Corporate In-house Human Capital Investment in Accounting*

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Abstract

In this study, we provide large-sample evidence on how corporate in-house human capital investments in accounting affect earnings management. We construct a dataset of more than 411,000 individual-years of in-house accountants between 2009 and 2015 and measure a firm's accounting human capital based on the proportion of in-house accountants with Big N work experience and a CPA designation. We find that firms with higher accounting human capital have a lower probability of accounting irregularities, lower discretionary accruals, better internal control, and fewer unintentional accounting errors. The results hold when we control for potential endogeneity by using the staggered adoption of the CPA mobility law and the number of top accounting undergraduate programs as instrumental variables for accounting human capital. We further find that firms with higher accounting human capital exhibit stronger market reactions to earnings news and lower audit fees, suggesting that external stakeholders perceive these firms as having better financial reporting quality.

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"*The acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship always costs a real expense, which is a capital fixed and realized, as it were in his person*" (Smith 1776, pp. 227)

1 Introduction

In his seminal work "The World of Nations," Adam Smith defines human capital as "the acquired and useful abilities of all the inhabitants and members of the society" and describes the production usefulness of human capital to a firm as similar to other assets: "The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which, though it costs a certain expense, repays that expense with a profit (Smith 1776, pp. 227)." Economics literature has documented in various settings that investments in human capital lead to improvements in productivity and performance.[1] Similarly, accounting human capital is expected to play a critical role in shaping firms' financial reporting, because corporate accountants handle corporate financial data on a daily basis. However, there is little empirical evidence on whether and how firms' accounting human capital affects the quality and creditability of their financial reports. In this paper, we investigate two fundamental research questions related to accounting human capital. First, do investments in accounting human capital lead to a decrease in earnings management? If so, do shareholders and auditors recognize such effect and react accordingly?

Following prior research in accounting and economics (e.g., Akerlof 1970; Leland 1979; Becker et al. 1998; Francis, Maydew, and Sparks 1999; Lennox and Pittman 2010), we define accounting human capital as the skills and competencies accumulated through accounting-specific on-the-job training, as captured by the Big N work experience, and the professional

[1] For example, see Black and Lynch (1996), Acemoglu and Pischke (1999), Bartel (1995), Bertrand and Schoar (2003), Moretti (2004), and Konings and Vanormelingen (2015).

licensing process, as captured by a CPA designation. We argue that firms' in-house accounting human capital can have a negative effect on earnings management via two primary channels.

First, a firm's in-house human capital investments in accounting can improve the monitoring of its management and the effectiveness of its internal control system, thus reducing intentional accounting irregularities and earnings management. Previous studies find that effective internal control reduces managers' opportunities to manage earnings (Ashbaugh-Skaife, Collins, and Kinney 2007; Doyle, Ge, and McVay 2007; Donelson, Ege, and McInnis 2017; Gleason, Pincus, and Rego 2017). Being close to the action, employees in the accounting departments have direct access to financial information. With the development of human capital through the Big N experience and CPA licensing process, high-quality corporate accountants are well-equipped with the capability to recognize and uncover abnormal accounting activities.

Second, in-house human capital investments in accounting can decrease the extent of earnings management by reducing unintentional accounting errors. Unintentional accounting errors can make fraud detection more difficult, thereby lowering the costs of earnings management (Fischer and Verecchia 2000; Fang, Huang, and Wang 2017). Firms with high-quality in-house accountants are less likely to make unintentional errors such as book-keeping deficiencies or misapplications of accounting standards, leading to lower earnings management (Plumlee and Yohn 2010).

However, we might not observe a negative effect of accounting human capital on earnings management for two reasons. First, the extent of earnings management is often determined by top executives (e.g., Francis et al. 2010; Ge, Matsumoto, and Zhang 2011; Schrand and Zechman 2011; Demerjian et al. 2013). Executives with the intention of engaging in earnings management may override their firms' internal control systems (SEC 2007; AICPA 2016; Cheng, Goh, and

Kim 2018). Second, higher quality in-house accountants can find better ways to manage earnings. The "talented" accounting group at Enron is an infamous example (DOJ 2003; DOJ 2006). Therefore, whether the quality of non-executive accounting professionals is negatively associated with the extent of earnings management is unclear.

To test our prediction, we construct a dataset of 411,184 individual-years of corporate accountants in S&P 1500 industrial firms for the 2009–2015 period by hand-collecting their information from *LinkedIn* – a professional networking website with more than 575 million registered members. We develop a firm-year level measure of accounting human capital based on the proportion of a firm's in-house accountants with Big N work experience and CPA designation, adjusted for sample means at firm size quintile and industry levels.

Consistent with our prediction, we find that firms with higher accounting human capital exhibit a lower level of earnings management; they are less likely to have restatements due to accounting irregularities and report lower discretionary accruals. Consistent with the underlying argument for the hypothesis, we find that firms with higher accounting human capital experience fewer internal control material weaknesses and that they have fewer unintentional errors – they receive fewer Securities and Exchange Commission (SEC) comment letters related to accounting and disclosure issues and experience fewer incidents of earnings restatements due to accounting errors.[2] The results are robust to the control for firm characteristics, executive (CEO and CFO) characteristics, auditor characteristics, and various fixed effects (firm, industry-by-year, and executive). Furthermore, to better establish Granger causality and address the possible confounding effect, we employ a change specification and find consistent results.

[2] Restatements due to accounting errors generally result from accounting standard application failures or clerical errors. In contrast, restatements due to accounting irregularities result from financial fraud, irregularities, or misrepresentations.

To address the endogeneity concern that omitted variables affect both accounting human capital investments and the extent of earnings management, we use (1) the staggered adoption of the CPA mobility law and (2) the number of high-quality undergraduate accounting programs around the firm's headquarters as the instrumental variables (IVs) for accounting human capital investments.[3] Supporting the validity of the IVs, we find both variables are positively associated with accounting human capital. Employing the control function approach to control for potential endogeneity (Wooldridge 2015), we continue to obtain the same inferences.

We next investigate whether stakeholders recognize the benefit of firms' accounting human capital investments. First, we focus on investors by examining the market reaction to earnings news, as captured by the earnings response coefficient (ERC). If investors recognize the negative effect of accounting human capital on earnings management, they will perceive the financial statements of firms with higher accounting human capital to be more credible, leading to higher ERC. However, for this prediction to hold, investors must have information about firms' accounting human capital investments.[4] We expect institutional investors, the more sophisticated and resourceful investors, to be more likely to acquire such information. Consistent with this prediction, we find that firms with higher accounting human capital have a higher ERC, but only for firms with high institutional ownership. These results suggest that accounting human capital enhances financial reporting credibility.

Second, we examine whether auditors consider the effect of accounting human capital on earnings management in their decisions on fees. Under the Statements on Auditing Standards

[3] The CPA mobility law allows out-of-state CPAs to practice in the adoption state, leading to an exogenous shock to the supply of accountants (Cascino, Tamayo, and Vetter 2020). During our sample period, Alaska, Massachusetts, Nebraska, New York, California, and the DC adopted the CPA mobility law.

[4] While investors can collect the information from *LinkedIn* by subscribing to the database, it is unclear whether individual investors are willing to incur the costs to acquire and process such information.

Nos. 104–111, auditors are required to properly identify and assess clients' risk of material misstatements through an in-depth understanding of the client and the environment, including the design and implementation of internal control system. If auditors recognize the negative effect of accounting human capital on earnings management, the high quality of a client's in-house accounting employees can reduce auditors' perceptions of client's risk. Thus, we expect clients with higher accounting human capital to incur lower audit fees. We document results consistent with our expectation.

Our study contributes to the literature in several important ways. First, we contribute by offering large-sample empirical evidence on the negative effect of accounting human capital on earnings management.[5] Our study not only complements existing research on the determinants of financial reporting quality and credibility,[6] but also fills the long-standing gap in the literature by looking inside the "black box" of firms' in-house accounting departments.

Second, our results suggest that sophisticated investors and auditors perceive firms' investments in in-house accounting human capital as a positive attribute that can enhance their financial reporting quality. As such, firms with higher accounting human capital have greater financial reporting credibility and lower audit fees. Financial reporting is valuable only when investors perceive it to be credible. Our research thus speaks to the effect of accounting human capital on the decision usefulness of financial reporting and its role in facilitating efficient resource allocation in the capital markets.

Third, this paper contributes to the accounting literature by providing empirical evidence on the importance of accounting-specific quality in a non-audit setting. Prior research has

[5] Because we do not consider the associated costs, such as those related to the recruiting and training of in-house accountants, one cannot infer the optimality of firms' investments in accounting human capital from our analyses.
[6] See Dechow, Ge, and Schrand (2010), Francis et al. (2010), Ge et al. (2011), Demerjian et al. (2013), Ferri, Zheng, and Zou (2018), and Gipper, Leuz, and Maffett (2019).

examined the effect of accounting competencies and expertise in the audit setting, including the effect of Big N auditors, industry-specialist auditors, and individual auditor backgrounds on audit quality.[7] Our findings complement the existing research by showing that the skills and competencies gained from working in Big N firms and obtaining a CPA designation are transferrable skills that are also important in a non-public audit setting.

Lastly, our results shed light on the labor market of professional accountants by documenting an unintended effect of the CPA mobility law. While the intention of the CPA mobility law is to allow out-of-state CPAs to practice public accounting in other states (Cascino et al. 2020), our results indicate that the CPA mobility law has a positive impact on corporate in-house accounting human capital for firms in the law adoption states. Due to the increase in the supply of inbound movements of out-of-state CPAs, companies benefit from their experience and professional competencies in the form of higher financial reporting quality. This finding should be of interest to professional accounting bodies and policymakers.

The remainder of this paper is organized as follows. Section 2 discusses the related literature and develops the hypotheses. Section 3 describes the data and research design. Section 4 presents the results from the main analyses and robustness tests, and Section 5 reports the results from the additional analyses. Section 6 concludes.

2 Literature Review and Hypothesis Development

2.1 Accounting Human Capital: Concept and Measures

The labor economics literature defines human capital as the stock of knowledge or skills that increases productivity (Becker 1964) or the ability to adapt to a changing environment and

[7] See Chin and Chi (2009), Lennox and Pittman (2010), Gul, Wu, and Yang (2013), Knechel, Niemi, and Zerni (2013), Minutti-Meza (2013), Burke, Hoitash, and Hoitash (2019), and Jiang, Wang, and Wang (2019).

society (Schultz 1961; Nelson and Phelps 1966). Following the standard approach in labor economics, we view accounting human capital as a set of accounting-specific skills that increase the productivity of a corporate accountant. Prior research in accounting has identified two important characteristics that can capture accounting-specific skills: work experience at Big N firms and a CPA designation.

