Flu Season, Human Capital Resources, and Audit Outcomes

Landi Morris
Doctoral Student
Department of Accountancy
Bentley University
lmorris@bentley.edu

Rani Hoitash
John E. Rhodes Professor
Department of Accountancy
Bentley University
rhoitash@bentley.edu
781.891.2588

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Abstract

This study examines whether influenza (flu), a threat to human capital resources, is associated with audit outcomes. Because the peak months of flu season overlap with audit busy season, we examine whether audit offices most impacted by the flu will be associated with adverse audit outcomes. We test our hypotheses using flu data collected from the Centers for Disease Control and Prevention (CDC) and find that audit quality suffers, audit report lag is prolonged, and audit production costs increase in audit offices most impacted by the flu. This association extends to Big 4 but not non-Big 4 auditors. Examining Big 4 offices that serve complex clients, we find that the effect of the flu is heightened when the need for auditors' client specific knowledge and judgment is stronger. This study informs regulators and practitioners with a vested interest in threats to auditor judgment and audit quality.

***Keywords*:** Influenza; audit quality; audit report lag; audit production costs; human capital

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I. Introduction

The flu has been described as the last great uncontrolled plague of mankind (Davenport 1976, 273), the effects of which are widespread. The disease infects an estimated 9.2 to 60.8 million people in the U.S. each year (CDC 2017), or approximately 3-20 percent of the population. The magnitude of people with the flu results in significant productivity loss in the workplace, where employees lose 69 percent of expected working hours while sick with the flu (Van Wormer et al. 2017). We predict that audit firms are highly susceptible to the costly effects of influenza. Flu season peaks in December through March and therefore overlaps with audit busy season. Although the timing of the flu is consistent year-to-year, the severity of and locations most impacted by the disease are hard to predict,[1] making it difficult for firms to plan for and appropriately adjust staffing levels.[2] This study considers the costly impact of the flu on employee productivity and examines the impact of the flu on human capital resources and audit outcomes.

Regulators and standard setters have a vested interest in understanding threats to human capital resources via auditors' abilities to exercise strong judgment and decision making. The Center for Audit Quality (CAQ) cites high quality performance by public company auditors as one if its primary focuses. Additionally, Auditing Standard 1015 addresses auditors' due professional care in the performance of their work, stating that "the matter of due professional care concerns what the independent auditor does and how well he or she does it (PCAOB 2002)." The flu can

[1] There are four primary types of influenza virus. Within each type there are additional subtypes, lineages, and strains. While flu vaccines are available, they only protect against the viruses included in the vaccine. As a result, vaccine efficacy is limited to the viruses the vaccine was designed to protect against. In the sample period reviewed in this study, 2009 – 2016, vaccine efficacy ranged from 19-60 percent, with an average of 46.5 percent (CDC 2018a).

[2] Most reported flu hospitalizations are of adults ages 18-64 (CDCF 2018), the same working population that comprises employees of public accounting firms.

directly impair how well an auditor performs an audit, making influenza a previously unidentified threat to audit quality that audit firms, and regulators, should be aware of.

We posit that audit offices most impacted by the flu will experience adverse audit outcomes. This hypothesis is motivated by the human capital and pharma-economic literatures. The capacity of human capital is critical to corporate success (Schultz 1961; Becker 1962). This association extends to the auditing context, where improvements in [audit] inputs lead to improvement in audit quality (Knechel et al. 2013). Likewise, impairments to employee capacity or capabilities, a key audit input, may lead to impairments in audit quality. Employees sick with the flu either miss work (Akazawa et al. 2003; BLS 2010; Tsai et al. 2014) or go to work sick, limiting their productivity on the job (Goetzel et al. 2004; Hemp 2004; Hansen and Anderson 2008; Schultz et al. 2009; Petrie et al. 2016). It follows that as the flu hinders employees' abilities to go to work or exercise professional judgment while at work, audit quality will suffer, audit report lag will be prolonged, and audit production costs will be higher as the costs of engagement inefficiencies are transferred to the client.

To examine these questions, we employ a broad sample of firm-year observations from 2009 – 2016.[3] Influenza activity is measured using state-level data from the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC) in the period that overlaps audit busy season.[4] We use discretionary accruals and going concern errors to measure

[3] Our sample focuses on firms with a December 31st or January 31st year-end to ensure that the busy season of the audit engagement overlaps with flu season. In additional analyses we consider firms with fiscal year ends that do not coincide with the flu.

[4] Influenza data from the CDC measures how widespread and severe the flu activity is within each state. Spread measures the location of the flu within a state, while severity measures the intensity of the disease. The data is reported to the CDC on a weekly basis. For purposes if this study we take the average of this data during audit busy season, from January 1st to March 31st.

audit quality.[5] These proxies are indicative of auditor judgments that could be impaired from the flu. We find that influenza is associated with lower audit quality, yielding a 6.8 percent increase in discretionary accruals and 27.48 percent increase in the likelihood of going concern errors when moving from the 25th to 75th percentiles of flu activity.[6] This evidence suggests that audit quality suffers when flu outbreaks impair audit firms' human capital.

Further analysis reveals that audit report lag is positively associated with influenza, suggesting that when auditors are sick, it takes a longer amount of time to complete the audit. The economic significance of this estimation yields a 9.6 percent increase in audit delay when moving from the 25th to 75th percentiles of flu. This finding contributes to literature suggesting that personnel shortage is a significant contributing factor to audit delay (Knechel and Payne 2001; Behn et al. 2006; Abbott et al. 2012). We further find a positive association between flu outbreaks and audit production costs. This suggests that audit hours are higher when employees are sick with the flu and team members unfamiliar with the engagement must be brought in to help, when the remaining team members must work additional hours to pick up the slack,[7] or when auditors who go to work sick are unable to maximize productivity, resulting in increased hours. Engagement team inefficiencies are then passed along to the client through audit fees (Palmrose 1989). A shift from the 25th to 75th percentiles of the test variable increases audit production costs by 3.3 percent.

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[5] Financial reporting quality and audit quality are not independent measures. "The two processes are interdependent and jointly determine the (observable) outcome" (Gaynor et al. 2016, 2). Thus, the quality of the audit depends on the financial reporting quality of the client. We acknowledge that if the client is sick with the flu and financial reporting quality deteriorates, this may also impact the quality of the audit. However, the majority of the client's work is done throughout the year, and in the months leading up to the end of the fiscal year, which do not overlap with flu season. Regardless, we address this concern in additional analysis.

[6] We complete analysis to identify whether high influenza is associated with greater likelihood of financial statement restatements but fail to find a significant association. It is possible that auditors are able to direct limited resources to areas of highest risk, thus avoiding severe outcomes such as restatements, but are not able to mitigate the impact of the flu on less severe quality issues such as discretionary accruals or going concern errors.

[7] Nagy et al. (2018) find that audit quality improves when there are more engagement team members to share the burden, suggesting that inefficiencies are created when the hours are spread across existing team members.

We next estimate our analyses separately within a more homogenous group for clients of Big 4 and non-Big 4 offices. The culture of Big 4 offices may be one that encourages employees to go to work sick, rather than staying home to rest, resulting in lower productivity that is not immediately visible. Non-Big 4 offices may promote better work-life balance (Khavis and Krishnan 2018) that encourages auditors to take a day off when sick, enabling managers to observe the absence of employees and adjust resources as needed. Big 4 offices may also serve more complex clients than non-Big 4 offices. Large complex engagements may be more challenging to audit when an auditor is sick with the flu. We find an association between the flu and the dependent variables only for Big 4 offices.

Holding auditor size-class constant, we next examine whether client complexity within Big 4 offices further influences the effects of influenza. We expect that the complexity of the engagement will augment the impact of the flu on audit outcomes because auditors who go to work sick will have a harder time achieving the same quality of work as they would if they were not sick. We thus examine complexity at both the client reporting and industry levels, considering whether the association between the flu and audit outcomes varies between offices serving clients with high reporting complexity versus low reporting complexity and clients in more versus fewer complex industries. Our results hold only in offices that serve complex clients and there is no association for offices who serve fewer complex clients or clients in complex industries. These findings suggest that influenza may most impair audit outcomes on engagements where client specific knowledge and strong professional judgment are critical and when auditors' work may be impaired when they are sick.

Our results hold after execution of multiple robustness tests. First, to examine the unpredicted nature of the flu, we estimate the models within firm-years where the efficacy of the flu vaccine was worse than either of the previous two years, and firm-years where this is not the case. We find a statistically significant association between the flu and discretionary accruals, going concern errors, and audit production costs only in years in which the low efficacy of the flu vaccine was a shock. Second, as a falsification test, we examine the association between the flu and audit outcomes for clients in the same state whose audits do not overlap with flu season. We find no association between the flu and audit quality or audit report lag for these clients.[8] Third, we consider whether our results can be explained by the overall auditors' health.[9] Unlike the flu, health in each state has little variation over time and therefore its predictable nature should enable audit firms to better plan their staffing needs. Consistently, we find that overall health is not statistically significant. Fourth, we document that the association between the flu and audit outcomes holds after controlling for state-level resources which could influence the vaccination and treatment efforts in each state. Fifth, we repeat our analyses using a broader definition of busy season. Our results remain robust to this alternative specification. Finally, we implement propensity score matching to address concerns of endogeneity and find that our results remain robust to estimating our analyses within a matched sample of clients in high and low flu states.[10]

Our findings offer insights to both research and practice. This paper takes a unique position in the growing body of literature on human capital and resource management in auditing (e.g. Bills et al. 2016; Beck et al. 2018; Nagy et al. 2018). Extending this literature, our study examines audit offices' abilities to invest in and manage human capital resources, and how a negative influence on the supply of human capital impacts audit quality, audit report lag, and audit production costs.

[8] This sample includes clients with year ends from 4/30 to 10/31

[9] This data is also collected from the CDC

[10] High flu states are defined as those in which the annual flu measure exceeds the sample median.

The flu serves as a unique influence on the supply of human capital because it is not predictable nor consistent across states or stable over time.

