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Daniel Gyung Paik

University of Richmond, daniel.paik@richmond.edu

Philip Keunho Chung

Collin Rabe

University of Richmond, crabe@richmond.edu

Marshall A. Geiger

University of Richmond, mgeiger@richmond.edu

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**Materiality Thresholds: Empirical Evidence from
Change in Accounting Estimate Disclosures**

Philip Keunho Chung
Luter School of Business
Christopher Newport University
1 Avenue of the Arts, Newport News, VA 23606, USA
philip.chung@cnu.edu
(757) 594-7238

Marshall A. Geiger
Robins School of Business
University of Richmond
102 UR Drive, Richmond, VA 23173, USA
mgeiger@richmond.edu
(804) 287-1923

Daniel Gyung Paik*
Robins School of Business
University of Richmond
102 UR Drive, Richmond, VA 23173, USA
daniel.paik@richmond.edu
(804) 289-8573

Collin Rabe
Robins School of Business
University of Richmond
102 UR Drive, Richmond, VA 23173, USA
crabe@richmond.edu
(804) 289-8560

*Corresponding author

Materiality Thresholds: Empirical Evidence from Change in Accounting Estimate Disclosures

SYNOPSIS: This paper provides empirical evidence on the materiality thresholds adopted in “change in accounting estimate” (CAE) disclosures. We also investigate the characteristics of the disclosing firms and their auditors, as well as the characteristics of the CAEs, such as the effect on income, the accounts affected, and disclosure venue. U.S. GAAP requires firms to disclose a CAE if its effect on the financial statements is deemed to be “material” (ASC 250-50-4). We analyze 4,335 CAE disclosures from 2006 to 2016 and provide the first descriptive evidence of the actual materiality thresholds used for CAE disclosures in practice. Our main finding is that quantitative materiality thresholds for CAE disclosures are significantly lower than conventional materiality thresholds, such as 5 percent of pretax income, and that firms may not only apply quantitative materiality thresholds more conservatively, but that other qualitative considerations play an important role in determining CAE materiality. Our results also show that there exists considerable variation in CAE disclosure across firm size, industry membership, auditor, financial statement account effected and the direction of the effect on income.

Keywords: Change in accounting estimate; Materiality; Materiality thresholds; Quantitative and qualitative materiality considerations

Data Availability: The data used in this study are publicly available from the sources listed in the paper.

INTRODUCTION

Materiality is an “overused and under-defined notion” in accounting as well as in law (Oesterle 2011). In fact, the Securities and Exchange Commission (SEC) leaves the formal definition of materiality intentionally vague so that no bright-line rules can be used to limit the amount of important information released to investors.¹ Nonetheless, volumes of accounting literature have attempted to more precisely identify the quantitative, qualitative, and other contextual considerations conventionally used in the determination of materiality in various financial reporting and auditing settings. This mosaic approach is unavoidable and even desirable due to the inherent nature of the materiality concept and its pervasive use in financial reporting.

In this paper, we investigate the application of the materiality concept in financial reporting by examining firm disclosures of a material change in accounting estimate (CAE, hereafter). U.S. generally accepted accounting principles (GAAP) require that, in the period of the change, firms disclose CAEs that have a material effect on the financial statements. We utilize 4,335 individual CAEs disclosed by 2,050 unique firms during the years 2006 – 2016, and provide descriptive evidence on the characteristics of CAEs and the implicit materiality criteria adopted for CAE disclosure. Additionally, we examine how the characteristics of the reporting firms, their auditors, and the financial statement accounts associated with the CAEs are related to disclosure materiality thresholds.

Our results reveal that a significant percentage of CAE disclosures fall *below* conventional quantitative materiality thresholds. Specifically, on average, about 60 percent of disclosed CAEs in our sample are smaller than traditional quantitative materiality thresholds. Our results with

¹ In SAB (Staff Accounting Bulletin) 99, the SEC defines a matter as material “if there is a substantial likelihood that a reasonable person would consider it important” (SEC 1999). Similarly, the Financial Accounting Standards Board (FASB) dictates in Statements of Financial Accounting Concepts No. 2 that any accounting information is material if its omission or misstatement “in the light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would have been changed.”

respect to CAEs are markedly different than those for restatements as found by Acito, Burks, and Johnson (2009) who examine restatements of prior lease accounting errors. They find that the magnitude of lease restatements is distributed roughly as a bell-shaped curve, centered around the traditional materiality threshold of 5 percent of earnings. Unlike restatements or error corrections, that are backward-looking modifications of previously reported financial statements, CAEs are the revisions of forward-looking estimates and forecasts resulting from the ongoing current and future reporting of business activity. Our findings imply that when firms and their auditors make these forward-looking materiality judgments for CAE disclosure, they may not only apply quantitative materiality thresholds more conservatively, but, consistent with SAB 99 (SEC 1999), they may also consider additional qualitative factors in these decisions.

Additionally, we provide evidence that firms with CAE disclosures tend to be relatively large and highly concentrated in the manufacturing industry when compared to the general *Compustat* population. We also find that there is considerable variation for clients among Big 4 auditors and between Big 4 and non-Big 4 auditors in applying CAE materiality thresholds. Lastly, the CAE financial statement accounts analysis reveals that revenue, liabilities, depreciation, tax, and compensation-related CAEs are most frequently disclosed, and there is significant variation in applied materiality thresholds across the different financial statement accounts.

Our finding that firms give significant *qualitative* consideration to disclosure decisions regarding CAEs provides compelling empirical evidence that when considering whether to disclose a CAE, firms generally appear to follow the SEC's guidelines that require evaluations of materiality in terms of quantitative and qualitative dimensions. In sum, our findings also suggest that, collectively, firms disclose more CAEs than would be expected by applying traditional materiality thresholds. We believe that these additional disclosures provide added information from management regarding their approaches, methods and perspectives, resulting in improved

financial reporting transparency. However, we also find that the application of CAE materiality thresholds varies significantly across firms, industries, auditors, and financial statement accounts. Our results suggest that further empirical research is warranted regarding the necessity and expected benefits of additional CAE disclosure requirements.²

We organize the remainder of the paper as follows. The next section reviews prior literature about CAEs and materiality and develops our primary research questions. We then discuss our sample selection process and research design, followed by an analysis of CAE data to provide answers to our proposed research questions. The final section summarizes and concludes the paper.

BACKGROUND, LITERATURE REVIEW AND RESEARCH QUESTIONS

CAE Disclosure Requirements and Materiality Judgments

Accrual-based accounting critically depends on the ongoing estimation of the future status of a firm's assets, liabilities, and operations. Depreciation of long-lived assets, the collectability of receivables, the amount of future sales returns and allowances, salability of slow-moving inventory, the amount of future pension obligations, and the usability of uncertain tax positions are just a few examples of financial statement items that require a substantial amount of estimation. Reporting many financial statement accounts require the use of estimates, and estimates always involve making certain assumptions and projections about future activities and events. When new information emerges after the initial estimation, the original estimate needs to be updated and its change, if material, is required to be disclosed in financial statements (see the Appendix for several CAE disclosure examples). The need for the disclosure of a material CAE is an unavoidable result of the periodicity reporting principle and the ongoing assessment of a firm's expected future

² For example, the U.K. and the Netherlands require auditors to disclose in their audit reports the materiality thresholds they adopt for auditing clients. However, the regulatory bodies in the U.S. such as the Public Company Accounting Oversight Board (PCAOB) have not seriously considered a similar additional disclosure requirement. (Christensen, Eilifsen, Glover, and Messier 2018)

financial position and operational activities. In this sense, CAEs are forward-looking and reflect the uncertainty of estimating future events and business activities, both historically and currently.

According to U.S. GAAP, as captured in Accounting Standard Codification 250 (ASC 250-50-4), the disclosure of a CAE is required if its expected impact is deemed to be “material.” Specifically, if the effects of a CAE on current and future income, including per-share amounts, are judged to be material, then the CAE must be disclosed in the financial statements that reflect the change. However, disclosure is not required if CAEs arise in the ordinary course of operations, so long as the overall impact on the financial statements is immaterial (ASC 250-50-5).

As with other financial statement disclosure issues, materiality thresholds play a critical role in determining whether a CAE must be separately disclosed. However, as the SEC has emphasized, the exclusive reliance on “any percentage or numerical threshold has no basis in the accounting literature or the law” (SEC 1999, p. 2). The SEC reinforced this notion by specifically indicating that “a materiality evaluation must be based on all relevant quantitative and qualitative factors” (SEC 2006, p. 2). In addition, the U.S. Supreme Court has also consistently ruled that no bright-line rules should be adopted for the determination of materiality. In fact, in the case of *Matrixx Initiatives, Inc. v. Siracusano* (2011), the U.S. Supreme Court rejected the use of a “statistical significance” criterion for making disclosure decisions, because it could be construed as a bright-line rule for defining materiality.³ Further, as evidence of how deeply engrained the concept and the purposefully vague definition of “materiality” is in U.S. financial reporting, when the Financial Accounting Standards Board (FASB) proposed a change in 2015 to try and align the accounting definition of materiality more closely to the legal definition, it was met with fierce

³ *Matrixx Initiatives, Inc.*, the manufacturer of Zicam Cold Remedy, received several reports related to the adverse effects of its drug. However, the firm chose not to disclose the reports on the basis that they failed to find “statistically significant” evidence of a connection between the observed side effects and its product. However, the Court posited that even though some information may not have exhibited statistical significance in a cause-effect relation, it may still be considered material if investors were to act in response to the information (Oesterle 2011).

resistance and quickly abandoned (FASB 2015). Accordingly, judgments of materiality should be made on a case-by-case and fact-specific basis, in consideration of all relevant quantitative and qualitative information.

In practice, the materiality judgements for CAEs, and all financial statement disclosures, depend on how the reporting firm and their auditors collaborate to reach agreement on the issue (Acito, Burks and Johnson 2019). As the auditors must attest to the firm's financial statements (and filings with the SEC), final decisions regarding materiality and the need for separate financial statement disclosures are typically determined jointly between firm management, the Audit Committee of the Board of Directors, and the auditors. Concurrently, managers may be concerned that their accounting estimates can be perceived as excessively aggressive or possibly even fraudulent by the public (Roychowdhury 2006). Therefore, managers may be reluctant to make disclosures of one-time adjustments, such as CAEs in order to avoid additional public scrutiny and critical examination of not only the CAE, but all the prior reporting periods that may be associated with the change (Hamilton, Hirsch, Murthy, and Rasso 2018). In contrast, auditors may want managers to disclose a CAE to minimize their potential litigation risk arising from seemingly tolerating a client's opportunistic financial reporting practices (Venkataraman, Weber, and Willenborg 2008). Thus, materiality decisions for CAE disclosure are typically negotiated between the firm and their auditor.

Materiality Thresholds and Disclosure Distributions

The most common rule of thumb for the determination of materiality among financial reporting professionals is what has been referred to as the "5 percent rule," which advises that any amount greater than 5 percent of earnings should generally be considered material (SEC 1999; Keune and Johnstone 2009). While other quantitative rules of thumb exist, the 5 percent rule is often applied in practice, as documented by the literature (Eilifsen and Messier 2015; Acito et al.

2019).⁴ In fact, SEC Staff Accounting Bulletin 99 (SAB 99) specifically addresses this quantitative rule and posits that a formulaic approach such as the 5 percent rule, by itself, is not sufficient for judging materiality as other qualitative factors that might engender quantitatively small amounts to be deemed material.⁵ SAB 99 (SEC 1999) states:

“The staff has no objection to such a ‘rule of thumb’ as an initial step in assessing materiality. But quantifying, in percentage terms, the magnitude of a misstatement is only the beginning of an analysis of materiality; it cannot appropriately be used as a substitute for a full analysis of all relevant considerations.” (p. 2)

Nonetheless, the SEC concedes that the “use of a percentage as a numerical threshold, such as 5%, may provide for a preliminary assumption” (SEC 1999, p. 2) that an amount of less than the specified percentage may likely be judged to be immaterial. For this reason, prior accounting literature has often focused on identifying the quantitative materiality thresholds used in practice across reporting firms, auditors, and individual financial statement accounts (Heitzman, Wasley, and Zimmerman 2010).

