacancies in an MSA in a year.
$Duration_{t-1}$	Logged value of the average number of days to fill an accountant job vacancy for firm i in year t-1.
$Early\ Duration_{t-1}$	Logged value of the average number of days to fill an accountant job vacancy posted in the first 3 months of the fiscal year for firm i in year t-1.
$Early\ Duration_t$	Logged value of the average number of days to fill an accountant job vacancy posted in the first 3 months of the fiscal year for firm i in year t.

Late Duration$_{t-1}$	Logged value of the average number of days to fill an accountant job vacancy posted in the last 3 months of the fiscal year for firm i in year t-1.
Late Duration$_t$	Logged value of the average number of days to fill an accountant job vacancy posted in the last 3 months of the fiscal year for firm i in year t.
IT Duration$_{t-1}$	Logged value of the average number of days to fill an IT job vacancy posted by firm i in year t-1.

Control Variables and Cross-Sectional Variables

Size	The log value of total assets of a firm.
Foreign Transaction	An indicator variable equals to 1 if there are foreign transactions in a year,
M&A	An indicator variable equals to 1 if there are M&A activities in a year, otherwise 0.
Aggregated Loss	An indicator variable equals to 1 if a firm has negative earnings in year t and year t-1, otherwise 0.
Big4	An indicator variable equals to 1 if a firm is audited by one of the Big4 audit firms in year t, otherwise 0.
Audit Fee	The log value of total audit fee a firm incurs in a year.
Auditor Change	An indicator variable equals to 1 if a firm changed the audit firm in year t, otherwise 0.
Restructure	An indicator variable equals to 1 if a firm experience restricting activities in year t, otherwise 0.
Restatement	An indicator variable equals to 1 if a firm has issued a restated financial statement, otherwise 0.
ROA	Net income scaled by total assets of a firm.
Leverage	The ratio of long-term debt and debt in current liabilities Leverage to stockholders' equity.
Going Concerns	An indicator variable equals to 1 if a firm's auditor issued a going-concern opinion in a year, otherwise 0.
Bankrupt Risk	An indicator variable equals to 1 if a firm's Altman score indicates a firm has notable bankrupt risk (i.e., if z <1.8, or if z <3 and decreases 2 consecutive years).
High Business Segments	An indicator variable equals to 1 if a firm's total number of business segments is higher than the sample mean, otherwise zero.
High Accounting Complexity	An indicator variable equals to 1 if a firm's financial reporting complexity score (ARC) is higher than the sample mean, otherwise zero. ARC is constructed based on the count of accounting items (XBRL tags) disclosed in 10-K filings (Hoitash and Hoitash, 2014).
Low Labor Resource	An indicator variable equals to 1 if a firm's labor intensity is lower than the sample mean, otherwise 0.

	Labor intensity is defined as total number of employees a firm has in year t, scaled by total assets in year t.
Small Size	An indicator variable equals to 1 if a firm's market capitalization is lower than the sample mean in a year, otherwise zero.

References

Abraham, K. G. (1987). Job durations and the outcomes of job match quality. Journal of Labor Economics, 5(4), 546-560.

Acemoglu, D., & Autor, D. (2011). Skills, tasks and technologies: Implications for employment and earnings. Handbook of Labor Economics, 4, 1043-1171.

Acemoglu, D., & Restrepo, P. (2018). Robots and jobs: Evidence from US labor markets. Journal of Political Economy, 128(6), 2188-2244.

Ashbaugh-Skaife, H., Collins, D. W., & Kinney, W. R. (2007). The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. Journal of Accounting and Economics, 44(1-2), 166-192.

Ashbaugh-Skaife, H., Collins, D. W., Kinney Jr, W. R., & LaFond, R. (2009). The effect of internal control deficiencies on firm risk and cost of equity capital. Accounting Review, 84(2), 431-468.

Beck, P. J., Francis, J. R., & Gunn, J. L. (2018). Public accounting firm investment in audit technology and audit quality. The Accounting Review, 93(4), 309-334.

Beneish, M. D., Billings, M. B., & Hodder, L. D. (2008). Internal control weaknesses and information uncertainty. The Accounting Review, 83(3), 665-703.

Chen, C., & Li, L. Forthcoming. Is Hiring Fast a Good Sign? The Informativeness of Job Vacancy Duration for Future Firm Profitability. Review of Accounting Studies.