This paper also contributes to literature on potential impairments to auditors' cognitive abilities and audit outcomes. Kallunki et al. (2018) document a positive association between auditors' cognitive abilities and audit quality while Nelson (2009) finds that cognitive limitations can impair professional skepticism. We posit that the flu serves as a limitation to auditors' cognitive abilities and can therefore threaten auditors' ability to exercise professional skepticism. To our knowledge, no prior study has considered the influence of health on an auditor's ability to exercise professional skepticism and due professional care, as evidenced by adverse audit outcomes.

Pharma-economic research has documented the significant macroeconomic cost burden of influenza (Keech et al. 1998; Stewart et al. 2003; Molinari et al. 2007; Keech and Beardsworth 2008; Peasah et al. 2013; Petrie et al. 2016). To our knowledge, no study has directly examined the impact of the flu on a company's output. Finally, this paper contributes to the growing body of audit literature that identifies the local office as a decentralized decision-making unit and the resulting disparate audit quality between offices of the same firm (Francis and Yu 2009; Choi et al. 2010; Francis et al.2013).

These findings are informative to audit firms, who dedicate significant resources to manage and improve human capital and audit quality. Our conversations with human resources representatives of five international audit firms reveal that the firms do offer flu shots for employees in their local offices. This practice suggests that the firms are aware of the potential impact of the flu on employee productivity.[11] However, our conversations further reveal that four out of the five firms do not track sick days[12] and therefore have no documentation about the direct impact of the flu on their organization. This explains why we observe persistent results of the flu over time. Although rational organizations may adjust resources in response to the flu, without knowledge of these effects, firms are unable to make the appropriate adjustments, leaving them vulnerable to the threats of sick audit professionals. The results of this study suggest that audit firms may benefit from tracking the number of days of work lost from the flu, despite its unpredictable nature, so that losses in human resource capacity, and the associated decline in audit quality, may be mitigated.

Additionally, this study identifies that Big 4 offices are strongly impacted by the flu. Offices of Big 4 firms may reassess the culture within the office. Poor promotion of work-life balance may encourage employees to go to work when sick, thus impairing audit quality and other audit outcomes. Finally, Big 4 firms may choose to improve the capabilities of scheduling resources to address short-term changes to auditor availability, which is of critical concern when an engagement is particularly complex. For example, by maintaining up-to-date and easily accessible databases of employees who recently worked on each client or engagements in similarly complex industries. This would allow for engagement team resource needs to be met with the most qualified personnel.

The remainder of this paper is organized as follows. Section II describes further background and develops the hypotheses. Section III describes the research method and sample.

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[11] Anecdotal evidence identifies that a Big 4 firm compensates employees for annual preventative healthcare (employees receive a bonus for attending a physical). This suggests that the firm cares strongly about the health of its employees, so much so that it is willing to invest monetary resources in maintaining employee health.

[12] Sick days and vacation time are a single category and these firms do not distinguish between the two.

Section IV presents the results of the study, Section V presents tests of robustness, and Section VI reports the discussion and concluding remarks.

II. Background and Hypothesis Development

Health and Human Capital

Human capital serves as a key indicator of firm performance (Schultz 1961; Becker 1962). Prior literature has documented the influence of human capital on audit outcomes, with a focus on the education and skill of audit labor pools. For example, Beck et al. (2018) examine local labor characteristics and find that audit quality is positively associated with the education level in the city where the audit office is located. Similarly, Nagy et al. (2018) document a positive association between the number of CPAs and audit quality in a local office. The human capital literature also recognizes health as a critical component (Grossman 1972; Becker 2007) and identifies that employee productivity is driven by skills and effort, with health directly influencing skills (Bartel and Taubman 1979). With stronger and healthier human capital, the quality of a firm's outputs should improve. To the best of our knowledge, this has not been examined in the auditing context. We therefore examine the influence of health on audit quality by studying the impact of influenza outbreaks on auditor productivity and audit offices' abilities to adjust to changes to human capital resources.

Influenza and Busy Season

The timing of flu season is a critical factor that suggests that the significant costs of the flu (Molinari et al. 2007; Peasah et al. 2013) extend to audit firms. During the last 34 years, flu season peaks have most often occurred between the months of December and March (CDC 2016). The Bureau of Labor Statistics (2010) documents that illness related absences are 31.2 - 51.9 percent higher during flu season than other months of the year. Importantly, this period spans audit busy season. The majority of public companies have a December 31st year-end (Lopez and Peters 2012) and audit reports due in March. During this time period, auditors are often expected to work overtime, which prior literature associates with an increased susceptibility to mental and physical health stresses (Shields 1999; Harrington 2001). These pressures are likely to be exacerbated by the timing of flu season.

Although the timing of flu season is consistent from year to year, the severity of the flu varies drastically by year and location. For example, in a given week during the 2016 flu season, influenza in U.S. states ranged from no activity (Oregon) to widespread activity (Texas). Further, in 2009 the U.S. faced a global flu pandemic for the first time in over 40 years (CDC 2011), whereas the 2012 flu season was mild in comparison (CDC 2014). Unlike other phenomena influencing human capital resources, the unpredictable nature of the flu hinders audit firms' abilities to plan for and adjust resources.

The risk of the flu is not mitigated over time. Although outside the scope of the sample period in this study, the 2018 flu season was of high severity, with an increase in hospitalizations, doctor's office visits, and mortality across the country (PwC 2018). The season marked the third use of this classification since the 2004 flu season, and the first season in which the high severity classification applied to all age groups (CDC 2018b). With no promise of a guaranteed effective vaccine from the CDC, no solution to the flu is in sight in the near future, making it a continuing threat to the output of public accounting firms.

Influenza and Working Days Lost

Auditing requires significant expertise and professional judgment (DeFond and Zhang 2014), which calls for employees to be in good physical and mental health. We posit that auditors are vulnerable to the flu during busy season, and that the flu may impair auditors' health and force work absences, a phenomenon referred to as absenteeism in pharma-economics. Keech and Beardsworth (2008) find that days of work missed due to the flu range from 1 to 5.9.[13] The National Institute for Occupational Safety and Health reports that U.S. employees miss 17 million workdays due to the flu (NIOSH 2018). When engagement team members are absent, audit firms may lack the resources or capability to adjust human capital to replace them, resulting in a decline in audit quality from lost knowledge and expertise on the engagement.

For those that continue to work while battling the flu, the quality of their work may decline, resulting in an associated decline in audit quality. The act of going to work while sick is referred to as presenteeism and has significant economic consequences. Presenteeism is estimated to cost companies more than $150 billion per year (Stewart et al. 2003). Goetzel et al. (2004) document that respiratory disorders, including the flu, cost employees an average of 1.4 hours of productivity loss per day. A 2002 study initiated by Lockheed Martin documented the impact of the company's employees' common medical conditions and illnesses on job performance (Hemp 2004). 17.5 percent of Lockheed Martin employees reported having flu in the prior two weeks.[14] The reported average productivity loss was 4.7 percent. Employees may be more likely to go to work sick when they have an important deadline on the horizon, such as the audit report of a public company. Supporting this, Hansen and Anderson (2008) find that people are more likely to go to work sick when there is time pressure associated with the job, when they work more than 45 hours per week, and when a high degree of cooperation with coworkers is required. All are characteristic of an auditors' busy season experience. Additionally, the symptoms of the flu can persist longer if

[13] Kwon et al. (2014) report an average of 854 audit hours per engagement. Consider a hypothetical audit engagement team comprised of 8 auditors. If 2 are sick and miss 4 days of work due to the flu, this is a loss of 64 hours, or 7.5 percent of total audit hours.
[14] The timing of the study was not reported.

employees work, rather than rest, while sick (Shu 2013). This may result in a prolonged period of impaired judgment, and a stronger influence on audit quality.

Influenza and Judgment and Decision Making

Maintaining strong auditor judgment is critical to the success of an audit. Auditing Standard 1015 (AS 1015) defines auditors' responsibilities to exercise due professional care as what the independent auditor does and how well he or she does it (PCAOB 2002). AS 1015 and PCAOB Staff Audit Practice Alert No. 10 (PCAOB 2012) state that exercising due professional care requires the auditor to exhibit professional skepticism, or "an attitude that includes a questioning mind and a critical assessment of audit evidence."

Recent literature has examined the association between cognitive functions and audit quality. Kallunki et al. (2018) empirically document an association between cognitive abilities and audit quality, and Nelson (2009) finds that cognitive limitations can impair professional skepticism. Further, Hurley (2015) proposes that ego depletion theory applies to auditors and can decrease judgment and decision-making quality when auditors must deplete self-control to handle increased cognitive loads, control emotions, or engage in an undesirable action. Bonner et al. (2018) examine the sufficiency of auditors′resources for self-control in decision-making and find that poor audit outcomes are exacerbated when auditors have low levels of cognitive resources. We expect that each audit task would be made incrementally more challenging if the auditor was sick with the flu, potentially further depleting auditors' resources. Hurley (2017) finds that auditors begin workdays in buy season in an already depleted state. This suggests that during busy season auditors are more susceptible to impaired judgments from the flu. Influenza may influence auditors' cognitive skills and judgment, threatening their ability to adequately perform their jobs. To our knowledge, no prior study has considered the influence of health on an auditor's judgment and cognitive abilities. We contribute to the understanding of potential impairments to auditor's judgment and decision making, as evidenced in this paper by adverse audit outcomes.