The argument that Big N employees are of higher quality than non-Big N employees is based on DeAngelo's (1981) theory that Big N accounting firms, which are larger and have greater reputation concerns than other public accounting firms, are less likely to sacrifice audit quality for individual audit engagements. In addition, Big N firms have more resources for employee training. The theoretical predictions of DeAngelo (1981) are generally supported by empirical research. For example, the literature documents that the clients of Big N firms have lower levels of discretionary accruals, are less likely to engage in earnings management, and are more conservative in financial reporting (e.g., Becker et al. 1998; Francis et al. 1999; Francis 2004; Lennox and Pittman 2010; Eshleman and Guo 2014). Using the setting of Big N auditors' acquisition of non-Big N auditors, Jiang et al. (2019) find that the audit quality improves after the switch to Big N auditors for the affected clients. Accordingly, prior research has used Big N work experience as a proxy for accounting and financial expertise of board members and executives (Goh 2010).

CPA licensure is an occupational licensing requirement for public accounting practice and is intended to improve the competency of public accountants (DeFond and Zhang 2014). It includes mandatory training, examinations, and related work experience.[8] Economic theory

[8] In the U.S., the requirements to become a CPA generally include a bachelor degree (or higher) in accounting with a specific number of education hours, work experience involving supervision by an active CPA, continuing professional education (CPE), and the ethics requirement fulfilled by taking an ethics exam covering topics from the American Institute of Certified Public Accountants (AICPA) Code of Professional Conduct requirements.

suggests that occupational licensing provides individuals with greater incentives to make occupational-specific human capital investments, because such investments can protect them from the competition from low-quality competitors (Akerlof 1970; Leland 1979; Shapiro 1986). From the perspectives of the clients who pay for the professional services, occupational licensing reduces the uncertainty over the quality of the services and increases the demand for the licensed services (Arrow 1973). Prior research in accounting has used the CPA designation as one proxy for financial expertise among top executives and audit committee members (e.g., Abbott, Parker, and Peters 2004; Gore, Matsunaga, and Yeung 2010).

In sum, findings from prior research indicate that an individual's accounting human capital can be captured by accounting-specific training through Big N work experience and occupational licensing of the CPA designation. Following prior research, we later construct the firm-year level measure of corporate in-house accounting human capital based on these two dimensions.

2.2 Hypothesis Development: Accounting Human Capital and Earnings Management

We argue that human capital investments in accounting can reduce the extent of earnings management because they can reduce (1) intentional biases in accruals and (2) unintentional errors in accrual estimation.

First, accounting human capital can strengthen the monitoring of management and effectiveness of internal control, thus reducing intentional accounting biases and earnings management. While other stakeholders can also detect accounting frauds,[9] in-house accountants have direct and frequent access to corporate financial information as part of their daily work. More important, high-quality corporate accountants are better trained in technical competency,

[9] Dyck, Morse, and Zingales (2010) find that firms' employees play a key role in fraud detection, representing the highest proportion among all types of whistleblowers (17.1%) of the revealed fraud cases. Other types of whistleblowers include short sellers (14.5%), analysts (13.8%), industry regulators, government agencies or self-regulatory organizations (13.2%), the media (13.2%), and auditors (10.5%).

making them better monitors of accounting activities and gatekeepers of corporate fraudulent behavior. For example, in an announcement of whistleblower awards, Sean McKessy, Chief of the SEC's Office of the Whistleblower, commented that "Individuals who perform internal audit, compliance, and legal functions for companies are on the front lines in the battle against fraud and corruption. *They often are privy to the very kinds of specific, timely, and credible information that can prevent an imminent fraud or stop an ongoing one* (SEC 2014, emphasis added)." Anticipating a higher likelihood that irregularities can be detected, executives of firms with higher accounting human capital are less likely to engage in earnings management in the first place. In addition, higher quality corporate accountants can also improve the effectiveness of internal control by reducing managers' ability and opportunity to manage earnings (Ashbaugh-Skaife et al. 2007; Doyle et al. 2007; Donelson et al. 2017; Gleason et al. 2017).[10] We present several examples in which in-house accountants discover wrongdoings in their firms' reporting systems and report them to the board in Appendix A.

Second, accounting human capital can reduce unintentional accounting errors. Plumlee and Yohn (2010) find that unintentional errors in financial reporting, such as basic book-keeping deficiencies or misapplications of accounting standards, are generally attributable to an inadequate number of competent accounting employees. Further, unintentional accounting errors can have a camouflage effect whereby accounting errors make accounting irregularities more difficult to detect and therefore lower the costs of earnings management (Fischer and Verecchia 2000; Fang et al. 2017).[11] Given that high-quality accountants can reduce unintentional errors,

[10] Human capital investments have long been identified as a critical component of an effective internal control system (COSO 2013). In the post-SOX (Sarbanes-Oxley Act of 2002) era, firms' accounting functions face increasing pressure to improve internal audit quality. One of the key components of SOX compliance is managing Segregation of Duties (SoD). Firms have SoD weaknesses when they cannot sufficiently prove that employees do not have conflicting privileges to manipulate financial data.

[11] An offsetting effect is the value relevance–reducing effect. As described by Fischer and Verecchia (2000) and Fang et al. (2017), as the noise in the accounting process increases, earnings become less value relevant to the

we expect that accounting human capital can improve financial reporting quality through its negative effect on unintentional accounting errors and in turn on earnings management.

The above discussions lead to our first hypothesis (in the alternative form):

H1: The level of a firm's in-house human capital investments in accounting is negatively associated with the extent of earnings management.

There are two reasons why we might not find results consistent with H1. First, prior research suggests that earnings management is largely driven by the tone at the top. For example, the literature finds that firms' accounting practices are affected by executives' individual traits including reputation concerns, styles, overconfidence, and managerial ability (e.g., Francis et al. 2010; Ge et al. 2011; Schrand and Zechman 2011; Demerjian et al. 2013). Moreover, top executives may bypass or override internal control systems when they intend to commit accounting wrongdoings (SEC 2007; AICPA 2016; Cheng et al. 2018). Therefore, whether non-executive accountants can serve as effective gatekeepers of firms' financial statements is an empirical question. Second, higher quality corporate accountants can provide executives with greater accounting flexibility because of their higher ability to identify ways to manage earnings. If so, we may even observe a positive association between accounting human capital and earnings management.

When developing H1, we argue that accounting human capital can reduce earnings management by improving the internal control system and reducing accounting errors. For H1 to hold, we expect that firms with higher accounting human capital have (1) fewer internal control material weaknesses and (2) fewer accounting errors. Thus, we hypothesize the following:

H2a: The level of a firm's in-house human capital investments in accounting is negatively associated with internal control material weaknesses.

market, which reduces managers' benefits from biasing earnings and weakens their incentives to do so. However, Fang et al. (2017) find that the camouflage effect on average outweighs the value relevance–reducing effect.

H2b: The level of a firm's in-house human capital investments in accounting is negatively associated with unintentional accounting errors.

3 Data and Methodology

3.1 Data and Sample

We obtain the data on corporate accountants from *LinkedIn*, the world's largest professional network. To facilitate data collection, we focus on S&P 1500 firms. First, we manually search for each firm's *LinkedIn* homepage in 2015. This step results in 1,378 firms. We then exclude 312 firms in the financial industries (SIC codes 6000-6999), because earnings management proxies are different for financial firms. Second, for the remaining 1,066 firms, we search for the profiles of the *LinkedIn* members who have formerly worked in or are currently working in these firms' accounting departments. We exclude employees whose primary job function is not related to accounting or financial management such as salespeople, financial representatives, and financial advisors. We also exclude employees whose positions are temporary or administrative in nature, such as interns and clerks. A typical individual profile on *LinkedIn* includes the name, photograph (if available), work experience, accreditation, and academic degrees. Finally, based on the work history, we construct a database that consists of both current and former in-house accountants of the sample firms between 2009 and 2015.[12] Appendix B describes the data collection in detail.

Based on the search results, we construct a panel dataset of in-house accounting

[12] Using individuals' work histories reported in 2015 to construct the accounting departments in the earlier years of the sample period is subject to several limitations. Some individuals who worked in the accounting departments in earlier years may no longer be working and might not have a *LinkedIn* account. Some individuals may not list all of their past work experience. These limitations could lead to a downward bias in the estimation of the accounting department size in earlier years. To reduce the impact of this downward bias, we use 2009 as the start of our sample period. In addition, *LinkedIn* entered a hyper-growth period in 2009, with the number of registered users increasing by almost 50% to 55 million by the end of 2009. Tracing the data further back would introduce measurement errors. In contrast, having a shorter period would reduce the power of the tests. Using a different starting year (e.g., 2010, 2011 or 2012) leads to the same inferences (untabulated).

departments. We then match the *LinkedIn* data with the COMPUSTAT, I/B/E/S, and ExecuComp datasets. Our final sample consists of 5,849 firm-year observations covering 411,184 individual-years over the period of 2009-2015. Table 1 describes the sample selection process.

One important concern with *LinkedIn* data is the comprehensiveness of its coverage of corporate accountants, i.e., whether the majority of corporate accountants in our sample firms are *LinkedIn* members. As of 2020, there are more than 575 million registered *LinkedIn* members, with approximately 167 million members in the U.S. alone.[13] Pew Research (2019) finds that *LinkedIn* is especially popular among college graduates and high-income groups. As such, we believe that the *LinkedIn* coverage of accountants should be fairly comprehensive, given that working in the accounting profession generally requires a college education. Nevertheless, we acknowledge that the potential incompleteness of the data may introduce noise to our tests. However, we do not have any strong reason to believe that it introduces systematic bias to our analyses. In addition, our measures of a firm's in-house human capital in accounting are industry- and size-adjusted to control for potential variation in data coverage across firm size groups and industries.

3.2 Measures of In-house Accounting Human Capital

We construct a firm-year level measure of accounting human capital based on the proportion of a firm's in-house accountants with prior work experience in Big N firms and a CPA designation.[14] We calculate the ratio of a firm's in-house accountants who have Big N work

[13] https://news.linkedin.com/about-us#statistics

[14] We do not consider education in constructing our proxy because all professional accountants and auditors have at least an undergraduate degree with a focus on accounting or finance (Christensen et al. 2017). The homogeneity in education also applies to our sample, in which we exclude temporary or lower-level accounting or book-keeping employees: all of our sample in-house accountants hold at least an undergraduate degree, primarily in accounting or

experience (*Acc_BigN*) or who hold a CPA (*Acc_CPA*) to the firm's total number of in-house accountants for each firm-year. To construct the summary measure, *Acc_HC*, we (1) calculate the industry- and size-adjusted measure of *Acc_BigN* and *Acc_CPA* by subtracting their corresponding industry and firm-size means, which are calculated based on the quintiles of total assets and Fama-French-12 industry classification, (2) rank the industry- and size-adjusted values of *Acc_BigN* and *Acc_CPA* into terciles, (3) add the two components together, and (4) standardize the summary measure to a range between 0 and 1. Higher values of *Acc_HC* imply higher accounting human capital.

Panel A of Table 2 presents the descriptive statistics of the total number of in-house accountants (*Acc_Count*) and the unadjusted values of *Acc_BigN* and *Acc_CPA*. The average firm has 70 accounting professionals working in its accounting department. The variation is large, with a standard deviation of 103.6. On average, 10.2% of corporate accountants have Big N work experience and 14.4% are CPA holders. There are substantial cross-sectional variations in these proportions. For example, *Acc_BigN* has a standard deviation of 10.6%, and *Acc_CPA* has a standard deviation of 13.5%. The summary measure, *Acc_HC* has a mean of 0.504 and a standard deviation of 0.323.