Cheng, M., Dhaliwal, D., & Zhang, Y. (2018). Does investment efficiency improve after the disclosure of material weaknesses in internal control over financial reporting? Journal of Accounting and Economics, 66(1), 55-77.

Cheng, M., Dhaliwal, D., & Zhang, Y. (2018). Does investment efficiency improve after the disclosure of material weaknesses in internal control over financial reporting? Journal of Accounting and Economics, 65(1), 65-87.

Choi, J., Kim, J., Liu, X., & Simunic, D. (2013). Audit pricing, legal liability regimes, and big 4 premiums: Theory and cross-country evidence. Contemporary Accounting Research, 30(1), 55-96.

Choi, J. H., Choi, S., Hogan, C. E., & Lee, H. (2013). The effect of human resource investment in internal control on the disclosure of internal control weaknesses. Auditing: A Journal of Practice & Theory, 32(4), 169-199.

Chris, E., Emett, S. A., Summers, S. L., & Wood, D. A. (2021). The Effect of Automation on Audit Efficiency: An Experimental Approach. Journal of Accounting, Auditing & Finance, 08941392211004203.

Davis, S. J., Faberman, R. J., & Haltiwanger, J. (2013). The establishment-level behavior of vacancies and hiring. The Quarterly Journal of Economics, 128(2), 581-622.

Deming, D. J. (2017). The growing importance of social skills in the labor market. The Quarterly Journal of Economics, 132(4), 1593-1640.

Deming, D. J., & Kahn, L. B. (2018). Skill requirements across firms and labor markets: Evidence from job postings for professionals. Journal of Labor Economics, 36(S1), S337-S369.

Diamond, P. A. (1980). Aggregate demand management in search equilibrium. Journal of Political Economy, 88(5), 881-894.

Diamond, P. A. (1982). Wage determination and efficiency in search equilibrium. The Review of Economic Studies, 49(2), 217-227.

Dhaliwal, D., Hogan, C. E., Trezevant, R., & Wilkins, M. S. (2011). Internal control disclosures, monitoring, and the cost of debt. The Accounting Review, 86(4), 1131-1156.

Doyle, J., Ge, W., & McVay, S. (2007). Accruals quality and internal control over financial reporting. The Accounting Review, 82(5), 1141-1170.Doyle, J., Ge, W., & McVay, S. (2007). Determinants of weaknesses in internal control over financial reporting. Journal of Accounting and Economics, 44(1-2), 193-223.

Ellis, T. (2022). The disappearing act: Why are accountants leaving the industry? Journal of Business Studies, 25(2), 341-356.

Gao, X., Guo, Y., & Ham, J. (2023). The demand for rank-and-file accountants following ICWs. Journal of Accounting Research.

Gao, X., Merkley, K., Pacelli, J., & Schroeder, J. (2023). The Effect of Accountant Shortages on Internal Control Weaknesses. Accounting Horizons, 37(1), 11-35.

Ge, W., & McVay, S. (2005). The disclosure of material weaknesses in internal control after the Sarbanes-Oxley Act. Accounting Horizons, 19(3), 137-158.

Goh, B. W. (2009). Audit committees, boards of directors, and remediation of material weaknesses in internal control. Contemporary Accounting Research, 26(2), 549-579.

Guo, H., Huang, P., & Zhang, Y. (2016). Employee-friendly companies and internal control weaknesses. Auditing: A Journal of Practice & Theory, 35(2), 67-88.

Guo, H., Huang, S. X., Zhang, Y., & Zhou, N. (2015). Foreign ownership and real earnings management: Evidence from Japan. Journal of International Accounting Research, 14(2), 185-213.

Gul, F. A., Wu, D., & Yang, Z. (2013). Do individual auditors affect audit quality? Evidence from archival data. The Accounting Review, 88(6), 1993-2023.

Ham, J., Li, Y., & Xue, H. (2023). The Changing Nature of Accountancy Jobs: A Skill-Set Analysis. Journal of Accounting Education, 41(1), 1-15.

Hammersley, J. S., Myers, L. A., & Shakespeare, C. (2008). Market reactions to the disclosure of internal control weaknesses and to the characteristics of those weaknesses under section 302 of the Sarbanes Oxley Act of 2002. Review of Accounting Studies, 13(1), 141-165.