Hypotheses

As employees are absent or incapacitated from the flu, firms may adjust resources in attempts to maintain high quality audits. While firms are unlikely to hire additional employees for a temporary decline in human capital resources (Balachandran and Steuer 1982; Chou and Chung 2009), they may attempt to address temporary shortages by reassigning auditors from other clients to take the place of a sick auditor. However, this remedy may not be effective, as Summers (1972) notes audits are too complex for the convenient assignment of auditors to random engagements. Alternatively, firms may choose to ask auditors already assigned to the engagement to work longer hours to complete the work. Both strategies have the potential to mitigate the impact of the flu on audit quality. If effective, we would expect to see no association between the flu and audit quality. However, Nagy et al. (2018) find that audit quality improves as work is spread across a larger engagement team, thereby reducing auditor fatigue, suggesting that a limited number of human capital resources, despite firms' attempts to balance, will inevitably reduce audit quality. We therefore expect that the flu will impair audit quality and formulate this expectation in the following hypothesis:

> HYPOTHESIS 1. *Influenza is inversely associated with audit quality (discretionary accruals and going concern errors).*

Studying the association between influenza and audit delay is important because the value of financial statement information increases with the timeliness of such information (Ettredge et al. 2006). When employees are sick and daily productivity suffers, audit delay may be prolonged, a conjecture supported by findings in prior research. For example, in a survey of U.S. audit partners, Behn et al. (2006) found that limited human resources contributed to firms' inability to decrease the audit report lag. Abbott et al. (2012) report that firms with staff shortages exhibit higher audit delays. Further, Knechel and Payne (2001) find that the use of less experienced audit staff increases the audit report lag. Alternatively, Nagy et al. (2018) suggest that increased human resource capacity is associated with longer audit delay due to auditors' increased efforts to deliver a high-quality audit. This finding would suggest a negative association between influenza and audit delay, as sick auditors expend less effort to get the job done. Despite this, we expect to see a positive association between impairment to human capital resources via influenza and audit delay.

HYPOTHESIS 2. *Influenza is positively associated with audit report lag.*

Finally, we consider how the flu impacts audit production costs (Doogar et al. 2015) which are primarily a factor of labor hours incurred by the audit firm (Davis et al. 1993; Bell et al. 2001). While fees are typically determined in advance of the audit commencing, firms adjust fees for fluctuations in hours incurred (Palmrose 1989), often based on significant changes in the amount of audit team labor (Hackenbrack et al. 2014). If an employee is sick and out of the office, audit production costs may decrease when the audit firm does not bill for the sick person's missed days. Alternatively, audit hours may be higher than usual if the audit firm fills the position of the sick person with an auditor who is less familiar with the client or complexities of the audit or if other engagement team members must work additional hours at a lower level of productivity (Nagy et al. 2018). In either case, production costs may increase if the audit is completed less efficiently and the audit firm attempts to find a way to price the inefficiencies in the cost of the audit. It is ex-ante unclear whether audit production costs will be higher or lower on engagements impacted by the flu. We therefore propose the following non-directional hypothesis:

HYPOTHESIS 3. *There is no association between influenza and audit production costs.*

Big 4 vs. Non-Big 4

We also consider whether the association between influenza and audit quality differs between offices of Big 4 and non-Big 4 auditors. Due to reputation and litigation concerns about audit quality (DeAngelo 1981), Big 4 firms have strong incentives to respond to human capital shortages from the flu. In addition to these incentives, Big 4 firms may also be better equipped to respond to resource constraints (Dopuch and Simunic 1982). With more human capital available, these offices have a greater ability to shift individuals between engagements. However, it may be challenging for Big 4 firms to transfer personnel with specific knowledge necessary to serve on large and complex engagements. Additionally, Big 4 firms may have a culture that promotes going to work when sick, rather than taking a day off to rest. Khavis and Krishnan (2018) find a statistically significant difference in the work-life balance between Big 4 and non-Big 4 firms, with non-Big 4 firms having a higher work-life balance.

Non-Big 4 offices may struggle to respond to flu-induced changes to human capital resources because of their smaller size and limited resources. However, offices of non-Big 4 firms may also have advantages that mitigate the impact of the flu. Non-Big 4 auditors have more knowledge of local markets (Louis 2005) that could balance impairments to audit quality from the flu. Non-Big 4 offices may benefit from serving smaller and less complex clients, whose engagements could be less susceptible to the effects of influenza because auditors who go to work sick will have an easier time working through their sickness. Non-Big 4 firms also have better work-life balance (Khavis and Krishnan 2018) that allows for employees to take a day off when sick with the flu, thus minimizing the negative impact of presenteeism on non-Big 4 firms.

There are clear differences in the structure and clientele of Big 4 and non-Big 4 firms. However, it is not evident, ex ante, which firms are best equipped to protect offices from changes to human resource capacity from the flu. To address this uncertainty, we propose the following research question:

> RESEARCH QUESTION 1. *If there is evidence of an association between influenza and audit quality, report lag, and audit production costs, does this association differ for offices of Big 4 and non-Big 4 firms?*

III. Research Design

Sample

This study leverages seasonal influenza data collected by the Centers for Disease Control and Prevention (CDC) from 2009-2016.[15] We begin with 37,756 firm-year observations with audit-specific data available in Audit Analytics and financial data available in Compustat. We eliminate 7,894 firm-year observations without December 31st or January 31st year-ends to ensure that the timing of the engagements' busy seasons coincides with the timing of flu season. Samples for discretionary accruals, going concern errors, audit delay, and audit production costs are further limited by the necessary sample and control variable data.

The discretionary accruals sample excludes 8,203 observations of companies in the financial services industries (SIC 6000-6999) and an additional 5,950 observations without the necessary data for control variables, for a total sample of 15,709 firm-year observations. The going concern error sample includes 12,305 firm-year observations limited to financially distressed companies that report negative earnings or operating cash flows, current ratio less than one, or negative retained earnings (Beck et al. 2018). Bankruptcy data for this sample is obtained from Audit Analytics. The audit report lag and audit fee samples are reduced by observations missing the required control variable data for total samples of 27,713 and 27,034 firm-year observations, respectively.

[15] 2009 is the year in which the complete severity and spread flu data is first collected and published by the CDC.

Variable of Interest

We rely on CDC categorization of flu activity to measure our test variable. *INFLUENZA* measures the sum of the average spread and the average severity of the flu during audit busy season for the state in which the audit office is located. A higher score of *INFLUENZA* indicates higher spread and severity of the illness. Flu spread is reported to the CDC by state health departments on a scale of 1-5, with 1 being not widespread and 5 being persistent across the state. Flu severity is measured on a scale of 1-10, with 1 being minimal and 10 being high. To synchronize the scales of the two flu measures we standardize the spread and severity variables.[16] Since states report spread and severity data to the CDC on a weekly basis, we average the spread and severity measures between January 1st and March 31st, which is the period of flu season that directly overlaps with audit busy season.[17]

Multivariate Models

The models include industry and year fixed effects to control for variation in the dependent variables by industry and over time that are unrelated to change in the independent variables. Standard errors are clustered by client to control for potential correlation of error terms.[18] All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the influence of outliers in the data. All variables are defined in detail in the Appendix.

Discretionary Accruals

We first test Hypothesis 1, which predicts a positive association between the flu and audit quality. We posit that the flu will negatively impact auditors' abilities to exercise strong

[16] The standard score has a distribution with a mean of 0 and a standard deviation of 1.
[17] Although the peak of flu season begins in December, our variable measures activity starting in January, when the audit busy season work begins.
[18] Results are robust to clustering standard errors by state and by audit office, and to double clustering by client/audit firm, client/audit office, and client/year.

professional judgment and skepticism. We therefore identify discretionary accruals as a proxy for audit quality that is reflective of auditor judgment.[19] We estimate discretionary accruals using the absolute value of the performance adjusted modified Jones model (Kothari et al. 2005) controlling for the prior-year return on assets.[20] We test Hypothesis 1 using the multivariate model defined below, which controls for auditor- and client-level characteristics documented in prior literature (Francis and Yu 2009; Reichelt and Wang 2010). If the flu adversely effects audit firms the coefficient β_1 should be positive.

$$DISCACC = \beta_0 + \beta_1 INFLUENZA + \beta_2 SIZE + \beta_3 BUSSEG + \beta_4 GEOSEG + \beta_5 LOSS + \beta_6 LEVERAGE + \beta_7 CASH\ FLOW + \beta_8 MB + \beta_9 EXT\ GROWTH + \beta_{10} LIT + \beta_{11} MW + \beta_{12} STDSALES + \beta_{13} STDCASH + \beta_{14} BIG4 + \beta_{15} OFFICESIZE + \beta_{16} AUDIT\ TENURE + \beta_{17} OFFICE\ EXPERT + industry\ \&\ year\ fixed\ effects + \varepsilon \quad \textbf{(1)}$$

Going Concern Errors

Measuring the accuracy of audit reports provides incremental information about audit quality (Lennox 1999), and accuracy may be impaired when influenza is high. We therefore examine the association between influenza and going concern errors. *GC ERROR* is an indicator variable equal to 1 if the auditor committed a Type I or Type II error related to a going concern opinion (Beck et al. 2018). A Type I error occurs when the auditor issued a going concern opinion, but the client did not declare bankruptcy in the year following the opinion date. A Type II error occurs when the client declared bankruptcy in the year following the audit opinion, but the auditor failed to issue a going concern opinion. Hypothesis 1 predicts a positive association between auditors committing

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[19] Discretionary accruals serve as an appropriate proxy because they are associated with PCAOB findings related to complex estimates, which require significant auditor judgment (Aobdia 2018).