Panel B of Table 2 presents the mean in-house accountant headcount and quality proxies by firm size. When sorting firms based on the market value of equity (*Size*) quintiles, the average number of in-house accountants per firm increases monotonically with *Size*, from 16.84 for the smallest quintile to 183.55 for the largest quintile. *Acc_BigN* appears to be similar across firm size quintiles, while *Acc_CPA* is decreasing in firm quintiles. By construction, *Acc_HC* does not vary with firm size.

finance. Nevertheless, in a robustness test reported in Section 5, we examine the role of *graduate* education in in-house accounting human capital.

Panel C of Table 2 presents descriptive statistics by industry, defined based on the Fama-French 12 industry classification. The average number of in-house accountants per firm varies across industries, ranging from 35 for the utilities industry to 131 for the telephone & television transmissions industry. The proportions of in-house accountants with Big N experience and a CPA designation also vary across industries. The telephone and television transmissions industry has the highest proportion of in-house accountants with Big N work experience (13%), while the wholesale, retail, and services industry has the lowest (8.1%). Regarding the proportion of in-house accountants with a CPA designation, the utilities industry has the highest proportion (22.2%), while the consumer durables and the wholesale, retail, and services industries have the lowest (12%).

3.3 Research Design for Tests of H1

We estimate the following regression to test H1 and H2 (with firm subscript *i*, industry subscript *j*, and year subscript *t*):

$$FRQ_{it} = \alpha_0 + \alpha_1 Acc\_HC_{it} + \beta Control_{it} + \omega_i + \pi_{jt} + \varepsilon_{it} \quad (1)$$

In tests of H1, FRQ_{it} is one of the two measures of earnings management: (1) the incidents of restatements due to accounting irregularities (*Irregularities*) and (2) signed discretionary accruals (*DACC*). *Irregularities* is an indicator variable that equals one if firm *i*'s financial statement for fiscal year *t* is later restated and the restatement is classified as an irregularity following the classification procedure in Hennes, Leone, and Miller (2008).[15] *DACC* denotes the discretionary

[15] Specifically, we start from all Big R restatements identified in the Audit Analytics database. To identify the nature of restatements, we download the 8Ks of each firm in the two-year window surrounding the restatement announcement date. We then conduct a keyword search to determine whether the firm describes the misstatement as a fraud or irregularity. In addition, we search Factiva for restatement news in the three-month window surrounding the restatement announcement date to check whether the SEC, DOJ, or any other independent investigator has initiated any investigation. We classify a Big R restatement as a fraud/irregularity if any of the above-mentioned criteria are satisfied.

accruals obtained from cross-sectional estimations of the modified Jones model by industry-year (Jones 1991; Dechow, Sloan, and Sweeney 1995).

In tests of H2a, the dependent variable is *ICW*, which denotes the number of internal control material weaknesses over a three-year period from year *t* to year *t*+2. In tests of H2b, the dependent variable is one of the two proxies for unintentional errors: (1) the number of unique SEC comment letters the firm receives that are related to accounting and disclosure issues (*Comment Letter*) over the same three-year period, or (2) the number of restatements due to accounting errors (*Restate Errors*) over the same period.[16] *Comment Letter* and *Restate Errors* are used to capture firms' unintentional errors in financial statements. We measure internal control quality and unintentional accounting errors over a three-year period to increase the power of the tests; in addition, Section 408 of SOX requires the Division of Enforcement of the SEC to review registrants' 10-K filings at least once every three years.

The independent variable of interest is *Acc_HC*, the summary measure of firms' accounting human capital. H1 predicts that higher accounting human capital is negatively associated with the extent of earnings management. Thus, we expect α_1 to be negative when the dependent variable is one of the earnings management proxies. Similarly, H2a and H2b imply that α_1 is negative.

We control for a comprehensive list of variables that might affect financial reporting quality: (1) firm characteristics, (2) the strength of monitoring, (3) managerial incentives, (4)

[16] The SEC issues comment letters when it has concerns about a company's disclosure practices. The objective of these comment letters is to "request that a company provide additional supplemental information so the staff can better understand the company's disclosure, revise disclosure in a document on file with the SEC, provide additional disclosure in a document on file with the SEC, or provide additional or different disclosures in a future filing with the SEC (https://www.sec.gov/fast-answers/answerscommentlettershtm.html)." Prior research has used the issuance of SEC comment letters as a proxy for disclosure quality (e.g., Cassell, Dreher, and Myers 2013). In our main analysis, we focus on the comment letters related to accounting and disclosure issues, as classified by Audit Analytics, but the inferences remain the same if we use the total number of SEC comment letters to proxy for unintentional errors.

firm performance, and (5) MSA-level general work force quality at the firm's headquarters. First, prior research suggests that firm characteristics such as size, leverage, and investments are determinants of earnings management (e.g., Dechow et al. 2010).[17] As such, we control for firm size (*Size*), firm age (*Age*), market-to-book ratio (*MTB*), leverage (*Leverage*), capital intensity (*Capital Intensity*), intensity of intangible assets (*Intangible Intensity*), intensity of foreign operations (*Foreign*), number of segments (*Segments*), and return volatility (*Return Volatility*).

Second, prior research argues that financial analysts, auditors, and institutional investors can serve as external monitors and help constrain executives' ability to manage earnings.[18] Thus, we control for analyst coverage (*Analyst*), an indicator for Big 4 auditors (*Big4*), and institutional ownership (*Inst Ownship*).

Third, prior research shows that CEO characteristics, CEO equity ownership, and board independence can affect the extent of earnings management (e.g., Dechow and Sloan 1991; Cheng and Warfield 2005; Dechow et al. 2010; Chen, Cheng, and Wang 2015). Accordingly, we control for the CEO's age (*CEO Age*), tenure (*CEO Tenure*), and ownership (*CEO Ownership*), and board independence (*Board Independence*).

Fourth, prior research finds that firms with poor performance are more likely to manage earnings (Doyle et al. 2007). Therefore, we include lagged return on assets (*Lag ROA*) and z-score (*Lag Z-Score*) as control variables. We do not control for contemporaneous firm

[17] For example, larger firms tend to make income-decreasing accounting choices to reduce political/regulatory scrutiny (e.g., Watts and Zimmerman 1986); smaller and younger firms, and firms with higher leverage are more likely to have internal control deficiencies and to restate earnings (e.g., Ge and McVay 2005; Doyle et al. 2007; Ashbaugh-Skaife et al. 2007). Francis et al. (2010) find that the book-to-market ratio, capital intensity, and intangible asset intensity are important determinants of accruals quality. More complex operations also provide more earnings management opportunities (DeFond and Park 1997; Doyle et al. 2007). In addition, stock return volatility can affect firms' financial reporting quality (Casell, Dreher, and Myers 2013).

[18] For example, Yu (2008) finds that firms followed by more analysts manage their earnings less. Firms with Big N auditors are also shown to have lower discretionary accruals than those with non-Big N auditors (e.g., DeFond and Subramanyam 1998; Kim, Chung, and Firth 2003). Bushee (1998) finds that managers are less likely to cut R&D to avoid declines in earnings when institutional ownership is high.

performance because it can be mechanically related to the dependent variables.

Fifth, Call et al. (2017) find that the education level of a firm's workforce, as proxied by the average education level and wages of the workforce in the Metropolitan Statistical Area (MSA), where the firm's headquarters is located, is positively associated with its financial reporting quality. Therefore, we include the average education level (*MSA Education*) and wages (*MSA Income*) of the workforce in the MSA where the firm's headquarters is located.

Finally, we further include firm fixed effects (ψ_i) to control for any unobserved time-invariant firm characteristics that might affect the extent of earnings management. To control for the effects of industry shocks on earnings management, we also include industry-by-year fixed effects (π_{jt}). Appendix C provides detailed definitions of the variables.

Table 3 presents the descriptive statistics on the variables used in the regression analyses. *Irregularities* has a mean of 0.01, suggesting that approximately 1% of firm-year observations have restatements due to accounting irregularities. The mean *DACC* is 0.011, suggesting that the average *DACC* is 1.1% of the total assets. The average number of internal control weaknesses is 0.142. Regarding the proxies for accounting errors, the average number of SEC comment letters is 0.763, and the average number of restatements due to errors is 0.240.

Table 3 also reports the descriptive statistics on the control variables. On average, the sample firms have a market capitalization of $12,616 million, are 33 years old, have a market-to-book ratio of 3.37, a leverage of 20%, a capital intensity of 26%, an intangible asset intensity of 4.2%, a foreign operation intensity of 29.5%, 8 segments, a return volatility of 2.2%, an analyst following of 13, institutional ownership of 68%, a lagged ROA of 0.057, and a lagged Z-score of 4.45. Of the sample firms, 93% are audited by one of the Big 4 firms. In addition, CEOs are 56 years old on average, have an ownership of 2.1%, and have an average tenure of 7.6 years. The

average board independence is 72%. The average *MSA Education* is 7.6, about one or two years of college education, and the average *MSA Income* is $25,519.

4 Accounting Human Capital and Earnings Management

4.1 Tests of H1

Table 4 presents the estimation of Equation (1) using OLS regressions, with Column (1) reporting the results for the probability of accounting irregularities (*Irregularities*).[19] The coefficient on *Acc_HC* is significantly negative at the 1% level (*t* = -3.00), indicating that firms with higher accounting human capital are less likely to experience accounting irregularities. In terms of economic significance, a one-standard deviation increase in *Acc_HC* is associated with a relative decrease in the probability of accounting irregularities of 78% (= -0.0241×0.323/0.010) from the unconditional mean. Column (2) reports the results on signed discretionary accruals (*DACC*). We find that the coefficient on *Acc_HC* is significantly negative at the 1% level (*t* = -2.75), suggesting that firms with higher accounting human capital have lower income-increasing accruals. The effect is also economically significant: a one-standard-deviation increase in *Acc_HC* is associated with a relative decrease in *DACC* of 7.6% (= -0.0146×0.323/0.062) of the standard deviation of *DACC*. Because *DACC* can be either positive or negative, its mean is very small and therefore, we do not use its mean to evaluate economic significance.

Regarding the control variables, the results in Column (1) indicate that the probability of accounting irregularities increases with firm size, and decreases with foreign income, CEO ownership, and CEO tenure. The results in Column (2) reveal that discretionary accruals increase

[19] We use OLS regression model to better accommodate high dimensional fixed effects throughout the paper. Since *Irregularities* is an indicator variable, in an untabulated robustness test, we estimate Equation (1) with *Irregularities* as the dependent variable using a logit model. The inferences remain the same.

with leverage and intangible asset intensity, and decrease with return volatility and lagged ROA.

Overall, the findings in Table 4 suggest that consistent with H1, accounting human capital helps reduce the extent of earnings management.