Hay, D. C., Knechel, W. R., & Wong, N. (2006). Audit fees: A meta-analysis of the effect of supply and demand attributes. Contemporary Accounting Research, 23(1), 141-191.

Hogan, C. E., & Wilkins, M. S. (2008). Evidence on the audit risk model: Do auditors increase audit fees in the presence of internal control deficiencies? Contemporary Accounting Research, 25(1), 219-242.

Kinney, W. R., Palmrose, Z., & Scholz, S. (2004). Auditor independence, non-audit services, and restatements: Was the U.S. government right? Journal of Accounting Research, 42(3), 561-588.

Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. Journal of Accounting and Economics, 33(3), 375-400.

Krueger, A. B., & Summers, L. H. (1988). Efficiency wages and the inter-industry wage structure. Econometrica: Journal of the Econometric Society, 259-293.Murphy, K. M., & Topel, R. H. (1990). Efficiency wages reconsidered: Theory and evidence. In Advances in the Theory and Measurement of Unemployment (pp. 204-240). Palgrave Macmillan, London.

Mortensen, D. T., & Pissarides, C. A. (1994). Job creation and job destruction in the theory of unemployment. Review of Economic Studies, 61(3), 397-415.

Mongey, S., & Violante, G. L. (2019). A durable financial accelerator: Understanding movements in the net worth of the U.S. household sector. Quarterly Journal of Economics, 134(4), 1981-2036.

Mueller, A. I., Osterwalder, D., Zweimüller, J., & Kettemann, A. (2023). Vacancy Durations and Entry Wages: Evidence from Linked Vacancy–Employer–Employee Data. Review of Economic Studies, 00, 1-35.

Palmrose, Z. V. (1988). An analysis of auditor litigation and audit service quality. The Accounting Review, 55-73.

Peters, B. R. (2016). The indirect effects of auditing shareholders. Auditing: A Journal of Practice & Theory, 35(4), 189-191.

Pissarides, C. A. (1985). Short-run equilibrium dynamics of unemployment, vacancies, and real wages. American Economic Review, 75(4), 676-690.

Pittman, J. A., & Fortin, S. (2004). Auditor choice and the cost of debt capital for newly public firms. Journal of Accounting and Economics, 37(1), 113-136.

Shimer, R. (2001). The assignment of workers to jobs in an economy with coordination frictions. Journal of Political Economy, 109(3), 549-572.

Simunic, D. A. (1980). The pricing of audit services: Theory and evidence. Journal of Accounting Research, 161-190.

Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations.

Smith, J., & Taffler, R. (2000). The chairman's statement: a content analysis of discretionary narrative disclosures. Accounting, Auditing & Accountability Journal, 13(5), 624-646.

Trompeter, G., & Wright, A. (2010). The world of audits: The impact of audit quality on earnings management. Contemporary Accounting Research, 27(3), 751-786.

Watts, R. L., & Zimmerman, J. L. (1986). Positive accounting theory. Prentice-Hall.

Weber, A. (2010). Job search and hiring in local labor markets: Spillovers in regional matching functions. Journal of Labor Economics, 28(1), 1-32.

Williams, D. Z., & Johnstone, K. M. (2014). The relationship between audit fees and perceived audit quality. The Accounting Review, 89(6), 2143-2176.

Zhang, Y., Zhou, J., & Zhou, N. (2007). Audit committee quality, auditor independence, and internal control weaknesses. Journal of Accounting and Public Policy, 26(3), 300-327.

Figure 1. The Trend of Accounting Vacancy Duration from 2008 to 2022

This figure plots the mean and median of the duration of accounting vacancies posted by US public firms from 2008 to 2022.