[20] We do not utilize the Dechow and Dichev (2002) method of accruals quality because this method requires adjusted recognition of cash flows over time, during which *INFLUENZA* can significantly vary. The method requires five years of cash flow data. We deem this method to be less appropriate in our context than the Kothari et al. (2005) method, which estimates abnormal accruals for each year.

going concern errors and influenza. Control variables are consistent with prior research (Knechel and Vanstraelen 2007; DeFond et al. 2017; Beck et al. 2018).

$$GC\ \ ERROR = \beta_0 + \beta_1 INFLUENZA + \beta_2 SIZE + \beta_3 BANKRUPT + \beta_4 FSCORE + \beta_5 ACCUMDEF + \beta_6 LIFECYCLE + \beta_7 LCASHFLOW + \beta_8 STDCASH + \beta_9 ABSLAGACCR + \beta_{10} INFLUENCE + \beta_{11} AUDITOR\ \ TENURE + \beta_{12} BIG4 + industry \&\ \ year\ \ fixed\ \ effects + \varepsilon$$

(2)

Audit Delay

Hypothesis 2 examines the association between influenza and audit delay. The dependent variable *REPORT LAG* measures the number of days between the fiscal year end date and the filing date of the audit report less the number of days provided by the SEC filing deadline (60, 75, and 90 days for large accelerated, accelerated, and non-accelerated, respectively, Hoitash and Hoitash 2018). Hypothesis 2 predicts a positive association between influenza and audit report lag. Control variables are adapted from prior research (Schwartz and Soo 1996; Ettredge et al. 2006; Hoitash and Hoitash 2018).

$$REPORT\ \ LAG = \beta_0 + \beta_1 INFLUENZA + \beta_2 SIZE + \beta_3 BUSSEG + \beta_4 FOREIGN + \beta_5 INVREC + \beta_6 LIT + \beta_7 LEVERAGE + \beta_8 GC + \beta_9 MW + \beta_{10} RESTATE + \beta_{11} BIG4 + \beta_{12} AUDITOR\ \ CHANGE + industry\ \ \&\ \ year\ \ fixed\ \ effects + \varepsilon \quad \textbf{(3)}$$

Audit Production Costs

We also examine the association between the flu and audit production costs, measured as audit fees, via the model depicted below. The dependent variable is the natural log of audit fees (*FEES*). Hypothesis 3 predicts a positive association between audit production costs and influenza. We control for client-, auditor-, and engagement-level attributes expected to influence audit fees (Hay et al. 2006; Choi et al. 2010; Chen et al. 2015).

$$FEES = \beta_0 + \beta_1 INFLUENZA + \beta_2 SIZE + \beta_3 BUSSEG + \beta_4 GEOSEG + + \beta_5 FOREIGN + \beta_6 INVREC + \beta_7 LOSS + \beta_8 LEVERAGE + \beta_9 MB + \beta_{10} LIT + \beta_{11} GC + \beta_{12} MW + \beta_{13} RESTATE + \beta_{14} BIG4 + \beta_{15} AUDIT\ \ TENURE +$$

$\beta_{16} AUDIT\ \ CHANGE + \ \ industry\ \ \ \&\ year\ \ fixed\ \ effects + \ \ \varepsilon$
(4)

Descriptive Statistics

Table 1 panel A presents descriptive statistics for the sample. *INFLUENZA* ranges from -3.47 to 3.18 with an average for our sample of .022. Discretionary accruals are, on average, .086. Auditors make an error related to going concern opinions in 7.66 percent of the sample of financially distressed firms. The average audit report lag is negative, indicating that, on average, firms file the audit report 6.89 days ahead of the mandated deadline. The average audit fees within our sample are $1,907,484. Audit fees are skewed right, with the median fee being $837,000.

[INSERT TABLE 1 HERE]

Figure 1 presents *INFLUENZA* for each state and year in the sample. The heat map depicts variation across states and time. For example, in New Jersey, a state in the 75th percentile of flu, *INFLUENZA* ranges from -2.37 (2012) to 3.18 (2013). In Minnesota, a state in the 25th percentile of flu, *INFLUENZA* ranges from -2.71 (2010) to .477 (2013).

[INSERT FIGURE 1 HERE]

Table 1 panel B presents the correlation matrix. The dependent variables *DISC-ACC*, *REPORT LAG*, and *FEES* are positively and statistically significantly correlated with our variable of interest, *INFLUENZA* ($p < 0.01$).[21] The variance inflation factors throughout our analyses do not exceed 4, indicating that multicollinearity is unlikely to be an issue.

[21] The variable *HEALTH* is negatively correlated with influenza because *INFLUENZA* is on a scale where a higher number indicates worse flu, while on the *HEALTH* scale a higher number is indicative of better health.

IV. Results

The Association between Influenza and Discretionary Accruals

To test Hypothesis 1, we first examine the association between influenza and discretionary accruals. Table 2 Column (1) reports the results for the complete sample of clients whose audit is completed during busy season. The coefficient of the test variable *INFLUENZA* is positive and statistically significant ($p < 0.01$), which supports Hypothesis 1 and suggests that an increase in flu is associated with an increase in discretionary accruals, or a reduction in audit quality.[22] All coefficients of statistically significant control variables are of the expected sign. The results are also economically significant. Holding all other variables at the sample mean, moving from the 25th to 75th percentile of *INFLUENZA* increases discretionary accruals by 6.8 percent. The economic significance is further evidenced by comparing states in the highest and lowest quartiles of influenza. Moving from Minnesota (25th percentile, *INFLUENZA*= -1.056) to New Jersey (75th percentile, *INFLUENZA*=.817) increases the change in discretionary accruals by 0.06.

[INSERT TABLE 2 HERE]

We then consider the association for the Big 4 and non-Big 4 samples. 62.8 percent of our sample (Table 1 panel A) firms are audited by Big 4 auditors, comparable with Bills et al. (2016). Columns (2) and (3) of Table 2 report the results for clients of Big 4 and non-Big 4 auditors, respectively. The coefficient of *INFLUENZA* is statistically significant for the Big 4 samples ($p < 0.01$) but not for the non-Big 4 sample ($p > 0.10$), suggesting that the negative association between influenza and audit quality extends to audits of Big 4 firms but not of non-Big 4.[23]

[22] We also estimate the regression separately for income-increasing and income-decreasing discretionary accruals and find that the results hold for both.

[23] Non-Big 4 firms include mid-tier firms Grant Thornton LLP and BDO Seidman LLP. We estimate this separately for these two firms and the results are the same as for non-Big 4 firms. This suggests that the mid-tier firms are potentially more agile than the Big 4 in responding to human resource capacity changes from influenza. We also repeat the analysis for going concern errors, audit report lag, and audit fees with the two mid-tier firms and get similar results.

The Association between Influenza and Going Concern Errors

Hypothesis 1 also predicts the association between influenza and going concern errors. We posit that when *INFLUENZA* is high, the likelihood of a Type I or Type II error increases. The results of this estimation are presented in Table 3. Similar to the discretionary accruals analysis, we find support for Hypothesis 1, where *INFLUENZA* is positive and significant. ($p < 0.05$). This is indicative of a negative association between the flu and audit quality. The coefficients of statistically significant control variables are of the expected directions. To illustrate economic significance, moving from the 25th to 75th percentile of *INFLUENZA* (holding other variables at the sample mean) increases the likelihood of a going concern error by 27.48 percent. Further, moving from a state in the lowest quartile (MN) to the highest quartile of influenza outbreaks (NJ) increases the likelihood of a going-concern error .15.

[INSERT TABLE 3 HERE]

The association between *INFLUENZA* and going concern errors holds for Big 4 auditors ($p < 0.05$). However, there is no statistically significant association between influenza and going concern errors for non-Big 4 auditors. ($p > 0.10$).

The Association between Influenza and Audit Delay

Hypothesis 2 predicts that influenza is positively associated with audit report lag. We present the results of this hypothesis in Table 4. We find a positive association between the flu and audit report lag ($p < 0.01$), confirming Hypothesis 2. The coefficients of statistically significant control variables are generally of the expected directions. Examining the economic significance of the estimation, a shift from the 25th to 75th percentile of *INFLUENZA* increases the audit report lag by 9.6 percent. Moving from Minnesota (lowest quartile of influenza) to New Jersey (highest quartile of influenza) increases the audit report lag by 4.3 days.

[INSERT TABLE 4 HERE]

The positive association between the flu and audit report lag extends to both Big 4 and non-Big 4 auditors ($p < 0.01$ and 0.05, respectively), suggesting that the organizational structure of the firms does not influence the timing of the audit report.

The Association between Influenza and Audit Production Costs

Table 5 reports the estimation results of Hypothesis 3. We find a positive association between influenza and audit fees, our measure of production costs ($p < 0.01$), which supports the underlying hypothesis. Economically, the change is evidenced by moving from the 25th to 75th percentile of *INFLUENZA*, which results in a 3.3 percent increase in audit fees. This change holds all other variables at the sample mean. Columns (2) and (3) of Table 5 indicate that the results extend to Big 4 firms ($p < 0.01$) but not to non-Big 4 ($p > 0.10$).

[INSERT TABLE 5 HERE]

Additional Analysis

We next analyze client reporting and industry complexity that may aggravate the effects of influenza.

Influenza in Offices Serving Complex Clients

We have thus far found an adverse association between influenza and audit outcomes for Big 4 audit offices. As audit quality is not consistent across Big 4 audit offices (Francis and Yu 2009; Francis et al. 2013), it is not anticipated that all audits will be impacted equally. If employees are out sick, firms may be challenged to replace an auditor if the client is complex and requires specific expertise. If the auditor goes to work sick, their judgment may be impaired, the effects of which could be heightened on complex engagements. To determine whether the impact of the flu on Big 4 offices is driven by the number of complex engagements, and thus a need for strong engagement specific knowledge, we estimate our analyses in offices serving clients with high accounting reporting complexity. This analysis offers the advantage of holding auditor quality constant by estimating our models within Big 4 auditors only. Accounting reporting complexity (ARC) data is obtained from and measured following Hoitash and Hoitash (2018). ARC uses detailed XBRL tags from SEC filings to calculate the natural log of the total number of distinct numeric accounting concept tags reported in Item 8 of the 10-K filings.[24] Clients are identified as complex if their ARC exceeds the sample median. We then sum the number of complex clients served by each office in each year in our sample. An indicator variable, COMPARC, is equal to 1 if the number of complex clients served by each office exceeds the annual sample median, and 0 otherwise. We estimate our analyses of the dependent variables separately when COMPARC is equal to one and when COMPARC is equal to zero. We expect that offices serving more complex clients will experience negative audit outcomes. The results of this analysis are presented in Table 6.