4.2 Tests of H2a and H2b

Table 5 reports the regression results for tests of H2a and H2b, with Column (1) presenting the results for internal control material weaknesses. The coefficient on *Acc_HC* is significantly negative at the 1% level (t = -2.68), suggesting that firms with higher accounting human capital have fewer internal control material weaknesses. In terms of economic significance, a one-standard-deviation increase in *Acc_HC* is associated with a relative decrease of 28.9% (= -0.127×0.323/0.142) in the number of internal control material weaknesses.

For unintentional accounting errors, Columns (2) and (3) of Table 5 present the regression results on the number of SEC comment letters (*Comment Letter*) and error-induced restatements (*Restate Error*), respectively. As reported in Column (2), the coefficient on *Acc_HC* is significantly negative (t = -2.33) in the analysis of comment letters, suggesting that firms with higher accounting human capital receive fewer SEC comment letters related to accounting and disclosure issues. The coefficient of -0.2214 suggests that a one-standard-deviation increase in *Acc_HC* is associated with a relative decrease in SEC comment letters by approximately 9.3% (= -0.2214×0.323/0.763). As for error-related restatements, the results in Column (3) indicate that accounting human capital is negatively associated with the incidents of error-related restatements (t = -1.77). A one-standard-deviation increase in *Acc_HC* is associated with a relative decrease in the incidents of error-related restatements of 8.6% (= -0.0636×0.323/0.240).

Overall, the results in Table 5 indicate that consistent with H2a and H2b, firms with higher accounting human capital have fewer internal control material weaknesses and unintentional

accounting errors.

4.3 Robustness Tests

In this section, we conduct a series of sensitivity tests to ensure that our results are robust.

Changes Specifications. To better establish the (Granger) causal relationship between accounting human capital and financial reporting quality and to mitigate concerns about potential correlated omitted variables, we estimate the change specification of Equation (1). Table 6, Panel A reports the OLS regression results. The coefficient on Δ*Acc_HC* is significantly negative for the two earnings management proxies (t = -2.46 and -1.93 for Δ*Irregularities* and Δ*DACC*, respectively), the change in the number of internal control weaknesses (t = -2.57), the change in the number of SEC comment letters (t = -2.50), and the change in error-related restatements (t = -2.50). These results are consistent with our prediction that firms with higher accounting human capital have better financial reporting quality.

CFO, Auditor Characteristics, and Internal Audit Team Size. Given that CFOs and auditors play a significant role in shaping firms' financial reporting, we further control for the effect of CFO and auditor characteristics to ensure that our main results are robust. For this purpose, we control for the CFO's age, ownership, and tenure, and the auditor's tenure and industry expertise. In addition, because Ege (2015) finds that firms' internal audit quality affects their financial reporting quality, we control for firms' internal audit team size, measured by the industry- and firm-size-adjusted ratio of internal audit employees to total accounting employees.[20] The untabulated results indicate that our inferences continue to holder: the coefficient on *Acc_HC* remains significantly negative in all regressions.

[20] Using proprietary data from the Institute of Internal Auditors, Ege (2015) finds that firms with higher internal audit quality, captured by internal auditors' size, training hours as internal auditors, and Certified Internal Auditor designations, are associated with a lower likelihood of management misconduct.

CEO and CFO Fixed Effects. While we have controlled for potential time-varying CEO characteristics such as CEO age, tenure, and ownership, prior studies find that time-invariant traits of executives also affect financial reporting quality (e.g., Francis et al. 2010; Ge et al. 2011; Schrand and Zechman 2011; Demerjian et al. 2013). Therefore, we further control for CEO and CFO fixed effects. The results reported in Panels B of Table 6 indicate that our inferences remain the same after controlling for CEO and CFO fixed effects.

4.4 Control for Endogeneity

Accounting human capital investment is a firm's decision, which may be affected by its financial reporting quality. It is also possible that some unobserved firm characteristics affect both accounting human capital investment and financial reporting quality. Despite the control for a comprehensive list of firm and executive characteristics, as well as firm and industry-year fixed effects, we further address this potential endogeneity concern by considering two instrumental variables (IVs). Specifically, we exploit (1) the staggered adoption of the CPA mobility law by states as an exogenous shock to firms' accounting human capital and (2) the number of top undergraduate accounting programs in the region to capture the lagged local supply of high-quality accounting employees.

When a state adopts the CPA mobility law, it allows out-of-state CPAs to practice in the state. Thus, the adoption of the law increases the supply of out-of-state CPAs, satisfying the relevance criterion. Consistent with this notion, Cascino et al. (2020) find that the CPA mobility law adoption drives down the prices of local CPA firms, arguably due to the competition from out-of-state CPAs. While many states have adopted the CPA mobility law prior to the beginning of our sample period, five states and one district, namely Massachusetts, New York, California, Nebraska, Alaska, and the District of Columbia (DC) adopted the CPA mobility law during our

sample period.[21] At the same time, it is unlikely that the passage of CPA mobility law at the state level has a direct effect on a firm's earnings management, satisfying the exclusion criterion.

While Massachusetts, New York, and California are among the most popular locations of corporate headquarters, increasing the power of the test, one of the potential limitations of using the CPA mobility law adoption as an IV is that only five states and the DC passed the law during our sample period. Therefore, we consider a second IV – the number of top-tier universities that offered an undergraduate accounting program within 100 miles of the firm's headquarters in 2004 (*Acc_Program*).[22] *Acc_Program* captures the supply of accounting graduates from top universities. The quality threshold implies that the graduates would be more likely to pass the CPA exams and satisfy the rigorous entry screening of Big N firms, leading to an increase in the supply of high-quality accounting professionals. Thus, this variable satisfies the relevance criterion. It also satisfies the exclusion criterion because it is unlikely that the number of top universities with accounting programs in 2004 can affect the extent of individual firms' earnings management five to ten years later.

To examine whether the CPA mobility law adoption and the lagged number of top accounting programs serve as valid instruments for accounting human capital, we estimate the following determinant model of in-house accounting human capital:

$$Acc\_HC_{it} = \alpha_0 + \alpha_1 CPA\_Mobility_{it} + \alpha_2 Acc\_Program_{it} + \beta Control_{it} + \omega_i + \pi_{jt} + \varepsilon_{it} \quad (2)$$

We include in Equation (2) the same set of control variables as in Equation (1). $CPA\_Mobility_{it}$ equals 1 if firm i's headquarters is in one of the aforementioned states or district

[21] The CPA mobility law became effective in Nebraska in 2010, Alaska, Massachusetts, and New York in 2011, the DC in 2012, and California in 2013.
[22] For the classification of the top-tier universities, we use the list of the top 200 universities based on the 2004 QS World University Ranking by Quacquarelli Symonds and Times Higher Education magazine.

that adopted the CPA mobility law and year *t* is one of the years after the adoption of the law by the corresponding state or district. We expect the adoption of the CPA mobility law to have a positive supply-side effect on the number of out-of-state CPAs, who likely come with Big N experience from their home state to relocate to the adoption state. To the extent that the increased supply of accounting professionals spills over to corporate accounting departments in firms headquartered in these states, we expect the coefficient on *CPA_Mobility* to be positive. Similarly, we expect the coefficient on *Acc_Program* to be positive as the local top accounting programs can increase the supply of high-quality accounting professionals.

Appendix D reports the regression results. The coefficient on *CPA_Mobility* is significantly positive ($t = 4.87$). This result is consistent with our expectation that corporate accounting departments benefit from the law and that firms headquartered in the states that adopt the law experience a significant improvement in accounting human capital. Also consistent with our prediction, the coefficient on *Acc_Program* is significantly positive ($t = 2.90$), supporting the argument that it is easier for firms located close to top universities with accounting programs to recruit high-quality in-house accountants.[23] With respect to the other variables, we find that *Acc_HC* increases with firm age and board independence, consistent with older and better governed firms investing more in accounting resources (Ashbaugh-Skaife et al. 2008). Other firm-level factors are not significant, likely due to the inclusion of firm and industry × year fixed effects in the model.

Given that both *CPA_Mobilty* and *Acc_Program* satisfy the criteria of valid instruments, we employ the control function approach (Wooldridge 2015) to control for endogeneity. For this purpose, we include *Stage1 Residual*, the residuals from Equation (2), as an additional variable

[23] The partial F-statistic (untabulated) for these two instruments is 13.23, greater than the critical value of 11.59, indicate that our analyses are not subject to the weak instrumental variable problem (Larcker and Rusticus 2010).

in Equation (1) to control for the endogeneity. Table 7 reports the regression results. We find that after controlling for the potential endogeneity, the inferences remain the same: the coefficient on *Acc_HC* is significantly negative in all regressions. For all of the models, we also calculate the Sargan's *J*-statistic to test the over-identification of the two instruments; we find that the test is insignificant at the conventional levels, suggesting that the instruments are valid in the second stage regression.[24]

5 Accounting Human Capital, Financial Reporting Creditability, and Audit Fees

5.1 Accounting Human Capital and Financial Reporting Creditability

To corroborate the results from tests of H1 and H2, we investigate whether accounting human capital affects the creditability of financial reporting. To the extent that accounting human capital improves financial reporting quality, we would expect that firms with higher accounting human capital exhibit higher reporting credibility if investors recognize the benefits of accounting human capital. However, the information about firms' in-house accountants is not easily accessible. Investors who are interested in learning about the profiles of firms' employees must, for example, subscribe to the *LinkedIn* database and exert the effort to analyze the information. Therefore, more sophisticated investors, such as institution investors, would be more likely to acquire information about firms' accounting human capital. Thus, we test whether accounting human capital improves financial reporting credibility for firms with high institutional ownership.

Following prior research,[25] we use the earnings response coefficient (ERC) to capture

[24] The *J*-statistic follows a chi-square distribution with $(m - k)$ degrees of freedom, where m is the number of instruments and k is the number of endogenous variables.
[25] For example, see Francis and Ke (2006), Wilson (2008), Chen, Cheng and Lo (2014), Marshall, Schroeder, and Yohn (2019), and Gipper et al. (2019).

financial reporting credibility. We measure ERCs based on the association between the three-day cumulative abnormal returns (*CAR*) centered on the earnings announcement date and unexpected earnings (*UE*). We then use the following regression to examine the effect of accounting human capital on ERC, with firm subscript *i*, industry subscript *j*, and year subscript *t*:

$$CAR_{it} = \alpha_0 + \alpha_1 UE_{it} + \alpha_2 Acc\_HC_{it} + \alpha_3 UE_{it} \times Acc\_HC_{it} + \beta Control_{it} + \gamma UE_{it} \times Control_{it} + \omega_i + \pi_{jt} + \varepsilon_{it} \quad (3)$$

where CAR_{it} is the three-day [-1, +1] cumulative stock return for firm *i* centered on year *t*'s earnings announcement date and adjusted for the CRSP value-weighted index return. UE_{it} is the difference between firm *i*'s actual annual earnings per share (EPS) and the median of analysts' most recent annual EPS forecast before the earnings announcement, divided by the stock price two days before the earnings announcement date. Acc_HC_{it} is the measure of accounting human capital for firm *i* in year *t*. The coefficient α_1 captures the ERC for firms with control variables being zero. The coefficient on *UE*×*Acc_HC* captures the effect of accounting human capital on ERC. We also include firm fixed effects (ψ_i) and industry-by-year fixed effects (π_{jt}) to control for the variation in stock returns across firms and industry-years.