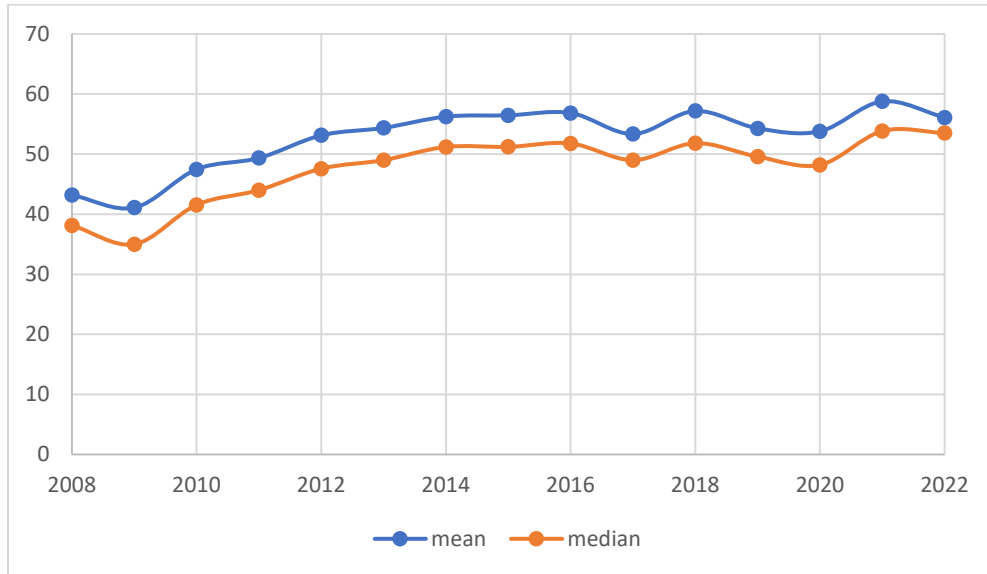**Figure 2. Accounting Vacancy Duration and Employment-to-Vacancy Ratio**

This figure plots the average accounting vacancy duration and the accountant employment-to-vacancy ratio at the MSA level from 2008 to 2022. The accountant employment-to-vacancy ratio is calculated as the total number of accountants employed in an MSA-year divided by the total number of accounting vacancies in the MSA-year.
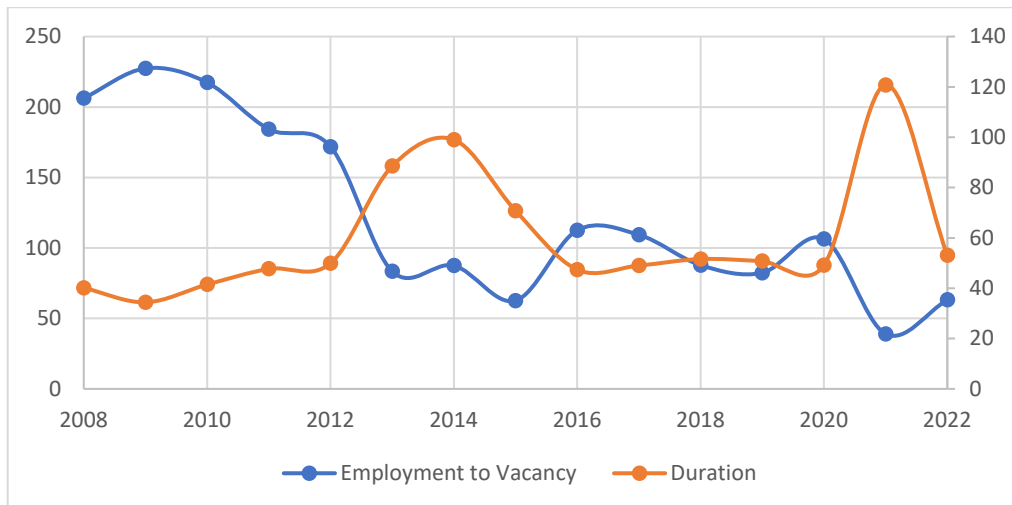
Table 1. Descriptive Statistics

Panel A reports the descriptive statistics for the variables used in our main analyses. Panel B reports the correlations among those variables. The Pearson (Spearman) correlations are provided in the lower (upper) diagonal of the panel. The sample includes 2,928 unique public firms, spanning over the sample period 2008-2022. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test.