[INSERT TABLE 6 HERE]

Columns (1), (3), (5), and (7) report the results for Big 4 offices serving more clients with high accounting report complexity, while columns (2), (4), (6), and (8) report the results for Big 4 offices serving fewer complex clients. We find a statistically significant association between *INFLUENZA* and the dependent variables for Big 4 offices serving complex clients ($p < 0.05$, 0.05, 0.01, and 0.01 for discretionary accruals, going concern errors, audit report lag, and audit fees, respectively). We do not find a statistically significant association for Big 4 offices serving fewer complex clients ($p > 0.10$). These findings suggest that Big 4 offices who serve complex clients struggle to adjust human capital resources in response to the flu. This may be due to employees of Big 4 offices going to work while sick, which is not a visible shock to human capital, thus making

[24] ARC data is available for years after 2010. To complete our sample, which includes years 2009 – 2016, we replace the missing ARC values from years 2009 and 2010 with the value from 2011.

it challenging for the firms to address. Employees who go to work sick may then experience more difficulty performing their job, thus negatively impacting audit outcomes.

Influenza in Offices Serving Complex Industries

We next estimate our analyses in Big 4 offices serving clients in complex industries. Following Francis and Gunn (2015), we identify complex industries as those in the FASB's *Topic 900: Industry Series* or the AICPA's *Audit and Accounting Practice Guides*. These include companies in the following industries: agriculture (1), entertainment (7), healthcare (11), construction (18), guns (26), gold (27), mines (28), coal (29), oil (30), utilities (31), communication (32), business services (34), computers (35), transportation (40), banking (44), insurance (45), real estate (46), and trading (47).[25] We then sum the number of complex industries served by each office during each year in our sample. We create an indicator variable, *COMPLEX*, which is equal to 1 if the number of complex industries served by each office exceeds the annual sample median, and 0 otherwise. We estimate the regressions of all four dependent variables within our study when *COMPLEX* is equal to one and when *COMPLEX* is equal to zero. We expect that judgment and client knowledge will be more impaired for offices serving clients in complex industries. The results are reported in Table 7.

[INSERT TABLE 7 HERE]

Columns (1), (3), (5), and (7) report the results for offices serving complex industries while Columns (2), (4), (6), and (8) report results of offices with fewer clients in complex industries. We find a significant association between *INFLUENZA* and the dependent variables only for those offices whose number of complex clients served exceeds the sample median. These findings support the theory that the flu impairs auditor judgment and client knowledge when auditors go to

[25] Consistent with our main analysis, the discretionary accruals analysis excludes complex clients in the financial services industries.

work sick and most impacts offices serving complex clients. If auditors do not go to work, it is likely that the firms' ability to bring in alternative resources is limited by the complex nature of the engagement.

V. Robustness Tests

To address concerns of alternative explanations for our results, we complete the following additional tests.

Significant Changes in Vaccine Efficacy from the Previous Year

Because the efficacy of the flu vaccine is difficult to predict (CDC 2018a), we expect to see differences between years in which the vaccine was more effective in preventing the flu and years in which it was less effective. Table 8 presents the results of this estimation. Columns (1), (3), (5) and (7) report state-years in which vaccine efficacy is worse than either of the prior two years. Columns (2), (4), (6), and (8) presents state-years in which the vaccine efficacy was the same or better than either of the two previous years. We find a statistically significant association between *INFLUENZA* and discretionary accruals, going concern errors, and audit fees only in years in which the low vaccine efficacy was unexpected compared to prior years. The association between *INFLUENZA* and *REPORT LAG* is significant in both columns.

[INSERT TABLE 8 HERE]

Control Sample

To address the concern that states with bad cases of influenza have inherently different clients than non-influenza inflicted states, and therefore lower audit quality and longer audit report lags, we repeat our analyses on a sample of clients whose year-ends do not fall within the peak flu season. The samples of 4,209; 2,341; 5,667; and 5,683 for discretionary accruals, going concern errors, audit delay, and audit fees, respectively, represent clients with fiscal year-ends that fall in the months of April - October. The audits of these companies are therefore completed outside of busy season, when auditors are not expected to be sick with the flu. The results of this analysis are reported in Table 9.

[INSERT TABLE 9 HERE]

As predicted, we find no association between *INFLUENZA* and discretionary accruals, going concern errors, or audit report lags for clients whose fiscal year-ends do not fall within peak flu season. However, we do find a statistically significant association between *INFLUENZA* and *FEES* for this control sample, which is inconsistent with our prediction.

Controlling for General Health

We perform additional analysis to explore whether general health explains the associations we detect. Unlike the flu, health is predictable, as it does not vary drastically from year to year. Audit firms should have the time and resources to adjust personnel needs for general employee health concerns. We therefore do not expect a significant association between health and audit quality. In addition to tracking flu activity, the CDC performs an ongoing health survey designed to collect data on health-related risk behaviors and conditions in U.S. adults. *HEALTH* represents the average of survey participants' responses to a 1-5 scale where 1 indicates excellent health and 5 indicates poor health. Within our sample, the average state heath is 2.56 (Table 1 panel A).[26] In Table 10 we include *HEALTH* as a control variable in all models and find that *INFLUENZA* remains statistically significant while *HEALTH* is not significantly associated with our dependent variables. These results suggest that the reduced audit quality, longer report lags, and increased audit production costs are not driven by the health of the state.

[26] We observe an inverse association between *HEALTH* and *INFLUENZA* (Table 1 panel B) because on the *HEALTH* scale a higher number is indicative of stronger health, while on the *INFLUENZA* scale a higher number is indicative of higher flu (poorer health). However, while *HEALTH* is a relatively sticky measure, *INFLUENZA* varies over time and place.

[INSERT TABLE 10 HERE]

Controlling for State-Level Resources

Addressing the concern that the intensity of influenza outbreaks is a function of state government resources, we update our analysis to control for these resources. We proxy for state-level resources with state corporate tax rates. It is possible that states with higher tax rates have more resources available to support flu vaccinations or treatments. As expected, we find a negative correlation (untabulated) between state resources (*TAXES*) and *INFLUENZA*. We control for *TAXES* in Table 11 and continue to observe a statistically significant association between *INFLUENZA* and our measures of audit outcomes.

[INSERT TABLE 11 HERE]

Alternative Measure of Busy Season

While our primary test variable measured busy season from January to March, we recognize that auditors may be involved in planning and control testing prior to year-end or involved in audit testing in April. Therefore, we re-estimate our analyses measuring *INFLUENZA* from December through April. Table 12 indicates that the results are robust to this alternative specification of audit busy season.

[INSERT TABLE 12 HERE]

Matched Samples

We implement propensity score matching (PSM) to address endogeneity concerns arising from functional form misspecification between the dependent and independent variables (Rosenbaum and Rubin 1983). Due to the potential self-selection issue of clients choosing where they locate their headquarters, we compare clients in states with high flu to those in states with limited influenza outbreaks. We first estimate the propensity scores using logistic regression. The dependent variable in this regression (*HIGHFLU*) is an indicator variable equal to one if *INFLUENZA* exceeds the sample median, and zero otherwise. For each year in our sample we model the likelihood of selecting a high flu state based on client size, litigious industries, , inventory and receivables, restatements, foreign activity, Big 4 auditor, and two state-level variables, education and health.[27] We generate 7,010; 2,292; 12,382; and 11,392 matched companies for the discretionary accruals, going concern error, audit delay, and audit fee analyses, respectively, by matching, without replacement, clients in high flu states to those in non-high flu states with the closest propensity score within a maximum Caliper distance of .01. Regression results within the matched pair sample remain robust and are reported in Table 13.

[INSERT TABLE 13 HERE]

Additional Tests

We complete the following tests in additional untabulated analyses. We consider whether the results are driven by the client being sick, education, office growth, select states, or poor company performance. Like most archival audit studies, we recognize that observed audit quality is also influenced by company personnel because the work of financial statement preparers is the starting point of any audit. Likewise, we acknowledge that it is not possible to fully disentangle the two. It is possible that the client may also be sick during flu season and thus contribute to impaired audit quality, increased audit delay, or inefficient work that increases audit fees.[28] We perform two tests to address this concern. First, we update our measure of *INFLUENZA* to include only the months of November and December. These are the months of the year in which the client is wrapping up year-end financial reporting and preparing for the earnings announcement release. We find no

[27] The covariance balance affirms the success of the matching procedures, as the normalized differences do not exceed 0.25, indicating an acceptable balance between treatment and control groups (Imbens and Rubin 1997).
28 Going concern errors, unlike our other measures of audit outcomes, are less likely influenced by sick clients located in a high flu state as going concern opinions are a decision made by the auditor, independent of the client.

association between *INFLUENZA* and going concern errors, report lag, or audit fees, and only a marginal association ($p<0.10$) between *INFLUENZA* and discretionary accruals, suggesting that the client being sick is not a primary driver of our results. Second, we examine the association between *INFLUENZA* and the earnings announcement delay (EA lag).[29] The earnings announcement is the responsibility of management and is often issued prior to the completion of the independent audit (Krishnan and Yang 2009; Bronson et al. 2011; Schroeder 2016). We consider the year-over-year change in the EA lag and find no association between *INFLUENZA* and the change in EA lag, giving us further confidence our results are not completely driven by the client being sick.[30]

It has been documented that audit offices in cities with higher levels of education have higher audit quality (Beck et al. 2018). To test if the impact of the flu is incremental to education of the workforce, we control for *EDUCATION*, measured as the percentage of the state population with a Bachelor's degree or higher.[31] Table 1 panel A reports that approximately 32 percent of the population of the states within our sample have a bachelor's degree, consistent with Beck et al. (2018). We find that our results are not affected by the inclusion of *EDUCATION* as a control variable in our models.

It is possible that our results are driven by increases in the number of clients served, rather than reduction in auditor supply. We therefore consider whether our results are driven by office growth. Bills et al. (2016) document that increases in audit workload reduce audit quality. Our results are robust to controlling for office growth, measured as the percentage change in office size

[29] We control for determinants of the earnings announcement delay following Sengupta (2004).
30 These results are robust to three specifications of the *INFLUENZA* variable: our primary measure from January to March, our alternative measure from December to March, and the measure designed to capture the client's work in November and December.
[31] Education data is obtained from the U.S. Census Bureau's American Community Survey.