For example, Acito et al. (2009) provides evidence about the materiality thresholds adopted for disclosing the correction of lease accounting errors in the period 2004-2005.⁶ Their results show that, except for the very large and clearly material amounts, the distribution of amounts reported in the restatements is roughly a bell-shaped curve around the traditional quantitative

⁴ When evaluating the magnitude of errors and other accounting items for materiality, individuals typically assess the amounts relative to other current financial statement amounts. Examples of comparative measures commonly used by auditors (Eilifsen and Messier 2015) as well as researchers in the accounting literature include net income, pretax income, net sales, and total assets. For example, Gleason and Mills (2002) use 5 percent of pretax income and 0.5 percent of total assets to investigate firms’ materiality judgments regarding contingent liability disclosures. Liu and Mittelstaedt (2002) use 0.5 percent of net sales, 5 percent of income from continuing operations, 0.5 percent of total assets, and 1 percent of equity as thresholds to test the materiality measures. Keune and Johnstone (2009) use 5 percent of net income, 1 percent of total assets, and 1 percent net sales as benchmark materiality thresholds. Legoria, Melendrez, and Reynolds (2013) simply use 5 percent of pretax income as a general guide on materiality.

⁵ According to SAB 99, qualitative considerations in judging the materiality of misstatements include, but are not limited to, whether the misstatement affects earnings trends, market earnings consensus, operation or profitability, compliance with regulatory requirements, compliance with contractual requirements, management’s compensation, concealment of an unlawful transaction, or the registrant’s stock price.

⁶ In their paper, they distinguish between firms with material errors in their lease accounting as evidenced by the choice to do a formal restatement in order to correct the previous errors. These are contrasted against firms who chose an informal catch-up adjustment approach to correct what are deemed to be immaterial errors.

threshold of 5 percent of earnings. We present their aggregate frequency distribution results in Figure 1. Their findings suggest that firms and their auditors appeared to generally be implementing the 5 percent rule when determining materiality thresholds for material error correction disclosures. However, their results also provide evidence that qualitative considerations were also important for judging materiality because approximately one-third of the errors corrected through restatement are smaller than the traditional 5 percent of income threshold.

<Insert Figure 1 here>

In a more recent study, Acito et al. (2019) examine SEC comment letter conversations in order to determine what benchmarks managers used to support their materiality decisions. By examining 108 conversations between the SEC and firms on which the SEC questioned the firm's materiality judgements, the authors find that management used numerous benchmarks to support their materiality decisions, but that earnings was the most common. They also find that for errors judged by the firm to be immaterial, the "5 percent of earnings" threshold was commonly exceeded, and often by a substantial amount. Surprisingly, they report that in approximately 50 percent of the comment letter conversations, management indicated that at least one period's earnings were misstated by at least 23.7 percent by not correcting the error, implying that management considered errors of this magnitude to be immaterial. These findings are all the more interesting as they are drawn from SEC comment letter conversations from 2009 to 2015 after SAB 108 was released (SEC 2006), which was a period of heightened SEC focus on requiring firms to improve their materiality judgements.

Keune and Johnstone (2009) examine the error corrections disclosed after the SEC released SAB 108 (SEC 2006). Essentially, SAB 108 requires firms to re-evaluate the cumulative effects

of yearly immaterial errors and report them in the current period if their accumulation is material.⁷ Keune and Johnstone (2009) find that the median values of the newly defined “material error” correction disclosures were for amounts considerably below the 5 percent rule, as well as most other often used quantitative rules of thumb (Eilifsen and Messier 2015). Their results suggest that the reporting firms either adopted even more stringent reporting thresholds for determining material amounts after SAB 108, or that they included the examination of qualitative factors to determine the smaller amounts were material, given the other surrounding facts and circumstances. However, since Eilifsen and Messier (2015) report that the largest auditors use similar quantitative reporting thresholds to assess materiality in the period after SAB 108 as they appeared to have used prior to SAB 108, the results of Keune and Johnstone (2009) seem to have been reflective of the inclusion of qualitative factors in the firms’ determination of materiality.

While Acito et al. (2009) and Keune and Johnstone (2009) have examined materiality thresholds for different samples of error corrections, we examine the characteristics of disclosed material CAEs. Unlike error corrections that must be reported immediately upon discovery, CAEs are changes determined by management and, accordingly, have some reporting flexibility not afforded error corrections. In addition, we note that while error corrections, including restatements, are backward-looking as they are a result of past financial reporting, CAEs are forward-looking as they are a result of the ongoing current and future reporting of business activity in the financial statements. Therefore, the time periods assessed by error corrections and CAEs are fundamentally different. Accordingly, we might expect differences with respect to materiality thresholds for reporting CAEs compared to error corrections.

⁷ SAB 108 requires firms and auditors to more formally consider the accumulation of immaterial errors over multiple periods and the cumulative effects on current year-end Balance Sheet accounts– the “iron curtain” approach. Adopting the iron curtain approach would lead to more instances to be identified as material and in need of error correction.

Another possible difference between these two types of disclosures may be due to signaling behavior. For both CAEs and error corrections, the benefits of disclosure are similar in that the timely correction of prior period errors or inaccurate estimation can provide the protection from subsequent SEC scrutiny and present the appearance of transparency. However, there may be important asymmetries when it comes to the downside of disclosure. CAE disclosures and error restatements could be perceived by markets as a form of earnings manipulation and be interpreted as a negative signal. However, the associated strength of this negative signaling may be relatively low for CAEs, given that they carry an inherent expectation of imprecision that may require future revision. In contrast, error restatements may send relatively stronger negative signals, given that they are a backward-looking admittance of earlier misreporting and therefore may perhaps carry a possible connotation of ineptitude or malfeasance. Therefore, especially when judging the materiality of borderline cases, firms may be significantly more willing to disclose a CAE than an error restatement of similar magnitude, thus resulting in the two different-looking distributions.

Finally, the income effect of a disclosure may have different implications in materiality decisions. All of the lease error adjustments examined in Acito et al. (2009), and 63 percent (219 out of 350) of the SAB 108 error corrections examined in Keune and Johnstone (2009) were income-decreasing. However, CAEs can be either income-increasing or income-decreasing. Thus, materiality distributions may be reflective of the fact that firms are more likely to separately disclose income-increasing effects than income-decreasing effects for similar magnitudes of changes. This would lead firms to disclose relatively smaller amounts of income-increasing CAEs compared to income-decreasing error adjustments, leading to lower average overall quantitative assessments for CAEs compared to disclosures of accounting errors.

Further, if firms, on average, disclose CAEs only when they meet or exceed traditional materiality thresholds, this would be evidence that in practice firms are strictly applying

quantitative materiality thresholds when evaluating the reporting requirements related to CAE disclosure. However, if firms often disclose CAEs at amounts significantly below traditional quantitative materiality thresholds, this would provide evidence that firms are likely incorporating additional qualitative factors into their CAE disclosure decisions, or that they are attempting to provide additional financial reporting transparency beyond the minimum required by GAAP. Both of these reasons would result in firms disclosing more CAEs at lesser amounts, thereby enhancing financial statement transparency through the additional information provided by managers regarding their approaches and reasoning behind more of the estimates underlying their financial statements.

Therefore, we extend the literature on materiality thresholds that is currently based primarily on error correction disclosures. Specifically, prior studies assessing accounting materiality determinations in practice have examined different types of accounting error correction or restatement disclosures. Ours is the first study to examine materiality determinations in on-going accrual accounting estimates and forecasts, the changes of which result in CAE disclosures when deemed material. As such, we extend the literature and present a robust examination of materiality thresholds currently adopted in practice for CAE disclosures. Accordingly, our main research question (RQ1) is:

RQ1: What are the characteristics of the frequency distribution of CAEs?

CAE Firm Characteristics and Materiality Thresholds

Even though estimation is a fundamental and critical facet of accrual accounting, little is known about the common characteristics of firms that disclose CAEs (henceforth, “CAE firms”).

More importantly, what kind of materiality thresholds are used in practice for CAE disclosures by firms with differing characteristics remains unanswered.⁸

We believe that a firm's size and its industry membership are the two most important characteristics affecting CAE disclosures. The size of a firm is likely to be related to CAE disclosure decisions for three primary reasons. First, materiality is a firm-specific and relative concept, which makes the same amount of a CAE material for a small firm and immaterial for a large firm. For this reason, Georgiev (2017) suspects that the idea of relative materiality may allow large firms to circumvent the disclosure requirements for what might otherwise be material contracts, legal proceedings, and spending on business projects.⁹ Second, firm size is a common proxy for voluntary disclosure choice. Larger firms tend to provide detailed, voluntary information in order to reduce information asymmetry and to lower the costs of business operations and financing. Disclosure of a material CAE is mandatory under GAAP, but there may be incentives related to voluntary CAE disclosure, especially when no binding materiality thresholds exist (Heitzman et al. 2010). Third, larger firms are typically more complex and therefore more likely to depend on relatively sophisticated estimation methods, which may be subject to larger and more frequent revisions. At the same time, larger firms might have more resources and experience that enable them to develop more accurate estimation models, which may actually minimize the possibility of needing to report significant subsequent changes to their initial estimates.

⁸ Some possible exceptions include: Eckles and Halek (2010) find that managers of insurance firms manipulate estimates of their loss reserves in order to maximize their compensation when they have capped bonuses and exercisable stock options. Comprix and Muller (2011) find that managers opportunistically select biased pension accounting assumptions in order to obtain labor concessions.

⁹ For example, Items 601(b)(10) of Regulation S-K and Item 1.01 of Form 8-K Final Rule require a firm to disclose material definitive acquisition agreements with a brief description of the terms and conditions of the agreements. However, Microsoft did not follow these disclosure rules for the \$8.5 billion Skype acquisition in 2011. This deal size was equivalent to 30 percent of net income (\$28.1 billion) and 7.8 percent of assets (\$108.7 billion) in that year. This acquisition deal was not disclosed "presumably because it concluded that the agreement was not material" (Georgiev 2017).

Industry membership is another firm characteristic that might be associated with CAE disclosure choice for several reasons. First, each industry may share common characteristics in terms of operating cycle, operating complexity, and litigation risk. These industry-specific factors can influence firms' CAE disclosure choices. For example, the length of an operating cycle may be associated with the frequency of needing to adjust an estimate. Also, business operation complexity from being in certain industries may increase accounting estimation errors. Furthermore, if firms belong to one of historically litigious industries, they may be more likely to provide more up-to-date detailed information about their operations in order to avoid potential litigation. Herding behavior among firms in the same industry might also drive CAE disclosure choice. When there are no bright-line rules, firms tend to benchmark against peers in the same industry when making their accounting and financial reporting decisions. For example, Kedia, Koh, and Rajgopal (2015) document that a firm's earnings management technique using a specific account can be contagious to peers in the same industry. They further show that this within-industry contagion takes place only when there are no serious negative consequences from restatement, such as SEC investigations or securities class action lawsuits. In sum, we expect that CAE disclosure choice may be associated with the size and industry membership of a CAE firm. Therefore, we state our second research question (RQ2) as follows:

RQ2: What are the characteristics of CAE firms and the implicit materiality thresholds guiding their disclosure choices?

Auditors and Materiality Thresholds

Auditors jointly decide, or at least confirm, the need to disclose a CAE with their audit clients (henceforth, "CAE clients"). In fact, in SAB 99 the SEC often indicates that the registrant and their auditor need to consider all the relevant information when making materiality assessments. Therefore, as it is with different firms, different auditors may use similar quantitative

and qualitative metrics but arrive at slightly different thresholds for determining materiality. Eilifsen and Messier (2015) study the materiality guidance of the eight largest auditors in the U.S. and find that they all utilize income before taxes, total assets, and total revenue as prominent measures for deriving quantitative materiality thresholds.¹⁰ However, the guidance for materiality thresholds for each measure vary across auditors. Specifically, the audit firms in the study propose that amounts over the range of 3 percent to 10 percent for income before income taxes, 0.25 to 2 percent for total assets, and 0.5 to 5 percent for total revenue be considered material. However, there is little empirical evidence regarding the implementation of this guidance into the actual levels used in practice and the variation of materiality thresholds between auditors (Wright and Wright 1997; Keune and Johnstone 2009).