Panel A: Descriptive Statistics

	n	Mean	Std. Dev	p.25	p.50	p.75
Duration (days)	14,477	48	25	32	45	60
Duration (log)	14,477	3.733	0.612	3.484	3.829	4.103
ICW	14,477	0.085	0.278	0.000	0.000	0.000
Size	14,477	8.214	1.873	6.970	8.135	9.427
Foreign Transaction	14,477	0.720	0.449	0.000	1.000	1.000
M&A	14,477	0.652	0.476	0.000	1.000	1.000
Aggregated Loss	14,477	0.159	0.365	0.000	0.000	0.000
Big4	14,477	0.841	0.366	1.000	1.000	1.000
Audit Fee	14,477	13.857	3.824	13.988	14.666	15.431
Auditor Change	14,477	0.037	0.189	0.000	0.000	0.000
ROA	14,477	0.012	0.131	0.001	0.030	0.070
Leverage	14,477	0.251	0.214	0.068	0.221	0.372
Restructure	14,477	0.431	0.495	0.000	0.000	1.000

Table 1, continued

Panel B: Correlations

	Duration	ICW	Size	Foreign Transaction	M&A	Aggregated Loss	Big4	Audit Fee	Auditor Change	ROA	Leverage	Restructure
Duration	1	0.036***	-0.051***	-0.048***	-0.047***	0.023**	0.001	-0.004	0.012	0.013	-0.006	0.006
ICW	0.025**	1	-0.151***	-0.015	-0.026**	0.087***	-0.112***	-0.046***	0.135***	-0.135***	0.003	0.011
Size	-0.011	-0.141***	1	0.005	-0.048***	-0.195***	0.378***	0.752***	-0.117***	0.175***	0.182***	0.053***
Foreign Transaction	-0.035***	-0.015	0.016	1	0.063***	0.007	0.056***	-0.014	-0.017	0.011	0.111***	-0.075***
M&A	-0.061***	-0.026**	-0.042***	0.06***	1	-0.008	-0.032***	-0.117***	-0.005	0.019*	-0.077***	-0.163***
Aggregated Loss	0.024**	0.087***	-0.193***	0.007	-0.008	1	-0.071***	-0.087***	0.028***	-0.486***	0.116***	0.069***
Big4	0.015	-0.112***	0.393***	0.056***	-0.032***	-0.071***	1	0.525***	-0.128***	0.192***	0.140***	0.131***
Audit Fee	0.020*	-0.095***	0.507***	-0.016*	-0.074***	-0.097***	0.660***	1	-0.126***	0.180***	0.202***	0.253***
Auditor Change	0.003	0.135***	-0.118***	-0.017*	-0.005	0.028***	-0.128***	-0.108***	1	-0.066***	-0.021*	-0.012
ROA	0.015	-0.105***	0.305***	-0.031***	-0.039***	-0.406***	0.204***	0.290***	-0.076***	1	-0.056***	-0.004
Leverage	0.001	0.025**	0.101***	0.113***	-0.043***	0.140***	0.109***	0.085***	-0.011	-0.059***	1	0.120***
Restructure	0.014	0.011	0.051***	-0.075***	-0.163***	0.069***	0.131***	0.148***	-0.012	0.014	0.088***	1

Table 2. MSA-level Analysis: Job Vacancy Duration and the Employment-to-Vacancy Ratio

Table 2 reports the regression results on the relationship between accounting vacancy duration and the employment-to-vacancy ratio. We regress *MSA Duration*, the average duration of accountant vacancies at the MSA-year level, on, *Employment to Vacancy*, which measures the ratio of total number of accountants employed to total number of accountant vacancies in an MSA-year. Column (1)-(3) report the results of estimating the model without fixed effects, with MSA fixed effects, and with MSA and year fixed effects, respectively. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test.

	MSA Vacancy Duration		
	(1)	(2)	(3)
Employment to Vacancy	-0.037***	-0.060***	-0.012***
	(-8.734)	(-12.627)	(-2.753)
MSA Fixed Effect	No	Yes	Yes
Year Fixed Effect	No	No	Yes
Observations	4,461	4,457	4,457
Adjusted R-squared	0.017	0.096	0.375

Table 3. Accounting Vacancy Duration and Internal Control Weaknesses

Table 3 reports the regression results of Model (1). We regress an internal control weakness indicator variable in year t, *ICW*, on the average duration of accounting vacancies of a firm in year t-1, *Duration$_{t-1}$*. Columns (1) and (3) report the results of estimating the model augmented with industry and year fixed effects. Columns (2) and (4) report the results of estimating the model augmented with firm and year fixed effects. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm, and *t-stats* are reported in parentheses.