(fees).[32] This suggests that the negative association between audit quality and *INFLUENZA* is incremental to the association between office growth and audit quality.

To determine whether the results are sensitive to the largest and smallest states, we drop states with fewer than 20 observations (8 states) and the largest 3 states (comprising 37.57 percent of all observations). We re-estimate the regressions on discretionary accruals, going concern errors, audit report lag, and audit fees within the updated sample. We find similar (untabulated) results, indicating that the results are not sensitive to the inclusion of the smallest and largest states within our sample.

Finally, we examine the impact of the flu on overall company performance. If firms do not perform well (because of the flu), managers may be more likely to engage in earnings management. Additionally, auditors may assess higher risk and increase fees. We estimate regression models where the dependent variables are return on assets and Tobin's Q. We find no association between *INFLUENZA* and return on assets or Tobin's Q and conclude that the flu does not appear to be associated with company performance and our results are not driven by this alternative explanation.

VI. Conclusion

This paper is motivated by the timing of flu season, which directly overlaps with audit busy season. We examine the impact of the flu on audit quality, audit report lag, and audit production costs at the local office level. We find that audit quality, measured with discretionary accruals and going concern errors, declines in offices with the worst flu outbreaks. We find that audit delay increases when auditors are more likely to be sick with the flu. We also find that audit production costs increase in offices with flu outbreaks, suggesting that as audit quality declines, auditors pass the

[32] The results are also robust to controlling for high growth, an indicator variable equal to 1 if the office-year falls into the top decile of growth from year t-1 to year t, also following Bills et al. (2016).

inefficiencies to the client via audit fees. The effects of the flu are mitigated for non-Big 4 offices, perhaps because of the culture of Big 4 firms that encourages auditors to go to work when sick. Big 4 offices serving the most complex clients, measured by accounting reporting complexity and industry complexity, have poorer audit outcomes than those offices serving fewer complex clients. This suggests that auditors working when sick with the flu struggle to maintain quality and other outcomes when their judgment is impaired. Overall, our evidence suggests that the flu constitutes a serious shock to audit firms' human capital resources.

The results of this study are informative to both audit firms and regulators of financial statement audits. We offer insight for accounting firms on the importance of investing in and properly managing human capital resources. While many firms are already offering in-office flu shots, our findings suggest that these efforts may not be achieving the intended results, and that firms should seek alternative methods of mitigating the impact of the flu on audit quality. Most firms do not currently track sick days and may benefit from record keeping of the impact of the flu on employee productivity. While a rational organization would adjust resources in response to workforce impairment, audit firms may not be aware of the effects of the flu on audit outcomes. This lack of knowledge of the effects of the flu explain the persistent results that illustrate that firms are not able to make appropriate labor adjustments in response to flu-induced threats to human resource capacity.

Our results suggest that Big 4 offices may seek to implement better scheduling systems that allow them to transfer engagement team members with compatible experiences and skillsets at short notice. Finally, firms may wish to change the culture within the firm to one that encourages employees to stay at home and rest if sick, rather than going to work, which could impair judgment and professional skepticism and adversely affect audit quality. In addition to offering insights for public accounting firms, the results further inform regulators who have a vested interest in the audit firm risks that impair auditor judgment and audit quality.

Our study is not without limitations. We rely on available proxies of audit quality to measure an unobservable phenomenon. We are also unable to examine the impact of the flu at the individual auditor level and thus cannot directly measure auditors' cognitive states (DeHaan et al. 2017). Further research could examine the interaction of audit team members when one or more scheduled personnel are sick with the flu or otherwise unavailable.

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APPENDIX
Variable Definitions

Dependent Variables	
DISC-ACC	Discretionary accruals estimated using the performance-adjusted modified Jones model (Kothari et al. 2005)
GC ERROR	An indicator variable equal to 1 if the auditor committed a Type I or Type II going concern error, and 0 otherwise
REPORT LAG	The number of days between the fiscal-year end and the filing date of the audit report, less the filing period mandated by the SEC (60, 75, and 90 days for large accelerated, accelerated, and non-accelerated filers, respectively)
FEES	The natural log of audit fees

Variable of Interest	
INFLUENZA	The sum of the average standardized flu spread and severity measured from January 1st to March 31st of year t.

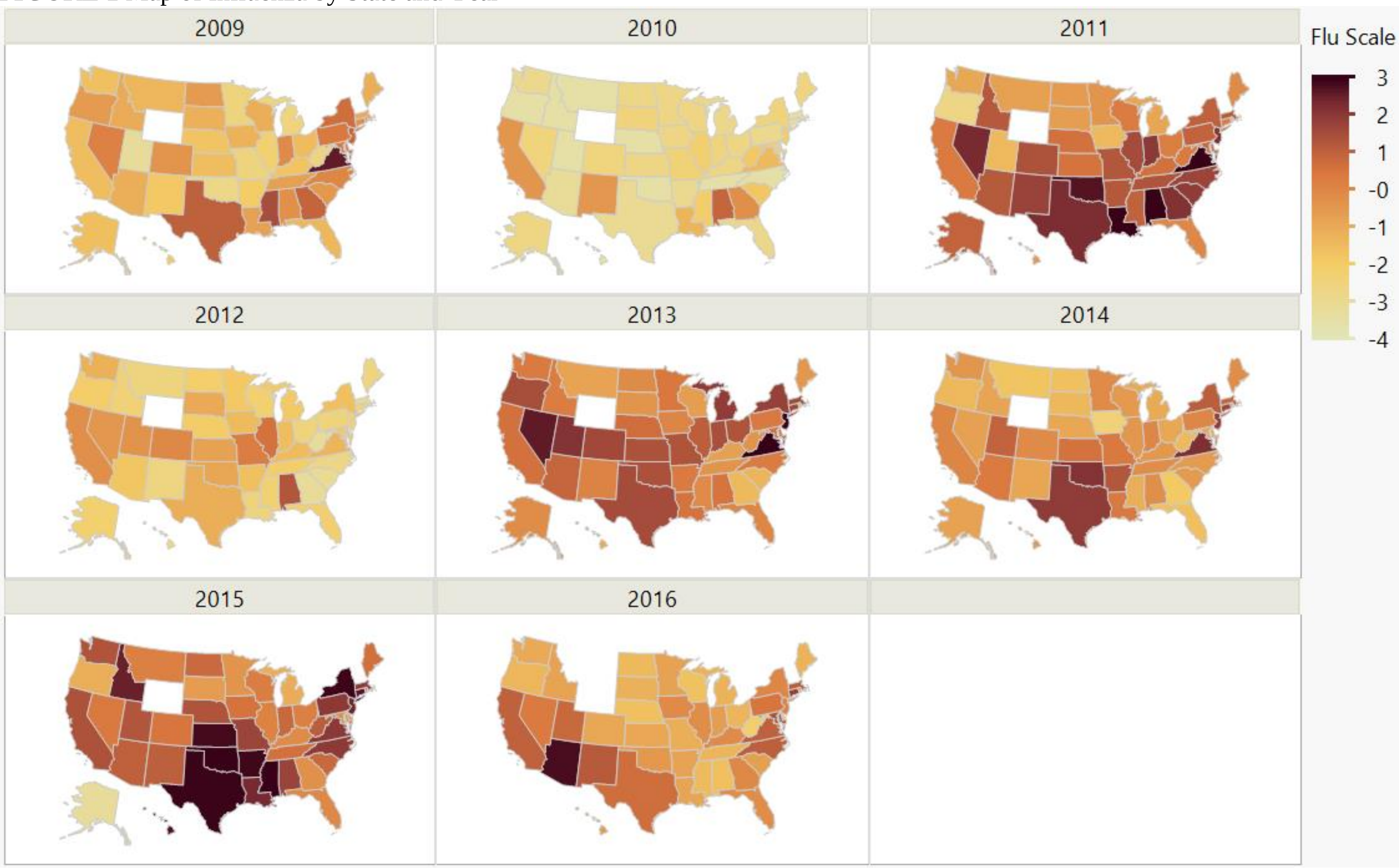
Client Variables	
SIZE	The natural log of total assets
BUS-SEG	The sum of reported business segments
GEO-SEG	The sum of reported geographic segments
LOSS	An indicator variable equal to 1 if the company reported a net loss in year t or year t-1, and 0 otherwise
LEVERAGE	The ratio of total debt to total assets
CASH FLOW	Operating cash flows deflated by lagged total assets
MB	Natural log of the market value of equity over book value of equity
EXT GROWTH	An indicator variable equal to 1 if year over year industry-adjusted sales growth falls into the top quintile, and 0 otherwise
LIT	An indicator variable equal to 1 if the company operates in a highly litigious industry (SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, and 7370), and 0 otherwise
MW	An indicator variable equal to 1 if the company reported an internal control material weakness, and 0 otherwise
STD-SALES	The rolling five-year window of standard deviation of sales revenue
STD-CASH	The rolling five-year window of standard deviation of operating cash flows
BANKRUPT	An indicator variable equal to 1 if the firm filed for bankruptcy in the fiscal year, and 0 otherwise
FSCORE	The predicted likelihood of restatement per Dechow, Ge, Larson, and Sloan (2011)
ACCUMDEF	An indicator variable equal to 1 if the firm has negative retained earnings, and 0 otherwise
LIFECYCLE	Total common equity less retained earnings scaled by total assets
INFLUENCE	The ratio of the client's total fees over annual office fees

FOREIGN	An indicator variable equal to 1 if the company reports an amount other than zero for foreign currency translation, and 0 otherwise
ABSLAGACCR	The absolute value of total accruals from year t-1. Total accruals are defined as income before extraordinary items minus operating cash flows.
INVREC	The sum of total inventory and total receivables scaled by total assets
GC	An indicator variable equal to 1 if the company received a going-concern audit opinion, and 0 otherwise
RESTATE	An indicator variable equal to 1 if the company announced a restatement during the fiscal year, and 0 otherwise