Following prior literature,[26] we include a series of control variables and their interactions with *UE* to control for their impact on ERC, including firm size (*Size*), growth opportunities as proxied for by the market-to-book ratio (*MTB*), risk as captured by the market-model beta (*Beta*) and leverage (*Leverage*), earnings persistence (*Persistence*), loss (*Loss*), analyst forecast dispersion (*Dispersion*), as well as investor sophistication as captured by institutional ownership (*Inst Ownership*). We also control for the nonlinearity of the relation between *CAR* and *UE*. To ensure that our results are not capturing the education level of the firms' headquarter MSA, we

[26] For example, see Hayn (1995), Wilson (2008), Chen et al. (2014), Ferri et al. (2018), and Gipper et al. (2019).

also control for the effect of *MSA Education* and *MSA Income*. Please see Appendix C for detailed variable definitions.

Follwoing prior studies (Ferri et al. 2018; Gipper et al. 2019), we winsorize *UE* at the 2% and 98% levels because it is known to have more extreme values. As reported in Table 3, the means of *CAR* and *UE* are 0.007 and 0.001, respectively, which are comparable to those reported in prior research (e.g., Wilson 2008; Chen et al. 2014). We winsorize other continuous variables at the 1% and 99% levels.

Table 8 presents the regression results. In Column (1), the coefficient on *UE* is significantly positive (t = 2.29), and the size of the coefficient (2.0573) is comparable with that reported in prior research (e.g., Wilson 2008; Chen et al. 2014).[27] More importantly, the coefficient on *UE* × *Acc_HC* is significantly positive (t = 3.06), suggesting that financial reporting credibility increases with accounting human capital. The effect is economically significant: a one-standard deviation increase in *Acc_HC* is associated with an increase in ERC by 0.948 (= 2.9347×0.323), corresponding to a relative increase of 27% from the unconditional mean of ERC.[28]

The coefficients on the interactions of *UE* with control variables are consistent with those reported in prior studies: larger firms, firms with higher leverage, firms with losses, and firms with greater analyst forecast dispersion have lower ERCs, but growth firms, firms with higher beta, and firms with greater earnings persistence exhibit higher ERCs. We do not find that ERC varies with *MSA Education* or *MSA Income*.

To investigate whether the results vary with institutional ownership, we partition the

[27] To reduce the impact of outliers on the coefficient estimates, in a robustness check, we estimate a robust regression where higher weights are assigned to better-behaved observations (Baker and Hall 2004). The inferences remain the same.

[28] The unconditional mean of ERC is the ERC for a firm with average firm characteristics. It is calculated as the sum of (a) the coefficient on *UE* (the ERC when all control variables are zero) and (b) the product of the coefficient on the interaction term of *UE* with a control variable and the sample mean of that variable, across all control variables.

sample based on the sample median of institutional ownership. Columns (2) and (3) of Table 8 present the results for the subsamples of firms with above- and below-median institutional ownership, respectively. Consistent with our prediction, the coefficient on *UE* × *Acc_HC* is significantly positive in Column (2) (t = 2.59), while it is insignificant in Column (3). These results suggest that more sophisticated investors spend time and effort in collecting information about firms' accounting human capital and reflect such information in stock prices.

Overall, the findings suggest that firms with higher accounting human capital have higher financial reporting credibility.

5.2 Accounting Human Capital and Audit Fees

In this section, we examine whether accounting human capital affects audit fees. The AICPA's Auditing Standards Board (ASB) Statements on Auditing Standards provide explicit guidance on auditors' assessment of the risks of material misstatements and audit procedures in response to the assessed risk.[29] The risk assessment standards require auditors to obtain an in-depth understanding of the entity and its environment, including the design and implementation of its internal control, to properly identify and assess risk. Auditors frequently interact with in-house accountants when they conduct fieldwork, including the exchange and reviews of documents and the communication of audit progress. Therefore, auditors should have a good understanding of the quality of in-house accountants and consider it in assessing audit risk. In practice, auditors often cite the lack of in-house accounting expertise of their clients as a

[29] The relevant standards include SAS No. 104, Amendment to Statement on Auditing Standards No. 1, Codification of Auditing Standards and Procedures ("Due Professional Care in the Performance of Work"), SAS No. 105, Amendment to Statement on Auditing Standards No. 95, Generally Accepted Auditing Standards, SAS No. 106, Audit Evidence, SAS No. 107, Audit Risk and Materiality in Conducting an Audit, SAS, No. 108, Planning and Supervision, SAS No. 109, Understanding the Entity and Its Environment and Assessing the Risks of Material Misstatement, SAS No. 110, Performing Audit Procedures in Response to Assessed Risks and Evaluating the Audit Evidence Obtained, and SAS No. 111, Amendment to Statement on Auditing Standards No. 39, Audit Sampling.

challenge when implementing the risk assessment standards (Ramos 2009). Thus, we predict that firms with higher accounting human capital incur lower audit fees because these firms likely receive a more favorable audit assessment of misstatement risks, for the reasons elaborated in the hypothesis development section. In addition, higher accounting human capital can improve the audit process because high-quality in-house accountants act as better liaisons with external auditors.

To test the above prediction, we estimate the following regression with firm subscript *i*, industry subscript *j*, and year subscript *t*:

$$Audit\_Fees_{it} = \alpha_0 + \alpha_1 Acc\_HC_{it} + \beta Control_{it} + \omega_i + \pi_{jt} + \varepsilon_{it} \quad (4)$$

where *Audit_Fees* is the natural logarithm of fees paid by firm *i* to its auditor in year *t*. Equation (4) includes the same set of control variables as in Equation (1). It also includes the following firm characteristics that prior research finds to affect audit fees (e.g., Dao, Raghunandan, and Rama 2012; Fung, Gul, and Krishnan 2012; Defond and Zhang 2014): quick ratio (*Quick*), the incidence of losses (*NLosses*), the number of employees (*Employees*), an indicator for going concern opinion (*GC*), and an indicator for December year-end (*YE_Dec*).

Table 9, Column (1) presents the regression results. We find that the coefficient on *Acc_HC* is significantly negative (*t* = -1.91), consistent with our expectation that firms with higher accounting human capital incur lower audit fees. The effect is economically significant: a one-standard-deviation increase in *Acc_HC* is associated with a reduction in audit fees by approximately 5.67% (= $e^{(-0.1808\times0.323)}$ - 1).

The inference remains the same when we estimate the change specification, as reported in Column (2), or when we control for the potential endogeneity using the control function approach, as reported in Column (3).

In sum, our results suggest that audit fees decrease with accounting human capital.

5.3 Additional Analysis: Components of Accounting Human Capital

The summary accounting human capital measure is based on the proportion of in-house accounting professionals with Big N work experience or a CPA designation. In this section, we investigate whether both components contribute to the documented results. For this purpose, we replace *Acc_HC* in Equation (1) with its two components, namely, *Acc_BigN_Rank* and *Acc_CPA_Rank,* which are the tercile ranks of the industry- and firm-size- adjusted values of *Acc_BigN* and *Acc_CPA*, respectively, then standardized to the range [0,1] to facilitate result interpretation.

Table 10 reports the regression results. We find that the coefficient on *Acc_BigN_Rank* is significantly negative in four out of five regressions, and that on *Acc_CPA_Rank* is significant in all five regressions. These results suggest that both components of accounting human capital contribute to the results.

6 Conclusion

In this study, we examine whether and how a firm's accounting human capital affects the extent of earnings management. We argue that firms with higher accounting human capital are more capable of preventing irregularities in the reporting process and have fewer unintentional errors in their financial reporting. Moreover, higher accounting human capital is expected to enhance the effectiveness of internal control over financial reporting, thus reducing both reporting bias and measurement error. Through these channels, firms with more in-house human capital investments in accounting are likely to exhibit lower levels of earnings management.

Relying on the economic and accounting literature, we define accounting human capital

based on two accounting-specific attributes: Big N work experience and CPA designation. We develop a firm-year measure of accounting human capital based on the proportion of in-house accountants possessing these attributes from a database of over 411,000 individual-years of in-house accountants between 2009 and 2015.

We document consistent evidence that accounting human capital reduces the extent of earnings management and improves firms' financial reporting quality: firms with higher accounting human capital manage earnings less, are less likely to have internal control material weaknesses, and have fewer unintentional accounting errors. Our results are robust to the change specification, the control for firm and executive fixed effects, and the control for potential endogeneity. Additional analyses indicate that accounting human capital improves financial reporting credibility and reduce audit fees, suggesting that investors and auditors perceive in-house accounting human capital as a credible signal of firms' commitment to higher financial reporting quality.

This study contributes to the accounting literature by being the first to look inside the "black box" of corporate accounting departments and by documenting evidence on the value of firms' investments in accounting personnel, those who directly record, process, and disseminate accounting information.

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Appendix A: Examples of Accounting Irregularities Discovered by In-house Accountants

Example 1:
Accounting and Auditing Enforcement Release (AAER) No. 3718, issued on December 2, 2015

"The fraudulent scheme [of Assisted Living Concepts, Inc. ("ALC")] unraveled in the spring of 2012…. on May 2, 2012, one of ALC's accounting personnel filed a whistleblower complaint with the audit committee of ALC's Board of Directors. The complaint described the employee adjustment as a "sham" and disclosed that ALC had included in the covenant calculations: (1) employees who did not travel to the Ventas facilities; (2) certain employees at multiple facilities on the same day; and (3) Bebo's [ALC's CEO] parents, husband, and a family friend. ALC immediately initiated an internal investigation, and Bebo was terminated shortly thereafter, purportedly for reasons unrelated to the employee adjustment."

Example 2:
Accounting and Auditing Enforcement Release (AAER) No. 3765, issued on April 19, 2016

"In Q312, the senior accountant [of Logitech International, S.A. ("LOGI")] developed a new, more robust 'waterfall' model despite having only limited historical sales and return data available to her. Using the new model, she estimated that the Company was under-reserved by several million dollars. She reported her findings to her supervisor, who arranged a meeting with Doktorczyk (the controller)…"

Example 3:
U.S. Securities and Exchange Commission, Litigation Release No. 20336, issued on October 17, 2007

"In an August 20, 2002 e-mail forwarded to Husi [the corporate controller of Centerpulse Ltd.], an employee of the European Orthopedics Division described the improperly carried Global Supply Chain project costs as a 'sword of Damocles' that had been hanging over Centerpulse for a long time. The employee noted that the U.S. Orthopedics Division intended to write off the asset, and on August 27,2002 he asked for permission to record an expense to reflect the impairment…"

Appendix B: Description of Data Collection from *LinkedIn*

Our sample selection begins with identifying a list of non-financial S&P 1500 firms in 2015. For each sample firm, we use *LinkedIn* to search for the names of *LinkedIn* members who have worked for or are working for the firm (i.e., current or past employees). We begin with a broad search for employees with current or past job titles that contain keywords such as "accounting," "accountant," "financial," "control," "comptroller," "treasurer," "auditor," "system," "cost," and "reporting." This search process results in employees with job titles such as "accounting information system analyst," "cost accountants," "accountant - internal reporting," "director of internal control and compliance," "VP finance & corporate controller," and "director of internal audits." We exclude employees whose primary jobs are not related to accounting and financial management, such as sales representatives, financial representatives, and financial advisors. We also exclude employees with positions that are temporary or administrative in nature, such as interns and clerks. A typical employee profile includes the name, photograph (if available), educational background, professional accounting designation (e.g., CPA or CA), and work experience.