	ICW			
	(1)	(2)	(3)	(4)
Duration$_{t-1}$	0.018***	0.020***	0.019***	0.019***
	(3.443)	(3.550)	(3.756)	(3.430)
Size			-0.016***	0.019
			(-4.556)	(1.493)
Foreign Transaction			-0.003	-0.010
			(-0.485)	(-1.103)
M&A			-0.009	0.005
			(-1.261)	(0.679)
Aggregated Loss			0.047***	0.035**
			(3.845)	(2.574)
Big4			-0.043**	0.005
			(-2.484)	(0.138)
Audit Fee			0.003	0.007**
			(1.382)	(2.005)
Auditor Change			0.154***	0.066***
			(6.534)	(2.921)
ROA			-0.028	-0.072
			(-0.643)	(-1.372)
Leverage			0.035	0.015
			(1.171)	(0.380)
Restructure			0.010	-0.002
			(1.231)	(-0.243)
Constant	0.009	-0.004	0.116***	-0.276**
	(0.495)	(-0.168)	(3.277)	(-2.314)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	Yes	No
Firm Fixed Effects	No	Yes	No	Yes
Observations	9,790	9,326	9,790	9,326
Adjusted R-squared	0.028	0.334	0.064	0.340

Table 4. Cross-sectional Tests: Firm Resources and Financial Statement Complexity

Table 4 reports the regression results of the cross-sectional tests. We regress an internal control weakness indicator variable in year *t*, *ICW*, on the average duration of accountant vacancies posted by a firm in year *t*-1, *Duration_{t-1}*, and its interactions with the cross-sectional variables. Panel A reports the results of estimating the moderating effect of financial resources and labor resources. Panel B reports the results of estimating the moderating effect of business complexity and accounting complexity. We include in the regressions the following untabulated control variables: *Size, Foreign Transactions, M&A, Aggregated Loss, Big4, Audit Fee, Auditor Change, ROA, Leverage, Restructure*. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm, and *t-stats* are reported in parentheses.

Panel A: Firm Resources

	ICW	
	(1)	(2)
Duration$_{t-1}$ x Small Size	0.025***	
	(2.653)	
High Complexity	-0.039	
	(-1.089)	
Duration$_{t-1}$ x Low Labor Resource		0.021**
		(2.172)
High Complexity		-0.076**
		(-2.115)
Duration$_{t-1}$	0.006	0.009
	(1.004)	(1.300)
Controls	Yes	Yes
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	9,790	9,790
Adjusted R-squared	0.070	0.065

Table 4, continued

Panel B: Financial Statement Complexity

	ICW	
	(1)	(2)
Duration$_{t-1}$ x High Business Segments	0.006	
	(0.678)	
High Complexity	-0.004	
	(-0.102)	
Duration$_{t-1}$ x High Accounting Complexity		0.014
		(1.320)
High Complexity		-0.016
		(-0.419)
Duration$_{t-1}$	0.016**	0.012*
	(2.354)	(1.665)
Controls	Yes	Yes
Industry Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	9,790	9,221
Adjusted R-squared	0.065	0.070

Table 5. Accounting Vacancy Duration and the Severity of Internal Control Weakness

Table 5 reports the regression results on the relationship between accounting vacancy duration and the severity of internal control weakness. We regress the number of internal control weaknesses for firm in year t, *Count ICW*, on the average duration of accountant vacancies posted by a firm in year t-1, *Duration$_{t-1}$*. We include in the regressions the following untabulated control variables: *Size, Foreign Transactions, M&A, Aggregated Loss, Big4, Audit Fee, Auditor Change, ROA, Leverage, Restructure*. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm, and *t-stats* are reported in parentheses.

	ICW Severity	
	(1)	(2)
Duration$_{t-1}$	0.015***	0.016***
	(3.374)	(3.211)
Controls	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	9,790	9,326
Adjusted R-squared	0.067	0.349

Table 6. Accounting Vacancy Duration, Late Filings, and Employee Satisfaction

Table 6 reports the regression results on the relationship between accounting vacancy duration and financial statement filing efficiency/employee satisfaction. In Panel A, we regress a late filing indicator variable in year t, *Late Filing*, on the average duration of accountant vacancies posted by a firm in year t-1, *Duration$_{t-1}$*. We include the following untabulated control variables: *Size, Foreign Transactions, M&A, Aggregated Loss, Big4, Audit Fee, Auditor Change, Restatement, ROA, Leverage, Going Concerns, Bankrupt Risk*. In Panel B, we regress the average Glassdoor ratings on the Work-life-balance rated by current employees serving accountant or internal auditor roles in year t, *Work-Life Balance* on the average duration of accountant vacancies posted by a firm in year t-1, *Duration$_{t-1}$*. We include the following untabulated control variables: *Size, ROA, MTB, Sales Growth and Leverage*. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm.