Audit Variables	
BIG4	An indicator variable equal to 1 if the auditor is one of the Big 4, and 0 otherwise
OFFICE SIZE	The sum of an office's audit sales for the fiscal year
AUDIT TENURE	The number of years the auditor has been engaged by the client
OFFICE EXPERT	An indicator variable equal to 1 if the auditor is ranked number one in their city/industry based on audit fees
AUDITOR CHANGE	An indicator variable equal to 1 if this is the first year the auditor is engaged by the client, and 0 otherwise

Other Variables	
COMPARC	An indicator variable equal to 1 if the sum of the number of clients with complex accounting reporting complexity (defined by Hoitash and Hoitash (2018) served by an office exceeds the sample median, and 0 otherwise
COMPLEX	An indicator variable equal to 1 if the sum of the number of complex industries (defined by Francis and Gunn 2015) served by an office exceeds the sample median, and 0 otherwise
HEALTH	A scale of 1-5, where 1=excellent health and 5=poor health
HIGH FLU	An indicator variable equal to 1 if the state flu exceeds the sample median, and 0 otherwise
EA LAG	The annual change in earnings announcement delay, calculated as the number of days between the fiscal year end and the filing date of the earnings announcement
EDUCATION	The percentage of people within the state that have obtained a Bachelor's degree or higher
HIGH GROWTH	An indicator variable equal to 1 if the audit office growth falls into the top decile, and 0 otherwise

FIGURE 1 Map of Influenza by State and Year



Wisconsin is omitted from the sample due to lack of audit offices serving as the lead auditor during the sample period. The same applies to Montana in 2016.

TABLE 1
Panel A: Descriptive Statistics

	N	Mean	Median	Std. Dev.	p25	p75
INFLUENZA	27,713	0.022	0.129	1.663	-1.272	1.126
DISC-ACC	18,156	0.086	0.045	0.117	0.019	0.098
GC ERROR	12,305	0.0765	0.000	0.266	0.000	0.000
REPORT LAG	27,713	-6.891	-4.000	9.920	-12.000	-1.000
FEES (log)	27,713	13.570	13.638	1.371	12.612	14.466
SIZE (ln)	27,713	6.536	6.722	2.386	5.054	8.157
BUS-SEG	27,713	1.700	1.000	1.395	1.000	2.000
GEO-SEG	27,713	1.648	1.000	1.982	0.000	2.000
LOSS	27,713	0.443	0.000	0.497	0.000	1.000
LEVERAGE	27,713	0.263	0.188	0.286	0.041	0.394
CASH FLOW	26,662	0.020	0.055	0.231	0.009	0.114
MB	26,651	2.914	1.660	7.708	0.954	3.213
EXT GROWTH	27,713	0.179	0.000	0.384	0.000	0.000
LIT	27,713	0.202	0.000	0.402	0.000	0.000
MW	27,713	0.112	0.000	0.315	0.000	0.000
STD-SALES	24,486	0.141	0.077	0.192	0.021	0.177
STD-CASH	24,411	0.066	0.033	0.101	0.013	0.072
BANKRUPT	27,713	0.002	0.000	0.049	0.000	0.000
FSCORE	23,648	1.375	0.923	2.259	0.511	1.545
ACCUMDEF	27,713	0.451	0.000	0.498	0.000	1.000
LIFECYCLE	26,931	1.412	0.299	3.809	0.084	0.864
INFLUENCE	26,760	0.178	0.066	0.277	0.021	0.190
FOREIGN	27,713	0.230	0.000	0.421	0.000	0.000
INV-REC	27,713	0.272	0.198	0.242	0.067	0.426
GC	27,713	0.064	0.000	0.245	0.000	0.000
RESTATE	27,713	0.080	0.000	0.272	0.000	0.000
BIG 4	27,713	0.639	1.000	0.480	0.000	1.000
OFFICE SIZE (log)	26,767	9.330	10.252	2.973	7.042	11.723
AUDIT TENURE	27,471	12.151	8.000	15.070	3.000	14.000
OFFICE EXPERT	27,713	0.572	1.000	0.495	0.000	1.000
AUDITOR CHANGE	27,713	0.064	0.000	0.244	0.000	0.000
EDUCATION	27,713	0.323	0.316	0.050	0.286	0.360
HEALTH	27,710	2.561	2.545	0.152	2.487	2.649
Observations	27,713					

We winsorize all continuous variables at the 1st and 99th percentiles. We define all variables in detail in the Appendix.

TABLE 1
Panel B: Pearson Correlation Matrices

	(1)					
	INFLUENZA	*DISC-ACC*	*GC ERROR*	*REPORT LAG*	*FEES*	*HEALTH*
INFLUENZA	1					
DISC-ACC	0.0502***	1				
GC ERROR	0.00392	0.311***	1			
REPORT LAG	0.0425***	0.118***	0.159***	1		
FEES	0.0504***	-0.349***	-0.282***	-0.117***	1	
HEALTH	-0.0329***	-0.0546***	-0.0346***	0.0119*	-0.00859	1

We denote statistical significant where * = $p < 0.05$, ** = $p < 0.01$, and *** = $p < 0.001$. P-values for all coefficients are conservatively reported as two-tailed. None of the variance inflation factors (VIF) are greater than 4, indicating that multicollinearity is unlikely to be a significant issue. We define all variables in detail in the Appendix.

TABLE 2
The Association between Influenza and Discretionary Accruals

	Predicted Sign	(1) Full Sample	(2) Big 4	(3) Non-Big 4
INFLUENZA	+	0.002***	0.002***	0.002
		(3.42)	(2.59)	(1.27)
SIZE	-	-0.007***	-0.005***	-0.012***
		(-9.14)	(-7.17)	(-6.80)
BUS-SEG	+	0.000	-0.001	0.001
		(0.47)	(-1.37)	(0.31)
GEO-SEG	+	-0.000	0.000	-0.002
		(-0.89)	(0.23)	(-1.65)
LOSS	+	0.011***	0.019***	0.005
		(5.87)	(9.03)	(1.29)
LEVERAGE	+	0.027***	0.018***	0.028***
		(5.22)	(3.48)	(3.09)
CASH FLOW	-	-0.082***	-0.033***	-0.105***
		(-9.35)	(-2.73)	(-8.57)
MB	+	0.000	0.000	0.000
		(0.80)	(0.11)	(0.87)
EXT GROWTH	+	0.023***	0.016***	0.035***
		(8.89)	(6.22)	(7.04)
LIT	+	0.002	-0.000	0.004
		(0.66)	(-0.10)	(0.58)
MW	+	0.016***	0.009**	0.017***
		(4.77)	(2.40)	(3.24)
STD-SALES	+	0.020***	0.012*	0.031***
		(2.92)	(1.89)	(2.74)
STD-CASH	+	0.189***	0.182***	0.146***
		(10.74)	(7.22)	(6.09)
BIG 4	+	-0.004		
		(-1.15)		
OFFICE SIZE	-	-0.001*	0.001	-0.001
		(-1.83)	(1.32)	(-0.57)
AUDIT TENURE	-	0.000***	0.000	-0.000
		(2.62)	(1.09)	(-0.33)
OFFICE EXPERT	?	0.001	0.001	0.002
		(0.71)	(0.85)	(0.54)
Constant	-	0.102***	0.064***	0.112***
		(10.27)	(6.32)	(5.40)
Industry & Year FE		Yes	Yes	Yes
Observations		15,709	10,824	4,885
Adjusted R^2		0.304	0.190	0.303

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 3
The Association between Influenza and Going Concern Errors

	Predicted Sign	(1) Full Sample	(2) Big 4	(3) Non-Big 4
INFLUENZA	+	0.047**	0.088**	0.012
		(2.05)	(2.37)	(0.42)
SIZE	-	-0.274***	-0.124**	-0.351***
		(-9.55)	(-2.49)	(-9.20)
BANKRUPT	+	1.424***	1.534***	0.366
		(6.58)	(5.85)	(0.64)
FSCORE	+	0.013*	-0.021	0.008
		(1.80)	(-1.02)	(1.03)
ACCUMDEF	+	0.777***	0.725***	0.851***
		(7.00)	(4.21)	(6.07)
LIFECYCLE	+	0.035***	0.059***	0.025***
		(5.54)	(4.35)	(3.42)
CASHFLOW	+	0.000	-0.000	-0.003*
		(0.23)	(-1.60)	(-1.85)
STD-CASH	+	0.825***	1.292***	0.486*
		(3.31)	(3.16)	(1.71)
ABSLAGACCR	+	0.188**	0.038	0.450***
		(2.06)	(0.63)	(4.03)
INFLUENCE	+	0.278***	0.188	0.265**
		(2.88)	(0.69)	(2.56)
AUDIT TENURE	-	0.003	0.006	-0.029**
		(0.57)	(1.11)	(-2.23)
BIG 4	-	-0.189**		
		(-2.14)		
Constant		-1.062***	-2.038***	-0.737**
		(-4.05)	(-4.60)	(-2.30)
Industry & Year FE		Yes	Yes	Yes
Observations		12,305	6,937	4,718
Pseudo R^2		0.386	0.263	0.358