Since our individual-level data contain both former and current in-house accountants of the sample firms, we are able to trace back the composition of the accounting departments of the sample firms as long as the individuals' *LinkedIn* accounts include their complete work history. Going too far back in time could introduce estimation errors. For example, some accounting professionals who worked in the accounting departments in the earlier years may no longer be working or might not have *LinkedIn* accounts, or some may not list all of their earlier work experience. Hence, we use 2009 as the start of our sample period since it is not too far back yet still allows us to have a sufficiently large sample for empirical analyses. Based on the individual-level data, we construct a dataset containing the year, firm, and individual accountants who work for the firm in a given year. The final sample consists of 5,849 firm-years, covering 411,184 individual-years over the period 2009-2015.

Appendix C: Variable Definition

Variable	Definition
Accounting human capital variables:	
Acc_Count_{it}	The number of in-house accountants for firm *i* in year *t*.
Acc_BigN_{it}	The ratio of the number of in-house accountants with Big N work experience to the total number of in-house accountants of firm *i*.
$Acc\_BigN\_Rank_{it}$	The tercile rank of the industry-firm size adjusted value of *Acc_BigN*. The mean adjustment uses Fama-French 12 industry classification and the quintile rank of firms' total assets. This measure is standardized between 0 and 1.
Acc_CPA_{it}	The ratio of the number of in-house accountants with a CPA designation to the total number of in-house accountants of firm *i*.
$Acc\_CPA\_Rank_{it}$	The tercile rank of the industry-firm size adjusted value of *Acc_CPA*. The mean adjustment uses Fama-French 12 industry classification and the quintile rank of firms' total assets. This measure is standardized between 0 and 1.
Acc_HC_{it}	The overall accounting human capital measure, calculated as the sum of *Acc_BigN_Rank* and *Acc_CPA_Rank*, then standardized to the range between 0 and 1.
$CPA\_Mobility_{it}$	An indicator variable that equals one if the state in which firm *i* resides adopted the CPA mobility law during the sample period and year *t* is the year of enactment or thereafter. During our sample period, Nebraska, Alaska, Massachusetts, New York, District of Columbia, and California adopted the law.
$Acc\_Program_{it}$	The number of top-tier universities that offered an undergraduate accounting program within the 100-mile radius of firm *i*'s headquarters in 2004. The top-tier universities are the top 200 universities in the world based on the 2004 QS World University Ranking, an annual publication of university rankings by the *Quacquarelli Symonds and Times Higher Education* magazine.
Dependent Variables for the earnings management analysis	
$Irregularities_{it}$	An indicator variable that equals one if firm *i*'s financial restatement for fiscal year *t* is restated later and the restatement is classified as an irregularity following the classification procedure in Hennes et al. (2008).
$DACC_{it}$	Discretionary accruals obtained from cross-sectional estimations of the modified Jones model (Jones 1991; Dechow et al. 1995) of accruals, estimated by industry-year.
ICW_{it}	The number of internal control material weakness in year *t*, *t*+1, and *t*+2 per Audit Analytics' SOX 404 - Internal Control database.
$Comment\ Letter_{it}$	The number of SEC comment letters received by firm *i* related to accounting rules and accounting disclosure issues in year *t*, *t*+1, and *t*+2.
$Restate\ Error_{it}$	The number of error-related restatement of firm *i*'s financial statement in year *t*, *t*+1, and *t*+2.

Control Variables for the earnings management analysis

$Size_{it}$	The natural log of the market value of equity measured at the end of fiscal year *t*. The market value of equity equals the share price × the number of shares outstanding (PRCC_F × CSHO).
Age_{it}	The number of years firm *i* appears in CRSP. We use the natural logarithm of firm age in the regressions.
MTB_{it}	The market value of equity (PRCC_F × CSHO) divided by the book value of equity (SEQ).
$Leverage_{it}$	The sum of debt in current liabilities (DLC) and long-term debt (DLTT) divided by the book value of equity (CEQ).
Capital Intensity$_{it}$	The intensity of capital assets, defined as net property, plant, and equipment (PPENT) divided by total assets (AT).
Intangible Intensity$_{it}$	The intensity of intangible assets, defined as R&D (XRD) plus advertising (XAD) divided by total assets (AT). Missing values of R&D and advertising are set to 0.
$Foreign_{it}$	The intensity of foreign operations, defined as the ratio of foreign pre-tax income (PIFO) to total pre-tax income (PI).
$Segments_{it}$	The sum of operating (OPER) and geographic segments (GEO) reported in Compustat's Historical Segments file in year *t*. We use the natural logarithm of segments in the regressions.
Return Volatility$_{it}$	Return volatility, measured as the standard deviation of daily returns (in percentage) during year *t*.
$Analyst_{it}$	The average number of analysts following during the fiscal year *t* obtained from IBES Summary Files. We use the natural logarithm of analyst following in the regressions.
$Big4_{it}$	An indicator variable that equals one if firm *i* is audited by a Big 4 auditor according to Compustat (AU).
Inst Ownership$_{it}$	The percentage of outstanding shares owned by institutional investors.
CEO Age$_{it}$	The CEO's age in year *t*. We use the natural logarithm of CEO age in the regressions.
CEO Ownership$_{it}$	The percentage of outstanding shares owned by the CEO.
CEO Tenure$_{it}$	CEO tenure, defined as the number of years from the year the CEO takes office to year *t*. We use the natural logarithm of CEO tenure in the regressions.
Board Independence$_{it}$	The percentage of independent directors on the firm's board.
Lag ROA$_{it}$	The ratio of income before extraordinary items to total assets (AT) in *t*-1.
Lag Z-Score$_{it}$	The Altman Z-score in year *t-1* computed as 3.3 × Net Income (NI)/Total Assets (AT) + Sales (SALE)/Total Assets +1.4 × Retained Earnings (RE)/Total Assets + 1.2 × Working Capital (WCAP)/Total Assets + 0.6 × [Stock Price (PRCC_F) × Shares Outstanding (CSHO)]/Total Liabilities (LT).
MSA Education$_{it}$	The weighted-average education level of respondents to the American Community Survey (ACS) in the MSA where the firm is headquartered. The data are collected from the Integrated Public Use

	Microdata Series (IPUMS) maintained by the University of Minnesota (ipums.org). IPUMS codes education levels as follows: 0 – N/A or no schooling; 1 – Nursery school to grade 4; 2 – Grade 5, 6, 7, or 8; 3 – Grade 9; 4 – Grade 10; 5 – Grade 11; 6 – Grade 12; 7 – one year of college, 8 – two years of college; 9 – three years of college; 10 – 4 years of college; 11 – 5+ years of college
MSA Income$_{it}$	The weighted-average wages (in thousands) for the employed workforce in the MSA where the firm is headquartered. The data are collected from the Integrated Public Use Microdata Series (IPUMS) maintained by the University of Minnesota (ipums.org).
Additional variables for ERC analysis	
CAR$_{it}$	The three-day market-adjusted stock returns around the annual earnings announcement date for year *t*.
UE$_{it}$	The difference between the I/B/E/S actual annual EPS and the median of I/B/E/S forecasts of annual EPS using each analyst's most recent forecast in the window starting from 95 calendar days before and ending with three days before the earnings announcement date of year *t*, scaled by the stock price two days before the earnings announcement date.
Beta$_{it}$	The coefficient from regressing excess daily stock returns for firm *i* on excess market returns over the year ending on the fiscal year-end date. The risk-free rate is collected from Kenneth French's data library.
Persistence$_{it}$	The coefficient from regressing basic EPS excluding extraordinary items (EPSPX) on lagged EPS using up to 10 years of data (where available).
Loss$_{it}$	An indicator variable that equals one if the basic EPS excluding extraordinary items (EPSPX) is less than zero.
Dispersion$_{it}$	The monthly average of the standard deviation of analyst forecasts in the past 12 months, scaled by the stock price two days prior to the earnings announcement date.
Additional variables for audit fees analysis	
Audit Fees$_{it}$	The amount of fees paid to the auditor in year *t* in dollar amount (AUDIT FEES). We use the natural logarithm of audit fees in the regressions.
Quick$_{it}$	Quick ratio, defined as current assets (ACT) minus inventory (INVT) divided by current liabilities (DLC).
NLoss$_{it}$	The number of years with negative income before extraordinary items over the past five years (IBT).
Employee$_{it}$	The number of employees (in thousands) of firm *i* in year *t* (EMP). We use the natural logarithm of employees in the regressions.
GC$_{it}$	An indicator variable that equals to one if firm *i* receives a going-concern opinion in year *t*, and zero otherwise
YE_Dec$_{it}$	An indicator variable that equals to one if firm *i* has a December fiscal year-end, and zero otherwise.

Appendix D: The Determinant Model of Accounting Human Capital

This table reports the results for the determinant model of accounting human capital (*Acc_HC*). *CPA Mobility* is an indicator variable that equals one for firms in the states that adopt CPA mobility law in the year of enactment and thereafter. During our sample period, Nebraska, Alaska, Massachusetts, New York, District of Columbia, and California adopted the CPA mobility law. *Acc_Program* is the number of top-tier universities that offered an undergraduate accounting program within the 100-mile range of the firm's headquarters in 2004. The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. Please see Appendix C for variable definitions. Intercept is included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both headquarters state and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

Dependent Variable	*Acc_HC*
CPA Mobility	0.0245***
	(4.87)
Acc_Program	0.0227***
	(2.90)
Size	0.0235
	(1.14)
Age	0.1723***
	(2.95)
MTB	-0.0008
	(-0.39)
Leverage	0.0087
	(0.97)
Capital Intensity	0.1213
	(1.54)
Intangible Intensity	-0.0756
	(-0.65)
Foreign	0.1466
	(1.09)
Segment	-0.0091
	(-0.50)
Return Volatility	-0.0057
	(-1.04)
Analyst	0.0201
	(1.05)
Big4	0.0691
	(1.56)
Inst Ownership	0.0001
	(0.15)
CEO Age	0.0022
	(0.23)
CEO Ownership	0.0001
	(1.52)
CEO Tenure	0.0080
	(1.02)
Board Independence	0.0003*
	(1.83)
Lag ROA	-0.0699
	(-0.91)

Lag Z-Score	0.0025
	(0.85)
MSA Education	0.0045
	(1.11)
MSA Income	0.0001
	(0.12)
Fixed Effects	Firm + Industry×Year
N	5,849
Adjusted R^2	0.76

Table 1 Sample Selection

This table describes the sample selection process.