Based on prior literature that suggests Big 4 auditors have higher audit quality than non-Big 4 auditors (Francis 2004; Knechel, Krishnan, Pevzner, Shefchick and Velury 2013; DeFond and Zhang 2014), and that Big 4 auditors apply materiality thresholds differently in practice than non-Big 4 auditors (Keune and Johnstone 2009), we examine whether Big 4 membership is associated with differences in CAE disclosure. Big 4 auditors might have lower materiality thresholds in order to provide higher audit and financial reporting quality. At the same time, Big 4 auditors have larger clients who pay substantially larger amounts of audit fees, which may cause them to be more accommodating to their clients' preferences, possibly leading to higher materiality thresholds and fewer disclosed CAEs.

Using restatement data related to lease accounting errors, Acito et al. (2009) conclude that there are minor variations among the Big 4 auditors, but that non-Big 4 auditors are more likely to consider their client's accounting errors material and to require a restatement compared to the Big 4 auditors. In their study of SAB 108 error corrections, Keune and Johnston (2009) find that, in

¹⁰ One auditor utilized after-tax income instead of before-tax income.

general, non-Big 4 clients report more error corrections that are above the typical asset materiality thresholds than Big 4 clients. In addition, and in contrast to Acito et al. (2009), they find considerable variation among Big 4 auditors when assessing materiality thresholds based on income. Thus, these researchers find differences among the Big 4 auditors and between Big 4 and non-Big 4 auditors with respect to frequency and materiality thresholds for the reporting of error corrections. Beyond these two studies, however, very little is known about whether there exists a marked difference among the Big 4 auditors and between Big 4 and non-Big 4 auditors in determining materiality thresholds in practice generally, as well as for reporting other required financial reporting items, such as CAE disclosures. In sum, since there are no definitive authoritative standards or bright line rules, auditors are likely to establish their own individual materiality thresholds. Therefore, we state our third research question (RQ3) as follows:

RQ3: How do materiality thresholds for CAE disclosures vary across auditors?

CAE Account Characteristics and Materiality Thresholds

In SAB 99, the SEC posits that “the degree of precision that is attainable in estimating the judgment item” should also be considered in materiality decisions and that the amount of estimation error deemed immaterial “may increase as the attainable degree of precision decreases” (SEC 1999, footnote 14). For example, SAB 99 goes on to note that “accounts payable usually can be estimated more accurately than contingent liabilities arising from litigation, or threats thereof, and a deviation considered to be material in the first case may be quite trivial in the second” (SEC 1999, footnote 14). This guidance implies that different thresholds of materiality may apply to CAE disclosures for different financial statement accounts. Therefore, analyzing CAEs by what financial statement account is affected (i.e., their “category”) can provide additional insight into whether materiality thresholds vary across specific financial statement items.

In conjunction with examining CAEs by financial statement account, we also examine several characteristics of the disclosed CAEs. Specifically, we investigate industry concentration, disclosure venue, and income effect (i.e. income-increasing vs. income-decreasing) in terms of frequency and materiality thresholds. Industry characteristics may be associated with specific CAE categories. For example, one may expect CAEs related to financial derivatives to be more frequent in the finance and banking industries. Similarly, inventory-related CAEs may be expected more often in the wholesale and retail industries because these industries have greater fluctuation and uncertainty regarding valuing inventory. However, if the finance and banking industries, or the wholesale and retail industries, have developed advanced capabilities that enable them to make more accurate estimates of these critical business and financial statement components, they may report fewer CAEs associated with financial derivatives or inventory, respectively, than firms in other industries without this account-specific expertise.

The second CAE characteristic we examine is the disclosure venue. Since CAEs are disclosed in the reporting quarter they are determined, they could be initially disclosed in a quarterly 10-Q filing or an annual 10-K filing.¹¹ We note that CAEs initially reported in 10-Q filings would also subsequently be reported in the CAE firm's 10-K filing. However, firms might strategically initially use form 10-Q for disclosure instead of form 10-K to avoid heavier scrutiny by the firm's auditor who must audit the annual financial statements included in 10-K filings but only review the quarterly financial statements included in 10-Q filings. Another possibility is that firms might choose to disclose CAEs in a 10-K over a 10-Q filing because the estimation change might take place in the last quarter of the operating period. Therefore, if firms do not strategically time CAE disclosures, and CAE determinations are made evenly throughout the year, we would expect to find roughly 75 percent of CAEs are initially disclosed in 10-Q filings and 25 percent in

¹¹Our analysis includes only the initial disclosure of the CAE for analysis, either in the 10-Q or 10-K, not both.

10-K filings, but the actual proportions and the magnitude of those disclosures is an empirical question.

The third characteristic we explore is the effect of CAEs on income. SAB 99 postulates that even a quantitatively immaterial item can be deemed to be material if a firm considers meaningful qualitative factors, such as a CAEs capacity to turn a negative income positive, maintain an earnings trend, or beat analysts' forecasts. Accordingly, we examine whether materiality thresholds appear to be different between income-increasing and income-decreasing CAEs. We also examine whether specific accounts are used more frequently as a way to influence income trends or current-period income levels, and whether materiality thresholds for these CAEs are different from other CAEs.

Collectively, our fourth research question (RQ4) is intended to investigate the relationship between CAE financial statement accounts and the characteristics of industry membership, disclosure venue, and direction of the income effect on materiality thresholds, stated as follows:

RQ4: How do the characteristics of disclosed CAEs differ by financial statement account, disclosure venue and effect on income?

SAMPLE AND RESEARCH DESIGN

We use the *Audit Analytics* CAE database to acquire data for CAE disclosures from 2006 to 2016. Our initial sample includes 6,020 CAEs disclosed through 10-K or 10-Q filings of U.S. firms. We eliminate 1,096 CAEs having no pretax income or net income effect information. We use *Compustat* to obtain firm financial information and remove another 589 CAEs disclosed by firms with missing data. Our final sample comprises 4,335 CAEs disclosed by 2,050 unique firms. We obtain auditor information from *Audit Analytics* and perform firm-level, auditor-level, and individual CAE-level analyses in order to investigate our research questions.

Following Keune and Johnstone (2009) and Eilifsen and Messier (2015), we study three common quantitative thresholds that the eight largest U.S. audit firms consider when making materiality judgments: pretax income, total assets, and net sales. For each measure, consistent with audit firm documentation reported in Eilifsen and Messier (2015), we adopt the most common thresholds espoused by the eight audit firms: 5 percent for pretax income, 0.5 percent for total assets, and 0.5 percent for net sales.¹² For example, the quantitative income threshold indicates that if the amount of a CAE is greater than 5 percent of the current period's pretax income, then that item is generally regarded as material and should be separately disclosed in the financial statements. Similarly, CAE amounts falling below the quantitative threshold are generally regarded as immaterial and do not require separate financial statement disclosure.

Panel A of Table 1 provides descriptive statistics about the CAE sample. In columns (2) and (3) of Panel A, the average CAE amount in absolute-value terms is \$45.0 million and the median value is \$2.2 million. There exists significant skew in the distribution of CAEs as evidenced by the large standard deviation (column 4), and the considerably larger mean value compared to the median value, indicating that CAE distribution is not normally distributed. Therefore, we focus on the median value instead of the mean value in our analyses. In column (3) of Panel A, the median value of income-increasing (income-decreasing) CAEs is \$2.3 (-\$2.1) million.¹³ Additionally, column (1) of Panel A provides evidence that the frequency of income-increasing CAEs (2,471) is greater than that of income-decreasing CAEs (1,864). We note that our CAE results contrast those of Keune and Johnstone (2009) who find that 56.7 percent of error corrections following SAB 108 were income-decreasing. Additionally, Acito et al. (2009) find that all of the corrections of prior accounting for operating leases in their study were income-decreasing.

¹² We use the reported impact on pre-tax income as the CAE amount. If this information is not available in the *Audit Analytics* CAE database, we assume a 40 percent tax rate to convert net income into pre-tax income (Moehrle 2002). In our sample, only 475 out of 4,335 CAEs report only the net income effects.

<Insert Table 1 here>

Panel B in Table 1 reports firm-level, net CAE-effect statistics to examine whether firms, on average, use CAEs to increase income or to decrease income. Column (1) indicates that CAEs increased income at 1,155 firms and decreased income at 892 firms over our 11-year examination period. Columns (3) and (4) of Panel B reveal that firms with CAEs that decrease income have slightly larger net median effects (in terms of absolute value) with a much smaller standard deviation. Panel C reports the frequency of CAE disclosures per firm over our sample period. Approximately 60 percent of firms disclosed only one CAE, while only about 13.2 percent (4.5 + 2.7 + 6.0) make more than three CAE disclosures during the sample period.¹⁴

RESULTS

RQ1: What are the characteristics of the frequency distribution of CAEs?

Figure 2 presents the observed frequency distributions of CAE disclosures by the three quantitative materiality thresholds. Irrespective of the materiality threshold metric being used to evaluate the sizes of the CAEs, all three frequency distributions are similar in general shape and for not exhibiting bell-shaped curves centered on the materiality threshold, indicative of firms focusing exclusively on quantitative thresholds. In fact, in all three cases, the lowest-value intervals have the highest frequencies, except for the very largest-value intervals, which simply condense the long right tails of the skewed distributions for the sake of graph readability. These findings imply that 1) even a small-sized CAE is deemed material by many firms and auditors, and 2) the qualitative factors in determining materiality play a very predominant role in the disclosure of CAEs below traditional quantitative materiality thresholds.

<Insert Figure 2 here>

¹⁴ As noted in the Additional Analysis section, if we restrict our sample to only the first CAE reported by a firm, our results and inferences remain substantively unchanged compared to the full sample results.

Our results are considerably different than those of lease error restatements examined by Acito et al. (2009). One possibility for differences in distribution frequency is that the error restatement data examined in Acito et al. (2009) was from August 2004 to August 2006, a period prior to SAB 108, while our CAE data is from fiscal years 2006 to 2016, a period subsequent to SAB 108. SAB 108 became effective for fiscal years ending after November 15, 2006 and, as noted previously, required a more stringent approach to assessing materiality. Adopting a stricter approach to the determination of materiality would result in relatively smaller amounts to be considered material after SAB 108 compared to earlier. Consistent with this argument are the results of Keune and Johnstone's (2009) examination of error corrections in response to SAB 108. These researchers also find that the median magnitudes of the error corrections were also considerably lower than traditional quantitative materiality thresholds.

In addition, the income effect may differentially impact materiality decisions of CAEs compared to error corrections. The error corrections examined in Acito et al. (2009) and Keune and Johnstone (2009) are more likely to be income-decreasing, both in number and in average magnitude. However, CAEs can be either income-increasing or income-decreasing. Thus, the materiality distribution differences may be due to the fact that firms are more likely to separately disclose income-increasing effects of CAEs than income-decreasing effects of error corrections, leading to relatively lower average overall quantitative assessments for CAEs. Nonetheless, our findings suggest that CAEs, on average, are disclosed at fairly small magnitudes, and often well below traditional materiality thresholds.

Another possible explanation of the differences in our CAE distribution results and those of error corrections reported in prior studies is that error corrections are backward-looking as they are a result of past financial reporting, while CAEs are forward-looking as they are a result of the ongoing current and future reporting of business activity in the financial statements. Therefore, the

time periods assessed by error corrections and CAEs are fundamentally different. Our findings imply that when firms make materiality judgments for CAE disclosure, they may not only apply quantitative materiality thresholds more conservatively, but, consistent with SAB 99 (SEC 1999), they may also weigh other qualitative factors differently for CAEs compared to error corrections.

RQ2: What are the characteristics of CAE firms and the implicit materiality thresholds guiding their disclosure choices?