Panel A: Late Filings

	Late Filing	Late Filing
	(1)	(2)
Duration$_{t-1}$	0.011***	0.007**
	(3.338)	(2.024)
Controls	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	9,260	8,818
Adjusted R-squared	0.070	0.203

Table 6, continued

Panel B: Current Employees' Work-Life Balance Satisfaction

	Work-Life Balance	Work-Life Balance
	(1)	(2)
Duration$_{t-1}$	-0.070**	-0.042
	(-2.256)	(-0.934)
Controls	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	1,922	1,735
Adjusted R-squared	0.030	0.150

Table 7. Timing of Accounting Vacancy Duration

Table 7 reports the regression results on the relationship between accounting vacancy duration and ICWs based on different timing of job postings. In Panel A, we regress an internal control weakness indicator variable in year t-2, and t+2 on the average duration of accountant vacancies posted by a firm in year t-1, $Duration_{t-1}$. In Panel B, we regress an internal control weakness indicator variable in year t, ICW, on the average duration of accountant vacancies posted by a firm in the first three months of fiscal year t-1 and t, $Early\ Duration_{t-1}$ and $Early\ Duration_t$, respectively. In Panel C, we regress ICW on the average duration of accountant vacancies posted by a firm in the last three months of fiscal year t-1 and t, $Late\ Duration_{t-1}$ and $Late\ Duration_t$, respectively. We include in the regressions the following untabulated control variables: $Size$, $Foreign\ Transactions$, $M\&A$, $Aggregated\ Loss$, $Big4$, $Audit\ Fee$, $Auditor\ Change$, $Restatement$, ROA, $Leverage$, $Going\ Concerns$, $Bankrupt\ Risk$. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm, and t-stats are reported in parentheses.

Panel A: Timing of Accounting Vacancy Duration

	ICW_{t-2}		ICW_{t+2}	
	(1)	(2)	(5)	(6)
$Duration_{t-1}$	0.009	-0.000	-0.002	-0.011
	(1.322)	(-0.048)	(-0.263)	(-1.455)
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	Yes	No
Firm Fixed Effects	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	7,042	6,705	5,776	5,387
Adjusted R-squared	0.072	0.393	0.049	0.335

Table 7, continued

Panel B: Vacancy Duration of Early-Fiscal-Year Job Postings

| | ICW | | | |
	(1)	(2)	(3)	(4)
Early Duration$_{t-1}$	0.013***	0.007		
	(2.990)	(1.458)		
Early Duration$_t$			0.010***	0.010**
			(2.631)	(2.531)
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	Yes	No
Firm Fixed Effects	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	8,890	8,425	13,303	12,662
Adjusted R-squared	0.061	0.341	0.060	0.323

Panel C: Vacancy Duration of Late-Fiscal-Year Job Postings

| | ICW | | | |
	(1)	(2)	(3)	(4)
Late Duration$_{t-1}$	0.010**	0.011**		
	(2.408)	(2.558)		
Late Duration$_t$			0.002	0.002
			(0.554)	(0.732)
Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	Yes	No
Firm Fixed Effects	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6,707	6,301	11,103	10,444
Adjusted R-squared	0.065	0.364	0.060	0.323

Table 8. Placebo Test: IT Vacancy Duration and Internal Control Weaknesses

Table 8 reports the regression results of a placebo test. We regress an internal control weakness indicator variable in year t, *ICW*, on the average duration of IT vacancies of a firm in year t-1, *IT Duration$_{t-1}$*. We include in the regressions the following untabulated control variables: *Size, Foreign Transactions, M&A, Aggregated Loss, Big4, Audit Fee, Auditor Change, ROA, Leverage, Restructure*. All variables are defined in Appendix A. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively, using two-tailed test. Standard errors are clustered by firm, and *t-stats* are reported in parentheses.

	ICW	
	(1)	(2)
IT Duration$_{t-1}$	-0.003	-0.000
	(-0.630)	(-0.090)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	No
Firm Fixed Effects	No	Yes
Observations	9,790	9,326
Adjusted R-squared	0.028	0.334