	Firms	Firm-years
Firms that appeared in the S&P 1500 index in December 2015 and had a *LinkedIn* homepage	1,378	
Exclude: financial firms	(312)	
	1,066	
Firm-year observations during the 2009-2015 period		7,462
Exclude: firm-year observations without data on regression variables		(1,613)
Final sample	944	5,849

Table 2 Descriptive Statistics on Accounting Human Capital Measures

This table presents the descriptive statistics on accounting human capital (*Acc_HC*) and its components for the full sample (Panel A), by firm size quintiles (Panel B), and by industry (Panel C). The full sample includes 5,849 firm-year observations with available data between 2009 and 2015. Please see Appendix C for variable definitions.

Panel A: Summary Statistics

	N	Mean	Std. Dev.	P25	P50	P75
Acc_Count	5,849	70.299	103.601	16.000	30.000	73.000
Acc_BigN	5,849	0.102	0.106	0.038	0.080	0.140
Acc_CPA	5,849	0.144	0.135	0.067	0.121	0.188
Acc_HC	5,849	0.504	0.323	0.250	0.500	0.750

Panel B: Mean Values by Total Assets

Quintile	Average Total Assets (millions)	N	*Acc_Count*	*Acc_BigN*	*Acc_CPA*	*Acc_HC*
1	393.153	1,170	16.842	0.092	0.170	0.519
2	1,084.702	1,170	27.436	0.113	0.154	0.493
3	2,506.487	1,170	40.489	0.102	0.134	0.504
4	6,306.892	1,170	83.279	0.980	0.129	0.495
5	42,150.290	1,169	183.546	0.107	0.131	0.508

Panel C: Mean Values by Industry

Note that that financial industry (Fama-French 11) is not included in our sample. The "Others" category includes mining, construction, building management, transportation, hotels, business services, and entertainment.

	Fama-French 12 Industries	N	*Acc Count*	*Acc BigN*	*Acc CPA*	*Acc HC*
1	Consumer Non-Durables	426	60.817	0.112	0.125	0.508
2	Consumer Durables	173	46.659	0.094	0.120	0.523
3	Manufacturing	886	62.801	0.106	0.135	0.497
4	Oil, Gas, and Coal Extraction & Products	295	72.176	0.097	0.153	0.507
5	Chemicals & Allied Products	247	67.470	0.116	0.132	0.472
6	Business Equipment	1,240	64.372	0.119	0.151	0.495
7	Telephone & Television Transmissions	150	131.013	0.130	0.127	0.513
8	Utilities	199	35.045	0.115	0.222	0.491
9	Wholesale, Retail, & Services	832	91.968	0.081	0.120	0.494
10	Healthcare, Medical Equipment, & Drugs	574	69.634	0.090	0.169	0.555
12	Others	827	73.357	0.091	0.145	0.503

Table 3 Descriptive Statistics on Regression Variables

This table presents descriptive statistics on the variables used in the analysis. Please see Appendix C for variable definitions. The full sample includes 5,849 firm-year observations with available data between 2009 and 2015.

	N	Mean	Std. Dev.	P25	P50	P75
Dependent Variables for the earnings management analysis						
Irregularities (1/0)	5,849	0.010	0.099	0.000	0.000	0.000
DACC	5,849	0.011	0.062	-0.021	0.011	0.042
ICW	5,849	0.142	0.737	0.000	0.000	0.000
Comment Letter	5,849	0.763	1.075	0.000	0.000	1.000
Restate Error	5,849	0.240	0.677	0.000	0.000	0.000
Control Variables for the earnings management analysis						
Size (in millions)	5,849	12,616	34,953	1,009	2,684	9,296
Size	5,849	7.923	1.548	6.918	7.896	9.138
Age (years)	5,849	32.553	17.735	19.000	27.000	48.000
Age	5,849	3.319	0.596	2.944	3.296	3.871
MTB	5,849	3.369	4.693	1.602	2.426	3.845
Leverage	5,849	0.201	0.165	0.053	0.189	0.306
Capital Intensity	5,849	0.262	0.226	0.089	0.181	0.372
Intangible Intensity	5,849	0.042	0.059	0.000	0.019	0.060
Foreign	5,849	0.295	0.558	0.000	0.107	0.556
Segments (count)	5,849	8.139	4.004	5.000	8.000	10.000
Segments	5,849	1.980	0.489	1.609	2.079	2.303
Return Volatility (%)	5,849	2.212	0.960	1.521	1.999	2.683
Analyst (count)	5,849	13.462	8.269	6.750	11.750	18.600
Analyst	5,849	2.393	0.673	1.910	2.464	2.923
Big4 (1/0)	5,849	0.933	0.250	1.000	1.000	1.000
Inst Ownership (%)	5,849	67.853	17.166	50.000	68.864	81.872
CEO Age (years)	5,849	56.404	6.924	52.000	56.000	61.000
CEO Age	5,849	4.043	1.246	3.970	4.052	4.127
CEO Ownership (%)	5,849	2.102	4.389	0.189	0.570	1.654
CEO Tenure (years)	5,849	7.590	7.349	2.000	6.000	10.000
CEO Tenure	5,849	1.805	0.893	1.098	1.945	2.398
Board Independence (%)	5,849	72.066	25.701	70.000	80.000	88.889
Lag ROA	5,849	0.057	0.080	0.028	0.057	0.092
Lag Z-Score	5,849	4.454	3.782	2.261	3.500	5.232
MSA Education	5,849	7.627	0.725	7.332	7.656	7.960
MSA Income (000s)	5,849	25.519	23.491	7.906	35.761	44.521
Additional variables for ERC analysis						
CAR	5,602	0.007	0.071	-0.033	0.005	0.045
UE	5,602	0.001	0.005	-0.000	0.000	0.002
Beta	5,602	1.060	0.313	0.842	1.030	1.247
Persistence	5,602	0.367	0.415	0.069	0.362	0.658
Loss (1/0)	5,602	0.109	0.312	0.000	0.000	0.000
Dispersion	5,602	0.004	0.007	0.001	0.002	0.004
Additional variables for audit fees analysis						
Audit Fees (in 000s)	5,760	3,965.01	5,350.89	1,123.49	2,041.27	4,500.00
Audit Fees	5,760	14.547	1.605	13.932	14.529	15.320
Quick	5,760	1.882	1.612	1.005	1.466	2.224
NLoss	5,760	0.575	1.006	0.000	0.000	1.000
Employees	5,760	1.993	1.628	0.915	1.940	3.045
GC	5,760	0.001	0.020	0.000	0.000	0.000
YE_Dec	5,760	0.665	0.472	0.000	1.000	1.000

Table 4 Accounting Human Capital and earnings management – Tests of H1

This table reports the OLS regression results for the effect of accounting human capital on earnings management. The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

	(1)	(2)
Dependent Variable	*Irregularities*	*DACC*
Acc_HC	-0.0241***	-0.0146***
	(-3.00)	(-2.75)
Size	0.0107**	0.0056
	(2.16)	(1.63)
Age	0.0272	-0.0033
	(1.46)	(-0.20)
MTB	-0.0008	-0.0001
	(-1.04)	(-0.31)
Leverage	0.0212	0.0359**
	(0.81)	(2.24)
Capital Intensity	-0.0012	-0.0410
	(-0.04)	(-1.38)
Intangible Intensity	-0.1429	0.1313**
	(-1.54)	(2.10)
Foreign	-0.1082**	0.0099
	(-2.00)	(0.19)
Segment	-0.0003	0.0075
	(-0.05)	(1.28)
Return Volatility	-0.0052	-0.0055***
	(-1.61)	(-2.60)
Analyst	0.0070	0.0050
	(1.14)	(1.03)
Big4	0.0232	-0.0089
	(0.77)	(-0.76)
Inst Ownership	-0.0001	0.0001
	(-0.90)	(1.42)
CEO Age	0.0023	0.0018
	(0.69)	(0.85)
CEO Ownership	-0.0002*	-0.0000
	(-1.93)	(-1.26)
CEO Tenure	-0.0767*	-0.0040
	(-1.78)	(-0.19)
Board Independence	0.0000	-0.0000
	(0.24)	(-0.68)
Lag ROA	0.0052	-0.0123*
	(0.51)	(-1.67)
Lag Z-Score	-0.0000	0.0007
	(-0.04)	(1.36)
MSA Education	0.0013	-0.0007
	(1.00)	(-0.47)
MSA Income	0.0003	0.0002
	(1.13)	(0.95)
Fixed Effects	Firm + Industry×Year	
N	5,849	5,849
Adjusted R^2	0.47	0.16

Table 5 Accounting Human Capital, Internal Control Weaknesses, and Unintentional Accounting Errors – Test of H2a and H2b

This table reports the OLS regression results for the effect of accounting human capital on internal control weaknesses and unintentional accounting errors. The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

	(1)	(2)	(3)
Dependent Variable	*ICW*	*Comment Letter*	*Restate Error*
Acc_HC	-0.1270***	-0.2214**	-0.0636*
	(-2.68)	(-2.33)	(-1.77)
Size	0.0186	0.0207	0.1147***
	(0.73)	(0.43)	(2.69)
Age	0.2207**	0.6759***	0.0416
	(2.35)	(2.70)	(0.27)
MTB	0.0002	-0.0030	-0.0047
	(0.09)	(-0.55)	(-1.49)
Leverage	-0.1261	0.0497	-0.0636
	(-0.84)	(0.25)	(-1.13)
Capital Intensity	-0.1228	-0.0273	0.3887*
	(-0.72)	(-0.07)	(1.79)
Intangible Intensity	-0.0685	-0.0524	-1.0715***
	(-0.15)	(-0.08)	(-2.82)
Foreign	-0.4332	0.8235	-0.1711
	(-1.08)	(0.95)	(-0.35)
Segment	0.0179	-0.0232	0.0897
	(0.42)	(-0.25)	(1.55)
Return Volatility	-0.0016	0.0002	0.0093
	(-0.09)	(0.01)	(0.51)
Analyst	0.0458	-0.0602	0.1557***
	(1.00)	(-0.90)	(3.68)
Big4	0.0732	0.3214*	0.0405
	(0.65)	(1.86)	(0.35)
Inst Ownership	-0.0003	0.0005	-0.0009
	(-0.66)	(0.45)	(-1.55)
CEO Age	0.0378**	-0.0163	-0.0020
	(2.15)	(-0.56)	(-0.11)
CEO Ownership	-0.0010	-0.0003	0.0009
	(-1.64)	(-0.77)	(0.12)
CEO Tenure	-0.6113***	-0.0084	-0.1501
	(-3.56)	(-0.03)	(-0.86)
Board Independence	-0.0009*	0.0022**	-0.0001
	(-1.70)	(2.57)	(-0.25)
Lag ROA	0.1116**	0.0111	0.1461
	(2.13)	(0.02)	(0.52)
Lag Z-Score	-0.0028	0.0091	0.0011
	(-0.84)	(1.48)	(0.32)
MSA Education	-0.0062	-0.0232	-0.0095
	(-0.78)	(-1.14)	(-0.78)
MSA Income	0.0023	0.0023	0.0033*
	(1.11)	(0.77)	(1.81)
Fixed Effects		Firm + Industry×Year	
N	5,849	5,849	5,849
Adjusted R^2	0.66	0.32	0.44