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 4

The Association between Influenza and Audit Delay

	Predicted sign	(1) Full Sample	(2) Big 4	(3) Non-Big 4
INFLUENZA	+	0.277***	0.262***	0.270**
		(4.31)	(3.29)	(2.57)
SIZE	-	-0.150**	0.019	-0.276**
		(-2.08)	(0.20)	(-2.55)
BUS-SEG	+	0.567***	0.623***	0.227
		(5.80)	(5.65)	(1.06)
FOREIGN	+	0.567**	0.659**	0.148
		(2.26)	(2.35)	(0.28)
INV-REC	+	-0.053	-0.063	0.445
		(-0.08)	(-0.07)	(0.46)
LIT	-	-0.704	-0.258	-1.441**
		(-1.50)	(-0.42)	(-2.03)
LEVERAGE	+	0.244	-0.768	0.958**
		(0.62)	(-1.25)	(1.99)
GC	+	5.768***	3.487***	5.815***
		(14.40)	(4.68)	(12.83)
MW	+	5.496***	4.124***	6.180***
		(21.08)	(11.05)	(17.52)
RESTATE	+	0.542**	0.761***	0.308
		(2.31)	(2.70)	(0.74)
BIG 4	-	-0.963***		
		(-3.44)		
AUDITOR CHANGE	+	1.811***	2.105***	1.347***
		(7.33)	(5.23)	(4.28)
Constant		-5.558***	-6.514***	-6.430***
		(-4.17)	(-5.20)	(-2.80)
Industry & Year FE		Yes	Yes	Yes
Observations		27,713	17,709	10,004
Adjusted R^2		0.120	0.082	0.166

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 5

The Association between Influenza and Audit Fees

	Predicted sign	(1) Full Sample	(2) Big 4	(3) Non-Big 4
INFLUENZA	+	0.014***	0.022***	-0.000
		(3.44)	(4.59)	(-0.02)
SIZE	+	0.437***	0.434***	0.453***
		(74.94)	(58.12)	(52.07)
BUS-SEG	+	0.092***	0.095***	0.087***
		(12.20)	(11.78)	(5.18)
GEO-SEG	+	0.058***	0.055***	0.064***
		(12.20)	(10.09)	(7.43)
FOREIGN	+	0.166***	0.168***	0.134***
		(9.47)	(8.39)	(4.06)
INV-REC	+	0.170***	0.240***	0.089
		(3.18)	(2.90)	(1.48)
LOSS	+	0.184***	0.179***	0.183***
		(14.56)	(11.81)	(9.00)
LEVERAGE	+	0.044	-0.048	0.132***
		(1.59)	(-1.17)	(3.69)
MB	+	0.002***	0.004***	-0.001
		(2.59)	(4.21)	(-0.68)
LIT	+	0.013	-0.022	0.078*
		(0.44)	(-0.58)	(1.65)
GC	+	0.138***	0.245***	0.121***
		(5.36)	(5.12)	(3.97)
MW	+	0.169***	0.284***	0.072***
		(8.99)	(10.99)	(2.95)
RESTATE	+	0.075***	0.068***	0.046*
		(5.11)	(3.88)	(1.84)
BIG 4	+	0.608***		
		(30.46)		
AUDIT TENURE	+	0.001*	0.001	-0.001
		(1.70)	(1.59)	(-0.32)
AUDITOR CHANGE	-	-0.134***	-0.176***	-0.114***
		(-8.58)	(-6.74)	(-5.85)
Constant		9.694***	10.601***	9.293***
		(60.42)	(70.24)	(52.53)
Industry & Year FE		Yes	Yes	Yes
Observations		27,034	16,971	10,063
Adjusted R^2		0.853	0.740	0.695

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 6
Big 4 Office Client Reporting Complexity

	(1) *DISC-ACC* COMPARC =1	(2) *DISC-ACC* COMPARC =0	(3) *GC ERROR* COMPARC =1	(4) *GC ERROR* COMPARC =0	(5) *REPORT LAG* COMPARC =1	(6) *REPORT LAG* COMPARC =0	(7) *FEES* COMPARC =1	(8) *FEES* COMPARC =0
INFLUENZA	0.002***	0.003	0.048**	0.218	0.271***	0.262	0.012***	0.012
	(3.06)	(1.59)	(2.08)	(1.27)	(4.14)	(1.02)	(2.94)	(0.94)
Constant	0.107***	0.050**	-1.061***	5.176**	-5.604***	-6.946***	9.698***	10.325***
	(10.14)	(2.28)	(-3.96)	(2.20)	(-3.88)	(-3.85)	(61.09)	(58.09)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,433	1,276	11,501	290	25,704	2,009	25,123	1,911
Adjusted/Pseudo R^2	0.305	0.241	0.387	0.506	0.124	0.132	0.856	0.769

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 7
Big 4 Office Client Industry Complexity

	(1) *DISC-ACC* COMPLEX=1	(2) *DISC-ACC* COMPLEX=0	(3) *GC ERROR* COMPLEX=1	(4) *GC ERROR* COMPLEX=0	(5) *REPORT LAG* COMPLEX=1	(6) *REPORT LAG* COMPLEX=0	(7) *FEES* COMPLEX=1	(8) *FEES* COMPLEX=0
INFLUENZA	0.003***	-0.000	0.046**	0.166	0.310***	0.031	0.014***	0.001
	(3.46)	(-0.17)	(1.99)	(1.36)	(4.66)	(0.15)	(3.25)	(0.04)
Constant	0.105***	0.065***	-1.061***	-1.254	-5.138***	-9.658***	9.665***	10.979***
	(10.03)	(2.94)	(-3.96)	(-0.92)	(-3.51)	(-3.00)	(62.48)	(61.63)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,271	1,438	11,340	374	25,385	2,328	24,783	2,251
Adjusted/Pseudo R^2	0.304	0.237	0.384	0.438	0.128	0.092	0.855	0.748

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 8
Changes in Vaccine Efficacy

	(1) *DISC-ACC* (VAC_t < $VAC_{t-1, t-2}$)	(2) *DISC-ACC* (VAC_t > $VAC_{t-1, t-2}$)	(3) *GC ERROR* (VAC_t< $VAC_{t-1, t-2}$)	(4) *GC ERROR* (VAC_t > $VAC_{t-1, t-2}$)	(5) *REPORT LAG* (VAC_t < $VAC_{t-1, t-2}$)	(6) *REPORT LAG* (VAC_t > $VAC_{t-1, t-2}$)	(7) *FEES* (VAC_t < $VAC_{t-1, t-2}$)	(8) *FEES* (VAC_t > $VAC_{t-1, t-2}$)
INFLUENZA	0.003***	0.001	0.067**	0.014	0.282***	0.423***	0.015***	0.003
	(2.89)	(1.08)	(2.45)	(0.31)	(3.75)	(3.65)	(3.36)	(0.38)
Constant	0.109***	0.094***	-1.027***	-0.797**	-5.351***	-3.726**	9.584***	9.677***
	(9.68)	(7.20)	(-3.34)	(-1.97)	(-3.04)	(-2.51)	(55.63)	(51.10)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,751	3,881	7,558	2,725	18,045	6,153	17,614	6,016
Adjusted/Pseudo R^2	0.309	0.298	0.398	0.442	0.123	0.107	0.854	0.854

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 9
Control Sample: Clients with Non-flu Fiscal Year Ends

	(1) *DISC-ACC*	(2) *GC ERROR*	(3) *REPORT LAG*	(4) *FEES*
INFLUENZA	0.001	0.039	-0.027	0.028***
	(1.03)	(0.75)	(-0.19)	(3.37)
Constant	0.076***	-2.756***	0.489	9.764***
	(6.67)	(-4.00)	(0.27)	(45.27)
Control Variables	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	4,209	2,341	5,667	5,683
Adjusted/Pseudo R^2	0.283	0.417	0.215	0.881

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 10
Controlling for General Health

	(1) *DISC-ACC*	(2) *GC ERROR*	(3) *REPORT LAG*	(4) *FEES*
INFLUENZA	0.002***	0.046**	0.275***	0.014***
	(3.43)	(2.04)	(4.29)	(3.40)
HEALTH	-0.003	-0.124	0.749	-0.130***
	(-0.46)	(-0.61)	(1.15)	(-3.23)
Constant	0.109***	-0.225	-7.499***	10.021***
	(6.21)	(-0.36)	(-3.61)	(51.88)
Controls	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	15,709	12,305	27,710	27,031
Adjusted/Pseudo R^2	0.304	.386	0.121	0.853

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 11
Controlling for State-Level Resources

	(1) *DISC-ACC*	(2) *GC ERROR*	(3) *REPORT LAG*	(4) *FEES*
main				
INFLUENZA	0.002***	0.048**	0.285***	0.015***
	(3.28)	(2.11)	(4.38)	(3.58)
TAXES	-0.058**	-0.677	3.949	0.585***
	(-2.09)	(-0.63)	(1.09)	(2.58)
Constant	0.106***	-1.032***	-5.929***	9.663***
	(10.53)	(-4.02)	(-4.44)	(59.63)
Controls	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	15420	12135	27243	26589
Adjusted R^2	0.305		0.123	0.851
Pseudo R^2		0.387		

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 12

Alternative Measure of Busy Season

	(1) *DISC-ACC*	(2) *GC ERROR*	(3) *REPORT LAG*	(4) *FEES*
INFLUENZA	0.002***	0.042*	0.292***	0.021***
	(3.48)	(1.82)	(4.47)	(4.89)
Constant	0.103***	-1.049***	-5.470***	9.709***
	(10.36)	(-4.01)	(-4.10)	(60.57)
Controls	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	15,709	12,305	27,713	27,034
Adjusted/Pseudo R^2	0.304	0.386	0.121	0.853

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.

TABLE 13

Estimation Results within Matched Samples

	(1) *DISC-ACC*	(2) *GC ERROR*	(3) *REPORT LAG*	(4) *FEES*
INFLUENZA	0.002**	0.081*	0.309***	0.013***
	(2.13)	(1.65)	(3.65)	(2.59)
Constant	0.093***	-0.273	-6.918***	9.669***
	(7.42)	(-0.57)	(-4.85)	(38.20)
Control Variables	Yes	Yes	Yes	Yes
Industry & Year FE	Yes	Yes	Yes	Yes
Observations	7,010	2,292	12,382	11,892
Adjusted/Pseudo R^2	0.323	0.423	0.121	0.856

We winsorize all continuous variables at the 1st and 99th percentiles. Standard errors are clustered at the client-level to correct for heteroskedasticity. The numbers reported in each cell are coefficients (t-statistics), with significance denoted as *** (1%), ** (5%), and * (10%). P-values for all coefficients are conservatively reported as two-tailed. All variables are defined in the Appendix.