Table 2 presents the descriptive statistics of firms that disclosed CAEs and their industry membership. Panel A of Table 2 compares the sizes of the three accounting measures used as quantitative materiality thresholds between our sample of CAE firms and all firms covered by *Compustat* in the year 2010. Approximately 24 percent (i.e., 2,050 divided by 8,637) of firms in *Compustat* disclosed a CAE at least once during the sample period. CAE firms, on average, are more profitable than the population in *Compustat* in terms of median pretax income (\$12.1 million vs. \$4.3 million), but the difference is not statistically significant (p-value = 0.550). However, CAE firms are about two times larger than the *Compustat* population in terms of median total assets (\$682.8 million vs. \$316.4 million; p-value < 0.001), and median net sales (\$483.8 million vs. \$197.2 million; p-value < 0.001).

<Insert Table 2 here>

Panel B of Table 2 reports the concentration of CAE Firms in two-digit SIC industry classifications. In column (1) and (2) of Panel B, Manufacturing 2 (two-digit SIC, 30–39) and Hotels and Service (70–79) industries are over-represented in our sample compared to the *Compustat* 2010 population by 4.7 percentage points (= 23.4 - 18.7) and 3.3 percentage points (= 14.6 - 11.3), respectively. However, the Agriculture and Construction (two-digit SIC, 00–19) and Finance (60–69) industries are significantly under represented compared to the general *Compustat* population by -9.7 percentage points (= 5.7 - 15.4) and -6.6 percentage points (= 13.4 - 20.0),

respectively. One possible explanation of the under-representation of the agricultural industry might be that this industry is stable by nature, and significant complex accounting estimation is not frequently required. In contrast, under-representation of the financial industry might be explained by the fact that this type of industry specializes in controlling and abating estimation errors. Pearson Chi-square test results (p -value < 0.001) reported in the last row of Panel B indicate that the CAE sample industry distribution is statistically significantly different from the firms in *Compustat* 2010, suggesting our CAE sample is not reflective of a randomly drawn sample of the firms in *Compustat* 2010.

Panel C of Table 2 presents the percentage of CAEs below each materiality threshold by firm size. We partition CAE firms into five different size groups in terms of net sales and analyze the proportion of CAEs below the common materiality thresholds.¹⁵ As noted previously, we use 5 percent of pretax income, 0.5 percent of total assets, and 0.5 percent of net sales as our common quantitative thresholds in order to assess CAE disclosure decisions.

The results provide several interesting findings. First, the predominant portion of disclosed CAEs are smaller than traditional quantitative thresholds.¹⁶ This can also be seen in Figure 2; the graph on the left (right) side represents the relative frequency distribution (cumulative relative frequency distribution) for CAEs scaled by pretax income, assets, and net sales. The first half of all CAEs are well below the traditional thresholds. Statistical sign tests easily reject the null hypotheses that the medians of the different CAE distributions are equal to the traditional thresholds, with p -values of less than 1 percent in all three cases.¹⁷ Second, all three materiality

¹⁵ Alternatively using pretax income or total assets to categorize CAE firms into multiple different size groups produces similar results.

¹⁶ Specifically, 58.7 percent, 68.1 percent, and 61.2 percent of CAEs are below 5 percent of pretax income, 0.5 percent of assets, and 0.5 percent of net sales, respectively. In contrast, Acito et al. (2009) find that about 30 percent of their restatement sample lies below a 5 percent of earnings threshold. However, Keune and Johnston (2009) find that 58.9 percent, 94.0 percent, and 87.9 percent of error corrections following SAB 108 were below their thresholds of 5 percent of pretax income, 1 percent of assets, and 1 percent of net sales, respectively.

¹⁷ The median values of CAEs normalized by pretax income, assets, and net sales are 3.4 percent, 0.24 percent, and 0.31 percent, respectively. The statistical results are not tabulated, but available upon request.

thresholds generate similar results, meaning that, at least for the judgement of CAE materiality, these three thresholds can generally be used interchangeably. Third, consistent with Eilifsen and Messier (2015) the percentage of CAEs exceeding the quantitative threshold tends to decrease as the size of firm increases. For example, the percentage of CAEs exceeding the 0.5 percent of net sales threshold decreases from a high of 81.3 percent to a low of 24.0 percent,¹⁸ implying that the larger a firm is the more likely it is to consider *qualitative* factors and other voluntary disclosure motivations.¹⁹

Panel D of Table 2 analyzes the frequency of CAEs by CAE Firm industry membership. In column (1), Manufacturing industries (Manufacturing 1 and 2 combined) account for 41.9 percent (= 14.7 + 27.2) of disclosed CAEs, while Hotels and Services industries (14.5 percent) and Transportation and Utilities industries (11.9 percent) also disclose frequently. In column (2), we find that Agriculture and Construction industries have comparatively high percentages of CAEs exceeding the quantitative materiality thresholds (48.4, 40.6, and 39.0 percent), while Wholesale and Retail industries have low percentages (29.6, 18.9, and 12.2 percent).

To test whether litigation risk might affect a firm's CAE disclosure choice, we partition the CAE sample into two groups with high and low litigation risk. Following Francis, Philbrick, and Schipper (1994), industries having SIC codes of 2833–2836 and 8731–8734 (Biotechnology), 3570–3577 and 7370–7374 (Computers), 3600–3674 (Electronics), and 5200–5961 (Retailing) are coded as high litigation risk, and all other industries are considered low litigation risk. Untabulated results provide evidence that litigation risk has no conclusive association with CAE disclosure. Specifically, the percentage of CAEs below 5 percent of pretax income, 0.5 percent of net sales,

¹⁸ At first glance, it may seem that this is almost true by definition, i.e. the ratio of CAE to assets decreases as assets increase. However, it should be noted that larger firms also have the propensity to disclose larger CAEs; in fact, the Spearman correlation coefficient between $\log(\text{assets})$ and $\log(|\text{CAE}|)$ is 0.651 (p-value < 0.001).

¹⁹ Point-biserial correlation coefficients are calculated to test the relation between firm size and the percentage of CAEs exceeding thresholds. For the pretax income, total assets, and sales thresholds, respectively, we find coefficients of -0.092, -0.096, and -0.109, all with corresponding p-values = <0.001.

and 0.5 percent of assets is higher by 3.2 percentage points, lower by 3.7 percentage points, and lower by 2.8 percentage points, respectively, for the high litigation risk group compared to the low litigation risk group.

Our RQ2 analysis results can be summarized as follows: (1) On average, CAE firms are larger than representative *Compustat* firms. (2) CAE firms are more highly concentrated in Manufacturing (20–29 and 30–39) and Hotels and Service (70–79) industries, and less concentrated in Agriculture and Construction (00–19) and Finance (60–69) industries. (3) Approximately two-thirds of CAEs have effects that are smaller than traditional materiality thresholds. (4) The importance of quantitative materiality thresholds tends to decrease as the size of a firm increases. (5) Litigation risk has no significant association with CAE disclosure.

RQ3: How do materiality thresholds for CAE disclosures vary across auditors?

Table 3 presents the CAE auditor analysis.²⁰ Panel A shows the proportion of CAE-disclosing firms audited by each of the Big 4 auditing firms, as well as non-Big 4 auditing firms as a group. It also presents the auditors' market share of all firms in *Compustat* for 2010. In column (5), 22.4 percent of CAE firms are audited by non-Big 4 auditors while the overall market share of non-Big 4 auditors in *Compustat* 2010 is 38.4 percent, revealing that non-Big 4 auditors, on average, are less likely to be associated with CAE-disclosing firms. In contrast, all Big 4 auditors have higher percentages of clients disclosing CAEs compared to their overall market share of firms in *Compustat*. Among the Big 4 firms, firm Big 4a in column (1) has the highest percentage of clients disclosing CAEs (26.0 percent) during our examination period, as well as the largest difference of CAE clients compared to their overall market share, i.e. a difference of 9.2 percentage points (= 26.0 - 16.8).

²⁰ The total listed under “CAE” in column (6) of 2,154 is greater than the number of CAE firms in the sample, because 104 CAE firms changed auditors over the sample period, and we include both auditors for the sake of this analysis (i.e. the counts are of unique firm-auditor pairs). Our results are substantively unchanged if we remove these 104 observations.

<Insert Table 3 here>

Panel B in Table 3 presents the industry distribution of CAE clients by auditor. As would be expected, the aggregate results in the last column of Panel B are very similar to the CAE company results by industry reported in Panel B of Table 2. However, the Pearson Chi-square test results reported in the last row of Table 3 indicate that not only is the aggregate CAE client sample not a random representation of the *Compustat* 2010 population, neither are the industry distributions of CAE clients reflective of the client portfolios of any of the Big 4 auditors or collectively for the non-Big 4 auditors. An examination of the CAE clients versus overall client portfolios for each of the auditors reveals a fairly consistent pattern across the individual auditors and in the aggregate that suggests firms in the Manufacturing (20–39) and Hotel (70–79) industries are over-represented and that the Agriculture (00–19) and Finance (60–69) industries are under-represented compared to *Compustat* and to each auditor’s overall client portfolio.

Table 4 analyzes CAE disclosure frequency, income-increasing CAE proportions, and materiality thresholds by auditor. Panel A compares the frequency of CAE disclosure of each of the Big 4 auditors and collectively for the non-Big 4 auditors. First, we find that the Big 4a firm had the highest frequency of CAE clients (560) compared to the other Big 4 auditors and non-Big 4 auditors (ranging from 336 to 482). To explore this further, we partition CAE clients into two groups – “infrequent CAE clients,” who disclosed fewer CAEs than the average, and “frequent CAE clients,” who disclosed more CAEs than the average.²¹ In column (5) of Panel A, the concentration of infrequent CAE clients is higher in the non-Big 4 auditors (86.7 percent) compared to all of the four Big 4 auditors (ranging from 78.0 to 79.1 percent). These results suggest

²¹ The mean number of CAE disclosures per firm-auditor pair for our examination period is 2.01. Accordingly, “frequent CAE clients” were those with three or more CAEs.

that, on average, clients of Big 4 auditors are more likely to frequently disclose CAEs than clients of non-Big 4 auditors.²²

<Insert Table 4 here>

Panel B reports the proportion of income-increasing CAEs by auditor. More precisely, we sum all CAEs released by a firm-auditor pair and calculate the percent of net positive cases out of the total number of firm-auditor pairs in that category. In the last column, overall, 56.2 percent of CAE clients are associated with income-increasing CAEs. Specifically, 56.9 percent of CAE clients with infrequent CAE disclosures have income-increasing CAEs, while 53.3 percent of the CAE clients with frequent CAE disclosures have income-increasing CAEs. While we find income-increasing CAEs occur at rates slightly greater than 50 percent, our overall results suggest that both frequent and infrequent CAE clients do not appear to be substantively reporting only income-increasing CAEs. This finding also holds for the individual auditors.

The results presented in Panel C of Table 4 reflect the materiality thresholds adopted for CAE disclosure by auditor, and provides several interesting insights about CAE materiality thresholds. First, from columns (1), (2), and (3), a large percentage of CAE disclosures are below the conventional quantitative materiality thresholds: 58.7 percent for pretax income, 68.1 percent for assets, and 61.2 percent for net sales. For example, in column (1), about 58.7 percent of CAE disclosures are below 5 percent of the pretax income threshold (“<5%”) while 16.4 percent of CAEs are above four times the pretax income threshold (“>20%”). This finding implies that qualitative considerations play an important role in determining CAE disclosure materiality for CAEs with small magnitudes. Second, clients of non-Big 4 auditors are more likely to have a lower concentration of CAEs below the conventional materiality thresholds than clients of Big 4 auditors.

²² A test of independence between non-Big 4 firms and the sum of all Big 4 firm observations yields a Pearson Chi-square statistic of 16.1 with a corresponding p-value of less than 0.001.

In column (1), 43.6 percent of CAEs audited by non-Big 4 auditors are below 5 percent of pretax income, while 58.9 percent to 63.6 percent of CAEs audited by Big 4 auditors are below that threshold. We find a similar pattern for non-Big 4 and Big 4 auditors using the assets and net sales materiality thresholds in columns (2) and (3), respectively.