Table 6 Accounting Human Capital and Earnings Management – Robustness Tests

Panel A: Change Specifications

This table reports the regression results for the effect of accounting human capital on earnings management using change specifications. The full sample includes 4,836 firm-years from S&P 1500 firms with available data between 2009 and 2015. The first difference of the same set of control variables as in Table 4 are included but not tabulated for brevity. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

Dependent Variable:	(1) Δ*Irregularities*	(2) Δ*DACC*	(3) Δ*ICW*	(4) Δ*Comment Letter*	(5) Δ*Restate Error*
Δ*Acc_HC*	-0.0195**	-0.1408*	-0.3124**	-0.1040***	-0.0732**
	(-2.46)	(-1.93)	(-2.57)	(-2.77)	(-2.50)
ΔControl variables			Included		
Fixed Effects			Industry×Year		
N	4,836	4,836	4,836	4,836	4,836
Adjusted R^2	0.12	0.08	0.05	0.09	0.05

Panel B: Controlling for CEO and CFO Fixed Effects

This table reports the OLS regression results for the effect of accounting human capital on earnings management after further controlling for CEO and CFO fixed effects. The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. The same set of control variables as in Table 4 are included but not tabulated for brevity. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

Dependent Variable	(1) *Irregularities*	(2) *DACC*	(3) *ICW*	(4) *Comment Letter*	(5) *Restate Error*
Acc_HC	-0.0258**	-0.0161**	-0.1174**	-0.2307**	-0.0819**
	(-2.55)	(-2.37)	(-2.07)	(-2.06)	(-2.00)
Control Variables			Included		
Fixed Effects			Firm + CEO + CFO + Industry×Year		
N	5,849	5,849	5,849	5,849	5,849
Adjusted R^2	0.53	0.16	0.70	0.33	0.58

Table 7 Accounting Human Capital and Earnings Management – Control for Endogeneity

This table reports the results for the effect of accounting human capital on earnings management using the control function approach. We employ the control function approach by including *Stage1 Residual*, the residuals estimated from the first-stage determinant model, as presented in Appendix D, to control for the potential endogeneity (Wooldridge 2015). The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. The same set of control variables as in Table 4 are included but not tabulated for brevity. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

Dependent Variable:	(1) *Irregularities*	(2) *DACC*	(3) *ICW*	(4) *Comment Letter*	(5) *Restate Error*
Acc_HC	-0.0266**	-0.0217***	-0.2363***	-0.3523***	-0.0747*
	(-2.42)	(-2.70)	(-4.02)	(-2.61)	(-1.70)
Stage1 Residual	0.0027	0.0102	0.1389**	0.2018*	0.0397
	(0.20)	(1.31)	(2.21)	(1.68)	(0.69)
Control Variables	Included				
Fixed Effects	Firm + Industry×Year				
N	5,849	5,849	5,849	5,849	5,849
Adjusted R^2	0.47	0.15	0.66	0.32	0.44
Test of Over-identification of instrumental variables:					
J-test statistic	1.15	0.34	0.67	0.99	1.03
p-value	0.316	0.717	0.514	0.370	0.356

Table 8 Accounting Human Capital and Earnings Response Coefficient

This table reports the OLS regression results for the effect of accounting human capital on the earnings response coefficient. The full sample includes 5,602 firm-years from S&P 1500 firms with available data between 2009 and 2015. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

Dependent Variable	(1) *CAR* Full sample	(2) *CAR* *Inst Ownership* ≥ Median	(3) *CAR* *Inst Ownership* < Median
UE	2.0572**	3.8017**	3.8140***
	(2.29)	(2.26)	(3.12)
Acc_HC	-0.0131	-0.0145	-0.0180
	(-1.44)	(-1.07)	(-1.35)
UE×*Acc_HC*	2.9347***	4.1790***	-0.7610
	(3.06)	(2.59)	(-0.58)
UE× *Size*	-0.1850**	-0.4032**	0.0481
	(-2.16)	(-2.46)	(0.40)
UE× *MTB*	0.0710*	0.2406***	-0.1652***
	(1.79)	(3.88)	(-2.67)
UE× *Beta*	1.0037***	2.1582***	0.4360
	(3.19)	(3.03)	(1.08)
UE× *Leverage*	-2.2295**	-2.0211	-1.4436
	(-2.20)	(-1.20)	(-1.05)
UE× *Persistence*	0.8521***	0.1776	0.7992**
	(2.91)	(0.29)	(2.13)
UE× *Loss*	-1.2613***	-1.9432***	-0.9262**
	(-4.81)	(-3.95)	(-2.56)
UE× *Dispersion*	-3.3313***	-4.6202	-3.895**
	(-2.73)	(-1.08)	(-2.26)
UE× *Inst Ownership*	0.0029	-0.0175	0.0005
	(0.70)	(-1.33)	(0.06)
UE×$\lvert UE \rvert$	-1.9266*	0.4590	-3.7059***
	(-1.90)	(0.17)	(-2.87)
UE×$\lvert UE \rvert$ ×*Acc_HC*	0.0090	0.2753	0.0179
	(0.66)	(0.30)	(0.73)
UE× *MSA Education*	0.0193	0.1825*	-0.0979
	(0.34)	(1.77)	(-0.98)
UE× *MSA Income*	-0.0000	-0.0000**	-0.0000*
	(-0.05)	(-2.45)	(1.73)
Firm Characteristics	Yes	Yes	Yes
Firm + Industry×Year Fixed Effects	Yes	Yes	Yes
UE× Fixed Effects	Yes	Yes	Yes
N	5,602	2,765	2,716
Adjusted R^2	0.11	0.12	0.14

Table 9 Accounting Human Capital and Audit Fees

This table reports the OLS regression results for the effect of accounting human capital on audit fees. The full sample includes 5,760 firm-years from S&P 1500 firms with available data between 2009 and 2015. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

	(1)	(2)	(3)
Dependent Variable	*Audit Fees*	*ΔAudit Fees*	*Audit Fees*
Acc_HC	-0.1808*	-0.2624**	-0.3211**
	(-1.91)	(-2.26)	(-2.24)
Size	0.1276*	0.1134*	0.1711*
	(2.04)	(1.75)	(1.93)
Age	-0.1301	0.3323	0.0273
	(-0.45)	(1.19)	(0.07)
MTB	0.0000	-0.0000	0.0001
	(0.20)	(-0.06)	(0.49)
Leverage	-0.2503	0.1276	-0.3161
	(-0.77)	(0.65)	(-0.74)
Capital Intensity	-0.4383	-0.6551	-0.7418*
	(-1.23)	(-1.87)	(-1.79)
Intangible Intensity	0.1364	-0.1095	0.1528
	(0.24)	(-0.27)	(0.14)
Foreign	0.0539	-1.1917	0.3701
	(0.06)	(-1.57)	(0.25)
Segment	0.0821	0.0528	0.1214
	(1.40)	(0.57)	(1.42)
Return Volatility	-0.0373	0.0514	-0.0441
	(-0.96)	(1.49)	(-0.90)
Analyst	0.0844	0.0598	0.0240
	(0.59)	(0.59)	(0.16)
Big4	1.6189	1.3603	1.7453**
	(1.58)	(1.50)	(2.47)
Inst Ownership	-0.0011	0.0006	-0.0011
	(-0.55)	(0.74)	(-0.83)
CEO Age	0.0744	0.1491	0.0544
	(0.25)	(1.17)	(0.11)
CEO Tenure	0.0306	-0.0184	0.0191
	(0.89)	(-0.88)	(0.45)
CEO Ownership	-0.0007	-0.0004	-0.0010
	(-0.73)	(-0.55)	(-1.37)
Board Independence	0.0016	0.0001	0.0017
	(1.52)	(0.14)	(1.28)
Lag ROA	-1.0884	0.7027	-0.4492
	(-1.10)	(0.88)	(-0.46)
Lag Z-Score	-0.0017	0.0163	-0.0077
	(-0.14)	(0.68)	(-0.34)
MSA Education	-0.0024	-0.0146	0.0018
	(-0.07)	(-0.68)	(0.09)
MSA Income	-0.0191	-0.0144*	-0.0182

	(-1.44)	(-1.89)	(-1.04)
DACC	0.1234	0.1103	0.0957
	(1.16)	(1.19)	(0.80)
Quick	-0.0182	-0.0537	-0.0321
	(-0.50)	(-0.85)	(-1.06)
NLoss	0.2866***	0.0020	-0.0396
	(3.87)	(0.06)	(-0.77)
Employees	0.7555	0.2466**	0.2774**
	(1.14)	(2.42)	(2.32)
GC	1.3187	-0.0383	0.8093
	(1.07)	(-0.14)	(0.93)
YE_Dec	-0.1301	-0.0028	1.2348
	(-0.45)	(-0.02)	(1.01)
Stage1 Residual			0.2269
			(1.57)
Fixed Effects		Firm + Industry×Year	
N	5,760	4,702	5,760
Adjusted R^2	0.47	0.07	0.47

Table 10 Components of Accounting Human Capital and Earnings Management

This table reports the OLS regression results for the effect of accounting human capital on earnings management. The full sample includes 5,849 firm-years from S&P 1500 firms with available data between 2009 and 2015. *Acc_BigN_Rank* is the tercile rank of the industry-firm size adjusted ratio of the number of in-house accountants with Big N firm work experience to the total number of in-house accountants of the firm. *Acc_CPA_Rank* is the tercile rank of the industry-firm size adjusted ratio of the number of in-house accountants with a CPA designation to the total number of in-house accountants of the firm. The mean adjustment uses the Fama-French 12 industry classification and the quintile rank of firms' total assets. *Acc_BigN_Rank* and *Acc_CPA_Rank* are standardized to the range of [0, 1]. The same set of control variables as in Table 4 are included but not tabulated for brevity. Please see Appendix C for variable definitions. Intercepts are included but not tabulated. The *t*-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels based on two-tailed tests, respectively.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	*Irregularities*	*DACC*	*ICW*	*Comment Letter*	*Restate Error*
Acc_BigN_Rank	-0.0091*	-0.0153**	-0.0644**	-0.0999*	0.0078
	(-1.69)	(-2.28)	(-2.00)	(-1.65)	(0.24)
Acc_CPA_Rank	-0.0198***	-0.0187*	-0.0645**	-0.1634**	-0.1391***
	(-2.60)	(-1.95)	(-2.17)	(-2.05)	(-3.31)
Control Variables			Included		
Fixed Effects			Firm + Industry×Year		
N	5,849	5,849	5,849	5,849	5,849
Adjusted R^2	0.46	0.10	0.66	0.31	0.56