Panel D of Table 4 analyzes the existence of discontinuity around the conventional materiality thresholds and tests whether the auditors' materiality judgments are sensitive to the materiality thresholds. If firms and their auditors are sensitive to conventional materiality thresholds, we would expect to observe discontinuity in the number of CAEs right around the threshold with significantly fewer occurrences just before the threshold and then significantly more occurrences after the threshold is met. The last row in Panel D shows that the number of CAEs steadily decreases as the materiality threshold interval increases from 4 percent to 6 percent, indicating that traditional thresholds have no additional effect on materiality judgments.

Results of our RQ3 analysis can be summarized as follows: (1) Big 4 auditors are more likely to be associated with CAE clients, compared to non-Big 4 auditors. (2) The Big 4a firm has the highest CAE client frequency compared to the other Big 4 auditors and non-Big 4 auditors. (3) Non-Big 4 auditors have higher *infrequent* CAE client concentration than Big 4 auditors. (4) The frequency of a client's CAE disclosures is generally not substantively associated with income-increasing CAEs for all auditors. (5) A substantial quantity of CAE disclosures are well below all quantitative materiality thresholds, indicating that *qualitative* considerations play an important role in judging the materiality of CAEs. (6) Non-Big 4 auditors are less likely to have clients reporting CAEs that are below traditional quantitative materiality thresholds. (7) Auditors and their clients are not sensitive to the precise cutoffs of the conventional quantitative materiality thresholds.

RQ4: How do the characteristics of disclosed CAEs differ by financial statement account, disclosure venue and effect on income?

Table 5 analyzes the industry concentrations of the 14 CAE financial statement account categories included in the *Audit Analytics* CAE database. In the last column of Table 5, we find that CAE disclosures related to revenue (22.3 percent), liabilities (21.2 percent) and depreciation (14.7 percent) are the most common financial statement accounts effected by CAEs; while asset retirement (1.1 percent), PPE (properties, plant, and equipment) & intangibles (0.7 percent), and derivatives (0.4 percent) are the least common financial statement accounts affected by CAEs.

<Insert Table 5 here>

However, we find that each industry has a different concentration of CAE account categories. In column (1), the highest concentration of CAEs for the Agriculture and Construction (00–19) industries is related to asset retirements, representing 20.4 percent of all asset retirement CAEs. In columns (2) and (3), the Manufacturing industries (20–29 and 30–39 combined) represent 41.9 percent (= 14.8 + 27.1) of total CAEs, and have the highest concentrations of inventory (71.4 percent = 27.7 + 43.7), revenue (50.5 percent = 14.0 + 36.5), and pension (50.6 percent = 22.9 + 27.7) related CAEs. Interestingly, the Manufacturing industries have more than 25 percent concentrations in all CAE categories except for PPE & intangibles (23.6 percent), cash & receivables (16.9 percent) and derivatives (16.7 percent). In column (4), Transportation and Utilities (40–49) have the highest concentration of asset retirement (40.7 percent) and depreciation (27.9 percent) related CAEs. In column (6), the Finance industry (60–69) has the highest concentration of cash & receivables (50.3 percent) and derivatives (50.0 percent) related CAEs. Wholesale and Retail (50–59), Hotel and Services (70–79), and Health, Legal and Education (80–99) have no outstanding (i.e., over 20 percent) concentrations in any of the CAE account categories.

Table 6 presents a breakdown of the overall results presented in Panel A of Table 1 by the accounts effected by CAEs, and presents the results of several CAE account analyses. Panel A shows the CAE size and disclosure venue analysis by income-effect direction (income-increasing

vs. income-decreasing) and CAE account. The absolute-value CAE results in column (1) present the account breakdown of the median value of \$2.2 million for all CAEs and indicate that the significant standard deviation is mainly driven by tax-related CAEs. The proportion of CAEs initially disclosed through 10-K filings (“10-K prop.”), on average, is 32.5 percent, which is higher than the 25 percent we would expect if CAEs were randomly distributed over the fiscal year.²³ Column (1) also indicates that inventory (55.5 percent) and pension related (49.4 percent) CAEs have the highest proportion of 10-K disclosure, and revenue (21.7 percent) has the lowest proportion of 10-K disclosure, followed by derivatives (22.2 percent) and compensation (25.4 percent).

<Insert Table 6 here>

The comparison between income-increasing CAEs (column 2) and income-decreasing CAEs (column 3) shows that income-increasing CAEs are more frequent and have a larger mean (in terms of absolute value) and standard deviation, while their 10-K disclosure venue proportion is lower than that of income-decreasing CAEs by 6.6 percentage points (= 36.2 - 29.6). Individual CAE account comparisons reveal that income-increasing CAEs related to pension, asset retirement, and expenses are 24.3 (= 66.7 - 42.4), 18.6 (= 51.9 - 33.3), and 16.9 (= 45.5 - 28.6) percentage points relatively less likely to be initially disclosed through a 10-K filing, respectively. By comparison, income-decreasing CAEs related to acquisitions, “other estimates,” and taxation are 18.0 (= 45.6 - 27.6), 6.7 (= 39.8 - 33.1), and 2.5 (= 36.2 - 33.7) percentage points less likely to be disclosed through a 10-K filing, respectively.

Panel B of Table 6 compares the pretax income reporting thresholds (i.e., CAE amount divided by pretax income) for the CAE account categories separately for income-increasing and

²³ If CAEs are uniformly randomly distributed over the fiscal year, we would expect 75 percent to be first reported in a 10-Q over the first three quarters of the year and 25 percent to be reported in a 10-K filing for the fourth quarter.

income-decreasing CAEs. Overall, the median value of income-increasing (income-decreasing) CAEs is approximately 3.1 (4.0) percent of pretax income, which is smaller than the commonly used materiality threshold of 5 percent of pretax income. These overall results suggest that firms employ a lower materiality threshold for disclosing CAEs than the traditional materiality threshold based on pretax income. They also suggest that firms are generally more willing to disclose income-increasing CAEs at lower magnitudes than income-decreasing CAEs.

Further, Pearson Chi-square test results reported in the last row of Panel B indicate that the distribution of CAEs across account categories is significantly different between income-increasing and income-decreasing CAEs (p -value < 0.001). In column (1), among income-increasing CAEs, the liabilities, depreciation, compensation, acquisitions, pension, and expense CAEs have smaller median values than the 3.1 percent median value of total income-increasing CAEs. In column (2), among income-decreasing CAEs, the liabilities, depreciation, compensation, acquisitions, and expense CAEs have smaller median values than the 4.0 percent median value of total income-decreasing CAEs. Untabulated analyses using total assets and net sales as thresholds produce similar results.

To provide further examination of the pretax income reporting threshold, Panel C of Table 6 reports the relative frequency of CAEs that fall into four intervals surrounding the common 5 percent threshold by income-effect and CAE category. We divide materiality thresholds into four intervals – one interval below the traditional materiality threshold (i.e. below 5 percent of pretax income) and three intervals above the threshold (i.e. 5 percent – 10 percent, 10 percent – 20 percent, and above 20 percent of pretax income).²⁴ Regardless of the income-effect direction, the overall relative frequency of CAEs below the 5 percent thresholds is quite substantial, and 60.7 percent of

²⁴ For simplicity, only the percentage of pretax income results are tabulated. Alternatively, using assets or net sales produces similar results.

income-increasing CAEs and 55.3 percent of income-decreasing CAEs are located in the lowest interval. In column (1), among the income-increasing CAEs, compensation (74.3 percent), expenses (71.4 percent), and pension (71.2 percent) related CAEs have a very high percentage of CAEs smaller than the traditional thresholds, indicating the general use of conservative materiality thresholds for these accounts. In column (2), among the income-decreasing CAEs, compensation (80.7 percent), liabilities (62.0 percent), and acquisitions (60.2 percent) related accounts also tend to have a high share of CAEs disclosed at lower than the traditional materiality thresholds. In t-test comparisons of the incidence of CAEs below the 5 percent of pretax income threshold between the two income-effect groups, a significant difference ($p < 0.01$) exists in the application of materiality between CAEs related to liabilities (8.9 percentage points = 70.9 - 62.0), cash and receivables (31.0 percentage points = 59.6 - 28.6), and pension (37.9 percentage points = 71.2 - 33.3).

Our RQ4 analysis results can be summarized as follows: (1) revenue, liabilities, and depreciation are the most common accounts effected by CAEs, followed by the tax, compensation, and other estimates categories. (2) The manufacturing industries represent 41.9 percent of the CAE sample and are highly concentrated in the inventory, revenue, and pension CAEs. (3) Income-increasing CAEs are more frequent than income-decreasing CAEs. (4) Overall, 32.5 percent of CAEs are initially disclosed through 10-K filings, and 29.6 percent (36.2 percent) of income-increasing (income-decreasing) CAEs are disclosed through 10-K filings. (5) The median size of income-increasing (income-decreasing) CAEs relative to pretax income is approximately 3.1 percent (4.0 percent), which is less than the traditional 5 percent materiality threshold. (6) For income-increasing (income-decreasing) CAE disclosures, CAEs effecting compensation, expenses, and pension (compensation, liabilities, and acquisitions) accounts tend to be disclosed most conservatively. (7) A substantial difference exists for liabilities, receivables, and pension account

categories between income-increasing CAEs and income-decreasing CAEs in conservatively applying materiality thresholds.

Additional Analyses

CAEs Below Multiple Materiality Thresholds

In our analysis, we have assumed that if a CAE was below a traditional quantitative materiality threshold, other qualitative factors were assessed in arriving at the materiality decision. However, it could be that the CAE was disclosed because it exceeded a different quantitative threshold than the one evaluated. Therefore, to determine if our results and conclusions are influenced by CAEs that fall below one materiality threshold and exceed other thresholds, we examine our sample of CAEs concurrently across all three quantitative thresholds. Results are presented in Table 7 and reveal that 2,026 CAEs (46.7 percent of our sample) do not exceed any of the three quantitative thresholds, and 984 CAEs (22.7 percent of our sample) exceed all three quantitative thresholds. Additionally, we find that of the CAEs falling below the pretax income threshold, 79.6 percent fall below all three thresholds. Likewise, 68.6 (77.1) percent of CAEs falling below the assets (net sales) threshold fall below all three thresholds. Therefore, our findings do not appear to be overly influenced by CAEs that fall below only one materiality threshold.

<Insert Table 7 here>

Alternative CAE Sample

In order to ensure that our results are not driven by a small number of firms that disclose multiple CAEs, we recalculate all of our main analyses using an alternative data set that includes only the first CAE disclosed by each firm in our sample period (2006-2016). Untabulated results indicate that our primary findings are not significantly influenced by this alternative specification, and all of our inferences remain unchanged.

Analysis of CAEs below Traditional Materiality Thresholds – Qualitative Factors

Unlike prior research in this area (Acito et al. 2009, 2019), our sample does not include “non-material” CAEs. That is, we do not have data on changes in accounting estimates that were implemented but not formally disclosed. Accordingly, we are unable to directly examine factors that cause a firm to consider a change in estimate to be material, and therefore disclosed as a CAE. However, using our sample of disclosed CAEs we can explore how some qualitative factors may interact to influence disclosure *below traditional materiality thresholds*. Accordingly, we estimate the following multivariate logistic regression model:

$$\begin{aligned} \text{logit}(\text{Pr}[BMT=1]) = & \beta_0 + \beta_1 \text{Prior_Restatement} + \beta_2 \text{Critical} + \beta_3 \text{Size} + \beta_4 \text{Income_Effect} + \\ & \beta_5 \text{10-K} + \beta_6 \text{Big4} + \beta_7 \text{Repeat} + \beta_8 \text{Litigation_Risk} + \beta_9 \text{Leverage} + \\ & \beta_{10} \text{MTB} + \beta_{11} \text{Z-score} + \varepsilon \end{aligned} \quad (1)$$

where *BMT* has a value of 1 if a CAE is *below* the materiality thresholds of 5 percent of pretax income, 0.5 percent of assets, or 0.5 percent of net sales, and 0 if above.²⁵

Our first variable of interest, *Prior_Restatement*, takes a value of 1 if a CAE firm had a restatement during the previous four quarters, and 0 otherwise.²⁶ Our conjecture is that firms that have recent restatements may be more willing to disclose minor estimate changes in the interest of transparency during a time they feel subject to increased scrutiny as a result of the restatement. Our second variable of interest, *Critical*, takes a value of 1 if the CAE caused net income to move either above or below zero, and 0 otherwise. SAB 99 suggests that a possible qualitative factor to consider is whether inclusion of the amount in question changes income from a loss to a profit, or vice versa. Our interest here is in ascertaining if small-magnitude CAEs were disclosed because they were critical in determining whether a firm’s quarterly income switched from a loss to a profit,

²⁵ We winsorize the continuous variables at the 1st and 99th percentiles. We also include indicator variables for CAE account category, one-digit SIC industry, and filing year.

²⁶ We obtain restatement data from *Audit Analytics’* Restatements database.

or vice versa.²⁷

As additional covariates, we include the natural log of sales (*Size*) and indicator variables for whether a CAE is income-increasing (*Income_Effect*), whether a CAE is initially disclosed in a 10-K as opposed to a 10-Q (*10-K*), whether the auditor is a member of the Big 4 (*Big4*), and whether the firm is in a high-litigation-risk industry (*Litigation_Risk*). We also include leverage (*Leverage*), market to book ratio (*MTB*), and Altman's z-score (*Z-score*) to control for additional considerations companies may factor into their materiality decisions (Acito et al. 2009).

Regression results are presented in Table 8 and indicate that *Prior_Restatement* is positive and significant for the total assets and net sales regressions. These results suggest that firms are more likely to disclose quantitatively smaller CAEs right after a restatement. More precisely, we estimate that a CAE disclosed after a recent restatement is more likely to be below the total assets (net sales) threshold with average marginal effects²⁸ of 4.3 (3.9) percentage points. Further, we find that *Critical* is negative and significant in all three regressions. At first glance, this seems to suggest that the importance of the qualitative factor relating to the sign of a firm's net income plays less of a role below conventional materiality thresholds, which is contradictory to our expectation. However, a closer look at the data reveals a more complete explanation: "critical" CAEs in our sample have mean (median) absolute values that are 16.3 (4.0) times greater than "non-critical" CAEs. In other words, compared to below threshold CAEs, above threshold CAEs are simply larger and are more likely to be "critical" as they are also more likely to cause a firm to switch between positive and negative net income. Therefore, the sign and significance of this coefficient

²⁷ We obtain similar results if we separately examine CAEs pushing net income above zero and below zero.

²⁸ As logistic regression models are nonlinear, the actual marginal effects will vary across different values of the independent variables. In order to present a simple summary of the practical significance of our estimated coefficients, we report the "average marginal effects" (or "average predicted probabilities"), which are constructed from the averages of numerically estimated two-sided derivatives calculated at the actual values of every observation in the regression sample.

is not surprising given that our model assesses the likelihood of CAEs being disclosed below the respective quantitative thresholds.²⁹

<Insert Table 8 here>

With respect to the other variables in our model, both *Size* and *Income_Effect* have a positive and significant association with the likelihood of a disclosed CAE *below* all three quantitative thresholds. Our *Size* results are consistent with those of Eilifsen and Messier (2015) who find auditors use decreasing percentages of thresholds as company size increases. Income-increasing CAEs are more likely to be associated with below-threshold disclosures than income-decreasing CAEs. We find this result interesting, as it suggests an asymmetrical application of materiality. We find *10-K* to be negative and significant in all three models, suggesting that CAEs reported in 10-K filings are significantly larger than CAEs reported in 10-Q filings. This is likely because the preparation of a 10-K filing, in contrast to a 10-Q filing, involves a more thorough evaluation of the full fiscal year's accounting which may be more likely to incorporate substantial changes to estimates for the current and future periods. Our results are also consistent with Acito et al. (2019) who find the SEC is more interested in materiality disclosures contained in 10-K filings compared to 10-Q filings. We find significant positive effects due to auditor type (*Big4*) in our pretax income and total assets regression results, indicating Big 4 auditors are more likely to be associated with CAEs that lie below those thresholds. We also find evidence that CAEs disclosed by companies with high growth opportunities (*MTB*) are more likely to lie above the traditional thresholds for pretax income and total assets, and CAEs disclosed by financially distressed companies (*Z-score*) tend to be below the traditional threshold for net sales, although these effects are fairly small. Lastly, a firm's debt load (*Leverage*) is significantly negatively

²⁹ This analysis also reveals that it is difficult to interpret the results of examining qualitative factors if they are closely correlated with the sizes of the CAEs themselves. However, this insight also serves to strengthen our inferences about the importance of other qualitative factors, such as prior restatements, since they are unlikely to be correlated with the size of subsequent CAEs.

associated with the thresholds of pretax income and total assets, suggesting that as debt load increases the likelihood of a firm disclosing a CAE below these thresholds decreases.

In sum, our analysis of qualitative factors finds that, in general, recent restatements, large firm sizes, positive income effects, disclosures in 10-Q filings, and Big 4 auditors are significantly associated with the likelihood of disclosed CAEs falling *below* the traditional materiality thresholds. These findings provide further support that CAE materiality decisions are influenced not only by quantitative factors but by several qualitative factors as well.

CAEs and Subsequent Restatements

As an additional examination of qualitative factors influencing CAE materiality decisions, and in order to determine if CAE disclosure may be driven by auditor concerns that the firm may have a future restatement, and therefore require disclosure of a CAE, we examine the association of CAEs and *subsequent* restatements. To explore this possible relation, we conduct two panel regressions. In the first untabulated regression, we develop a model similar to Beaulieu, Hayes and Timoshenko (2017) to test for a relationship between CAEs and restatements of the same CAE fiscal quarter. Consistent with their results, we find strong evidence that quarters reporting a CAE are positively associated with subsequent restatements.³⁰ In the second regression, we use a model of lagged CAE disclosures to test for a general association between CAE disclosures and subsequent restatements (regardless of the period being restated) for up to two years. In this context, we also find evidence of a significant positive relation (untabulated), but only for the first quarter subsequent to the CAE. Thus, in both analyses we find evidence that CAEs may signal the need for subsequent restatements and therefore justify the additional financial reporting transparency by requiring CAE disclosure.

SUMMARY and CONCLUSION

³⁰ Detailed results available from authors upon request.

In this paper we provide descriptive evidence of materiality thresholds adopted for CAE disclosures (ASC 250-50-4). Specifically, we analyze the characteristics of CAE disclosures in terms of disclosing firms, their auditors, and CAE account categories in consideration of materiality thresholds, industry membership, disclosure venue, and income-effect direction. The primary contribution of our study is to provide the first descriptive evidence on material CAEs disclosed in the financial statements. Our examination extends the sparse literature on the application of materiality judgements in practice (Acito et al. 2009; Keune and Johnstone 2009; Eilifsen and Messier 2015), and to our knowledge, presents the first examination of CAE disclosures under U.S. GAAP.

Our key finding is that both quantitative and qualitative considerations appear to be driving CAE disclosures and that the distribution of CAE materiality thresholds below conventional thresholds is quite different from that found in earlier investigations of restatements. Second, we compare CAE-disclosing firms with all firms in the *Compustat* population and find that CAE firms are larger and more concentrated in the manufacturing industry. We also find that more than 60 percent of disclosed CAEs are lower than the traditional materiality thresholds of 5 percent of pretax income, 0.5 percent of assets, and 0.5 percent of net sales. Additionally, we find that firm size is negatively correlated with the percentage of CAE disclosures exceeding the traditional materiality thresholds. This finding indicates that larger firms make up a substantial amount of CAE disclosures that are below traditional thresholds, implying that larger firms are more conservative in disclosing CAEs.

Third, our investigation into auditors and their CAE clients reveals that there exists some difference between auditors in applying quantitative materiality criteria. Specifically, compared to non-Big 4 auditors, Big 4 auditors are more likely to be associated with CAE clients, and to have a higher proportion of *frequent* CAE disclosing clients. We also find that, compared to non-Big 4

auditors, Big 4 auditors are more likely to have clients reporting CAEs that are below traditional quantitative materiality thresholds, suggesting that the weight given to quantitative materiality criteria is not the same between Big 4 and non-Big 4 auditors.

Fourth, we provide descriptive evidence on the characteristics and materiality thresholds of the accounts affected by CAEs. We find that manufacturing industries disclose CAEs most often and CAEs are highly concentrated in the inventory, revenue, and acquisition-related accounts. In addition, we find that, on average, the percentage of CAEs *lower* than the pretax income threshold is greater for income-increasing CAEs than for income-decreasing CAEs. Specifically, more than 70 percent of income-increasing CAEs related to liabilities, compensation, and expense categories are disclosed at lower than 5 percent of pretax income. This finding implies that auditors and firms are selectively more conservative in disclosing CAEs for certain accounts, especially if they are income-increasing CAEs.

Our additional analyses examining below-threshold qualitative factors finds that recent prior restatements, firm size, positive income effects, Big 4 auditors, and financial stress are significantly positively associated with the probability of disclosing a CAE *below* a traditional materiality threshold. In contrast, firms with greater growth opportunities, disclosure via a 10-K, and firms with high leverage are significantly less likely to disclose a CAE below traditional materiality thresholds. We also find that in general CAE firms are more likely to restate their financial statements in subsequent periods.

We provide the first empirical evidence on the materiality thresholds adopted by firms for CAE disclosure. As such, our results should be of interest to firms' Boards of Directors and their Audit Committees, auditors, investors and regulators. Our finding that CAEs are often reported at amounts below the traditional thresholds for quantitative materiality should be of interest to the SEC and other regulators as our results suggest that firms are attempting to adhere to SAB 99 and

SAB 108 guidance that requires both quantitative and qualitative considerations when determining materiality. Our results indicate that, in general, firms and their auditors consistently evaluate qualitative factors, and not just quantitative factors, in determining the materiality of amounts associated with CAEs. Further, as GAAP reflects minimum standards, our results suggest that in practice, firms are going beyond the minimum standards and providing information regarding CAEs often at amounts that are much smaller than traditional materiality thresholds would suggest. Disclosing additional CAEs enhances individual firm financial transparency, as well as the collective transparency for the US financial reporting system. Our results should also be of interest to investors as such conservative reporting postures by individual firms produces additional financial statement disclosures that present additional information regarding management's approach, forecasts and reasoning behind the CAE that helps reduce information asymmetry between investors and reporting firms. Our finding of varying industry concentrations of CAEs, and CAEs for specific accounts, can be used by regulators, investors and analysts as additional information in order to evaluate the quality of financial reporting across firms as well as industries. Our finding of differences in materiality thresholds among the Big 4 auditors should be of interest to auditors, firms, regulators and investors. Auditors can use this information to benchmark themselves against other auditors, and regulators can potentially use this information to allocate resources to the oversight and review of auditor performance in this area of financial statement disclosure. Investors and financial statement users can use this information as part of their evaluation of firm performance and the adequacy of financial statement disclosure under GAAP.

In addition, our findings have several implications for future accounting research and policy. First, our results are restricted to the reporting requirements of GAAP and the U.S. institutional environment. In future studies, it would be informative to perform similar examinations of CAEs in other countries reporting under IFRS (International Financial Reporting

Standards) to see how our results compare and contrast with those of firms under a different reporting framework, as well as from different national institutional regimes.³¹ It would also be informative for future research to examine the association between using higher/lower materiality thresholds and consequences to the firm such as future profitability or share price performance. An additional line of research that would extend our findings would be to explore the relation between CAE disclosures and other voluntary disclosure motivations such as signaling higher financial reporting quality using other proxies (e.g., timely loss recognition, reduced discretionary accruals). Lastly, the SEC, FASB and other standard-setters may consider reviewing materiality criteria for individual accounts and providing additional guidelines about the consistent application of materiality thresholds across financial statement elements.

³¹ For example, IAS (International Accounting Standards) 8 in IFRS posits that “the effect of a change in an accounting estimate is recognized prospectively,” but unlike U.S. GAAP, there is no specific requirement with respect to the materiality judgment for CAEs.

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APPENDIX
CAE Examples from Top Five Most Frequent CAE Categories

Case 1: Revenue - Boeing, 10-Q (2014.9.30)

“Contract accounting is used for development and production activities predominantly by Defense, Space & Security (BDS). Contract accounting involves a judgmental process of estimating total sales and costs for each contract resulting in the development of estimated cost of sales percentages. Changes in estimated revenues, cost of sales, and the related effect on operating income are recognized using a cumulative catch-up adjustment which recognizes in the current period the cumulative effect of the changes on current and prior periods based on a contract’s percent complete. In the second quarter of 2014, higher estimated costs to complete the KC-46A Tanker contract for the U.S. Air Force resulted in a reach-forward loss of \$425 of which the Commercial Airplanes segment recorded \$238 and the BMA segment recorded \$187. For the nine months ended September 30, 2014, net unfavorable cumulative catch-up adjustments, including reach-forward losses, across all contracts decreased Earnings from operations by \$54 and diluted earnings per share by \$0.06. For the three months ended September 30, 2014, net favorable cumulative catch-up adjustments, including reach-forward losses, across all contracts increased Earnings from operations by \$91 and diluted earnings per share by \$0.08. For the nine and three months ended September 30, 2013, net favorable cumulative catch-up adjustments, including reach-forward losses, across all contracts increased Earnings from operations by \$184 and \$20 and diluted earnings per share by \$0.17 and \$0.02.”

Case 2: Liabilities - Sprint, 10-Q (2009.6.30)

“In the second quarter 2009, we reduced the estimate of total severance and lease exit costs associated with our workforce reduction announced in January 2009 by \$29 million. For the six-month period ended June 30, 2009, total severance and lease exit costs associated with the January announcement were \$298 million. Of these amounts, a benefit of \$27 million and costs of \$227 million were related to the Wireless segment, and a benefit of \$2 million and costs of \$71 million were related to the Wireline segment for the same periods ended June 30, 2009, respectively.”

Case 3: Depreciation - Verizon, 10-K (2014.12.31)

“In connection with our ongoing review of the estimated remaining average useful lives of plant, property and equipment at our wireline and wireless operations, we determined that changes were necessary to the remaining estimated useful lives of certain assets as a result of technology upgrades, enhancements, and planned retirements. These changes resulted in an increase in depreciation expense of \$0.6 billion in 2014. While the timing and extent of current deployment plans are subject to ongoing analysis and modification, we believe the current estimates of useful lives are reasonable.”

Case 4: Tax - Verisign, 10-Q (2014.6.30)

“During the three months ended June 30, 2014, the Firm completed the previously disclosed repatriation of \$740.9 million of cash held by foreign subsidiaries, net of \$28.1 million of foreign withholding taxes which were accrued during 2013. The Firm utilized substantially all of the remaining deferred tax asset for net operating loss carryforwards generated from the 2013 worthless stock deduction to offset the income tax resulting from current year income and the repatriation. The repatriation generated foreign source income in the U.S. which allows the Firm to claim eligible foreign taxes amounting to \$191.8 million paid in the current year and prior years as foreign tax credits instead of as deductions. The benefit from these foreign tax credits was

included in the computation of the deferred tax liability on unremitted foreign earnings as of December 31, 2013. The majority of these foreign tax credits will expire in 2024. The Firm believes it is more likely than not that it will realize the benefit from these foreign tax credits before they expire, and accordingly has recognized a deferred tax asset as of June 30, 2014. During the three months ended June 30, 2014, the Firm recognized a discrete tax benefit of \$5.2 million in connection with the completion of the repatriation.”

Case 5: Compensation - Amazon, 10-Q (2006.3.31)

“The estimation of stock awards that will ultimately vest requires judgment, and to the extent actual results or updated estimates differ from our current estimates, such amounts will be recorded as a cumulative adjustment in the period estimates are revised. We consider many factors when estimating expected forfeitures, including types of awards, employee class, and historical experience. Actual results, and future changes in estimates, may differ substantially from our current estimates. In Q1 2006 we recorded a \$13 million benefit, \$8 million net of tax, or \$0.02 per diluted share, representing the cumulative effect of increasing our estimated rate of stock award forfeitures. As a result, the net amount of stock-based compensation classified as General and administrative and Marketing on our consolidated statements of operations was insignificant for Q1 2006.”

FIGURE 1

Materiality Frequency Distributions from Acito et al. (2009)

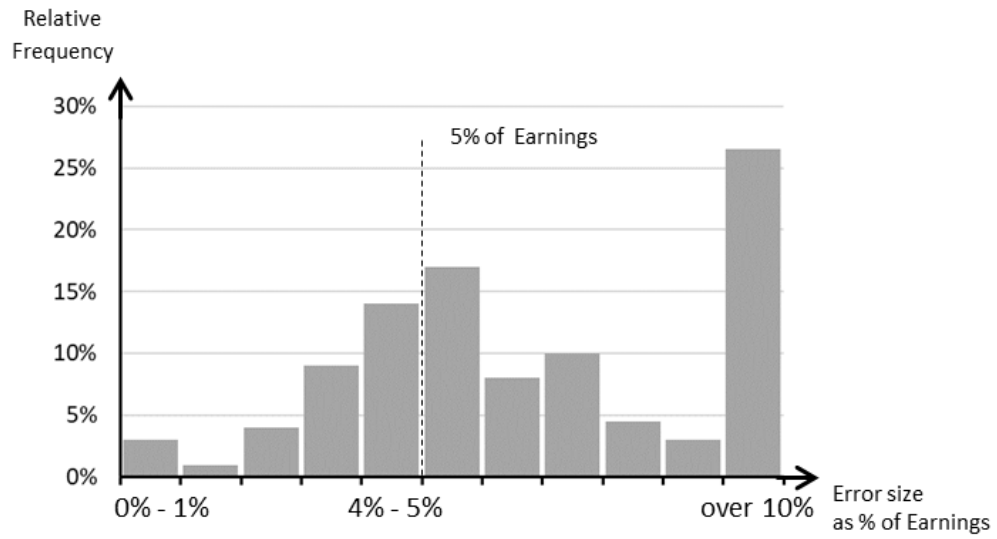
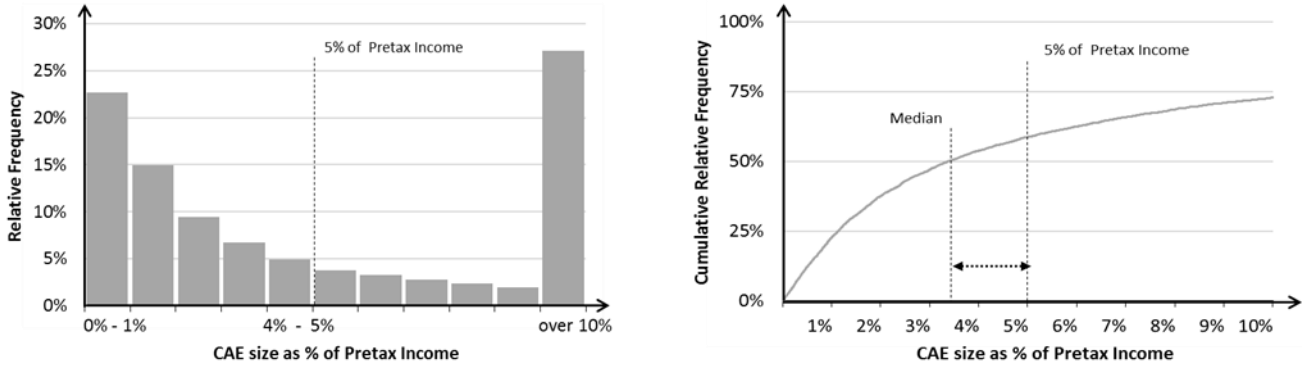


Figure 1 presents the frequency distribution of the relative size of lease accounting errors corrected through restatement. We replicated the figure originally reported in Panel B of Figure 1 in Acito et al. (2009).

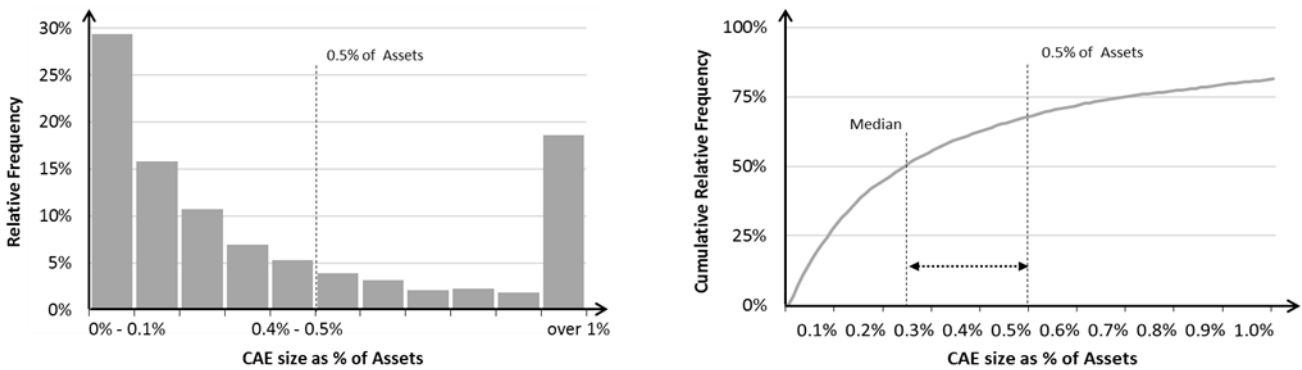
FIGURE 2

Frequency Distributions of CAE Disclosures

Panel A: Frequency Distribution of CAEs as Percentage of Pretax Income



Panel B: Frequency Distribution of CAEs as Percentage of Assets



Panel C: Frequency Distribution of CAEs as Percentage of Net Sales

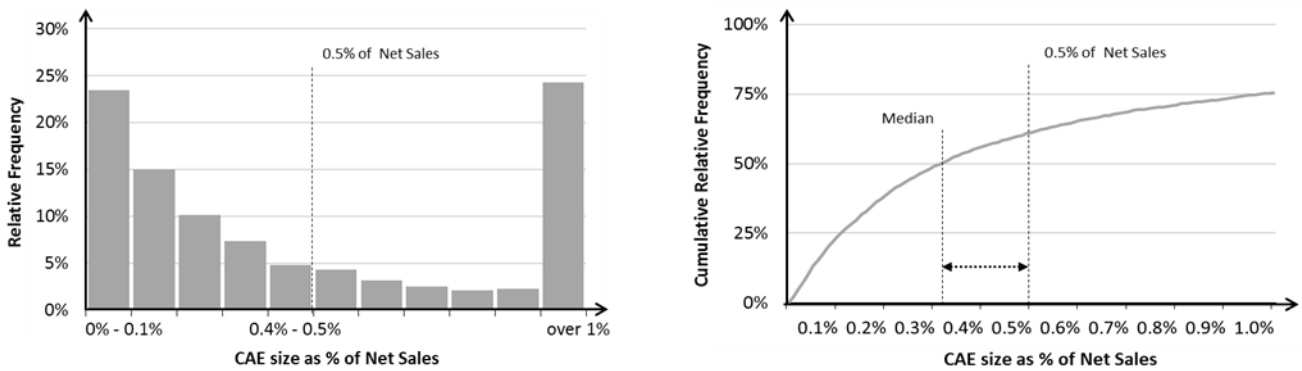


Figure 2 presents the relative frequency distributions of CAE disclosures. The graph on the left (right) side represents the relative frequency distribution (cumulative relative frequency distribution) for CAE scaled by pretax income, assets, and net sales.

TABLE 1
CAE Sample

Panel A: CAE Descriptive Statistics

	n (CAEs) (1)	Mean (\$mill) (2)	Median (\$mill) (3)	S.D. (\$mill) (4)
Absolute-Value CAEs	4,335	45.0	2.2	1,289.9
Income-Increasing CAEs	2,471	60.6	2.3	1,705.1
Income-Decreasing CAEs	1,864	- 24.4	- 2.1	124.2

Panel B: Firm-level Net CAE-Effect Statistics

	n (firms) (1)	Mean (\$mill) (2)	Median (\$mill) (3)	S.D. (\$mill) (4)
Absolute-Value CAEs	2,050	95.2	3.1	2,034.6
Net Income-Increasing CAEs	1,155	117.9	2.4	2,546.1
Net Income-Decreasing CAEs	892	-35.5	-2.9	185.2

Panel C: Frequency of CAEs per CAE Firms

Number of CAEs per Firm	n (1)	% (2)
1	1,223	59.7
2	387	18.9
3	170	8.3
4	93	4.5
5	55	2.7
6 or more	122	6.0
Total	2,050	100

Panel A of Table 1 provides descriptive statistics about the CAE sample over the period 2006-2016. Panel B reports firm-level CAE descriptive statistics. Panel C reports the frequency of CAE disclosures per firm.

TABLE 2
CAE Firm Analysis

Panel A: Descriptive Statistics of CAE Firms versus *Compustat* 2010 Firms

	CAE Firms ^b (1)			<i>Compustat</i> 2010 (2)			p-value ^c (3)	
	n	Mean (\$mill)	Median (\$mill)	n	Mean (\$mill)	Median (\$mill)	Mean	Median
Pretax Income ^a	2,048	220.4	12.1	8,583	320.5	4.3	0.194	0.550
Assets	2,050	9,474.6	682.8	8,637	11,834.8	316.4	0.248	< 0.001
Net Sales	2,017	3,579.9	483.8	7,707	3,419.7	197.2	0.646	< 0.001

Panel B: Frequency of CAE Firms by Industry

	Two-Digit SIC Codes	CAE Firms (1)		<i>Compustat</i> 2010 (2)	
		N	%	n	%
Agriculture and Construction	00-19	116	5.7	1,331	15.4
Manufacturing 1 ^d	20-29	346	16.9	1,198	13.9
Manufacturing 2 ^e	30-39	479	23.4	1,619	18.7
Transportation and Utilities	40-49	251	12.2	839	9.7
Wholesale and Retail	50-59	147	7.2	561	6.5
Finance	60-69	274	13.4	1,731	20.0
Hotels and Services	70-79	300	14.6	975	11.3
Health, Legal and Education	80-99	137	6.7	383	4.4
Total		2,050	100	8,637	100
Pearson Chi-square, df, p-value		228.4, 7, <0.001			

Panel C: Materiality Thresholds by Firm Size

Firm Size (Partitioned by Net Sales)		Percentage of CAEs below Threshold			Median CAE		
Size	n (1)	5% Pretax Income	0.5% Assets	0.5% Net Sales	% of Pretax Income	% of Assets	% of Net Sales
\$0 to \$50 million	486	51.2	37.4	18.7	4.7	0.9	2.4
\$50 to \$100	269	38.3	42.0	29.0	8.2	0.7	1.1
\$100 to \$250	469	49.7	61.4	51.6	5.1	0.3	0.5
\$250 to \$1,000	1,108	57.9	73.7	65.3	3.4	0.2	0.3
> \$1 billion	1,966	66.0	78.8	76.0	2.5	0.2	0.2
Total	4,298	58.7	68.6	61.2	3.4	0.2	0.3

Panel D: Materiality Thresholds by Industry

Industry	Two-Digit SIC Codes	CAE (1)		Percentage of CAEs below Threshold (2)			Median CAE (3)		
		n	%	5% Pretax income	0.5% Assets	0.5% Net Sales	% of Pretax income	% of Assets	% of Net Sales
Agriculture and Construction	00-19	283	6.5	51.6	59.4	61.0	4.7	0.4	0.4
Manufacturing 1	20-29	639	14.7	65.9	61.8	53.6	2.4	0.3	0.4
Manufacturing 2	30-39	1,179	27.2	55.6	64.8	62.1	4.0	0.3	0.3
Transportation and Utilities	40-49	515	11.9	62.5	77.3	65.8	2.9	0.2	0.3
Wholesale and Retail	50-59	270	6.2	70.4	81.1	87.8	2.1	0.2	0.1
Finance	60-69	499	11.5	54.4	76.2	46.0	4.1	0.1	0.7
Hotels and Services	70-79	629	14.5	58.2	69.2	62.7	3.7	0.2	0.3
Health, Legal and Education	80-99	321	7.4	53.9	60.7	63.3	4.3	0.3	0.3
Total		4,335	100	58.7	68.1	61.2	3.4	0.2	0.3

Table 2 presents the descriptive statistics of CAE firms and their industry membership. Panel A compares the size of three accounting measures that are used as quantitative materiality thresholds between CAE firms and all *Compustat* firms in the year 2010. Panel B reports the concentration of CAE firms in two-digit SIC

industry categories. Panel C presents the percentage of CAEs exceeding each materiality threshold by firm size. Panel D analyzes the frequency of CAEs by CAE firms' industry membership.

^a Pretax income (*Compustat* "pi"), Assets (*Compustat* "at"), and Net Sales (*Compustat* "sale") for CAE firms are beginning balances (in \$millions) of each account in the year CAEs are disclosed.

^b If a firm discloses several CAEs over the sample period, only the financial data corresponding to the CAE disclosed in the year closest to 2010 are used.

^c p-value for mean (median) value comparison is derived from a two-sample t-test (Mann Whitney Wilcoxon test).

^d Examples of Manufacturing 1 (two digit SIC code) industries include Food (20), Apparel (23), Printing (27), Chemicals (28), Petroleum refining (29).

^e Examples of Manufacturing 2 (two digit SIC code) industries include Plastics (30), Metals (33), Computers (35), Electrics (36), Autos (37).

TABLE 3
CAE Auditor Analysis

Panel A: CAE Frequency by Auditor^a

	Big 4a (1)		Big 4b (2)		Big 4c (3)		Big 4d (4)		Non-Big 4 (5)		Total (6)	
	CAE	All ^c	CAE	All	CAE	All	CAE	All	CAE	All	CAE	All
n	560	1,447	358	1,236	336	1,213	418	1,429	482	3,312	2,154	8,637
% ^b	26.0	16.8	16.6	14.3	15.6	14.0	19.4	16.6	22.4	38.4	100	100

Panel B: CAE Frequency by Industry and Auditor (%)

Two-Digit SIC Codes ^a	Big 4a (1)		Big 4b (2)		Big 4c (3)		Big 4d (4)		Non-Big 4 (5)		Total (6)	
	CAE	Industry	CAE	Industry	CAE	Industry	CAE	Industry	CAE	Industry	CAE	Industry
00-19	5.4	9.4	5.0	12.2	5.7	17.1	4.6	16.4	7.3	18.2	5.7	15.4
20-29	20.5	17.2	12.0	10.5	15.8	13.6	19.6	16.0	13.9	12.9	16.7	13.9
30-39	22.1	20.7	24.0	17.9	18.8	15.4	23.4	19.5	27.8	19.1	23.4	18.7
40-49	12.0	10.6	16.2	17.6	12.8	9.4	14.1	13.3	7.9	5.0	12.3	9.7
50-59	8.2	8.3	8.1	8.7	8.9	7.7	6.7	5.2	4.8	5.0	7.2	6.5
60-69	10.0	17.0	12.9	17.6	16.7	22.3	11.5	17.4	16.2	22.6	13.2	20.0
70-79	14.6	12.7	15.4	12.1	15.8	10.7	13.2	8.9	15.2	11.6	14.8	11.3
80-99	7.1	6.8	6.4	3.4	5.7	3.8	6.9	3.5	7.1	5.6	6.8	4.4
Total	100	100	100	100	100	100	100	100	100	100	100	100
Pearson Chi-square, df, p-value	33.5, 7, <0.001		32.2, 7, <0.001		41.6, 7, <0.001		61.6, 7, <0.001		66.7, 7, <0.001		244.0, 7, <0.001	

Table 3 presents the CAE auditor analysis. Panel A shows the proportion of CAE-disclosing firms audited by each of the Big 4 auditing firms, as well as non-Big 4 auditing firms as a group, as compared to the whole of *Compustat* 2010. Panel B reports the CAE coverage analysis by industry and auditing firm.

^a Auditors are categorized into Big 4 and non-Big 4. Big 4a through Big 4d represent Ernst & Young, Deloitte, KPMG, and PricewaterhouseCoopers, respectively.

^b Percentages for “CAE” (“All”) represent the percentage of CAE-disclosing firms (all firms in *Compustat* 2010) audited by each auditor over the total number of CAE firms (total number of firms in *Compustat* 2010 sample). Note that the total in the CAE column (2,154) is greater than the number of CAE firms in Table 2 Panel A (2,050) because 104 CAE firms switch auditors over the sample period.

^c Full sample of auditor data is based upon *Compustat* 2010 records.

^d 00-19 (Agriculture and Construction), 20-29 (Manufacturing 1), 30-39 (Manufacturing 2), 40-49 (Transportation and Utilities), 50-59 (Wholesale and Retail), 60-69 (Finance), 70-79 (Hotels and Services), 80-99 (Health, Legal, and Education)

TABLE 4**CAE Disclosure Frequency, Income Effect, and Materiality Thresholds by Auditor**

Panel A: CAE Disclosure Frequency by Auditor

Disclosure Frequency	Big 4a (1)		Big 4b (2)		Big 4c (3)		Big 4d (4)		Non-Big 4 (5)		Total (6)	
	n	%	N	%	n	%	n	%	n	%	n	%
Infrequent CAE Clients ^a	443	79.1	281	78.5	262	78.0	326	78.0	418	86.7	1,730	80.3
Frequent CAE Clients	117	20.9	77	21.5	74	22.0	92	22.0	64	13.3	424	19.7
Total	560	100	358	100	336	100	418	100	482	100	2,154	100

Panel B: Net Income-Increasing CAE Disclosure Frequency by Auditor

Disclosure Frequency	Big 4a (1)		Big 4b (2)		Big 4c (3)		Big 4d (4)		Non-Big 4 (5)		Total (6)	
	II_CAE	II_CAE proportion ^b	II_CAE	II_CAE proportion	II_CAE	II_CAE proportion	II_CAE	II_CAE proportion	II_CAE	II_CAE proportion	II_CAE	II_CAE proportion
Infrequent CAE Clients	258	58.2	152	54.1	151	57.6	190	58.3	234	56.0	985	56.9
Frequent CAE Clients	66	56.4	40	51.9	39	52.7	54	58.7	27	42.2	226	53.3
Total	324	57.9	192	53.6	190	56.5	244	58.4	261	54.1	1,211	56.2

Panel C: CAE Materiality Thresholds by Auditor

Audit Firms	Percent of Pretax Income Threshold (1)					Percent of Assets Threshold (2)					Percent of Net Sales Threshold (3)				
	n	Percentage of CAE				n	Percentage of CAE				n	Percentage of CAE			
		< 5%	5%~ 10%	10% ~ 20%	> 20%		< 0.5%	0.5%~ 1%	1% ~ 2%	> 2%		< 0.5%	0.5%~ 1%	1% ~ 2%	> 2%
Big 4a	1,179	63.2	12.0	10.4	14.4	1,180	71.6	11.9	9.0	7.5	1,174	62.3	14.3	9.2	14.2
Big 4b	749	58.9	15.8	11.0	14.4	749	69.7	15.8	8.1	6.4	747	65.2	16.5	9.1	9.2
Big 4c	701	63.6	13.6	10.7	12.1	701	75.0	12.0	8.1	4.9	698	68.9	13.0	9.2	8.9
Big 4d	898	62.5	15.6	9.7	12.2	899	76.6	12.6	6.5	4.3	890	69.7	13.5	9.0	7.9
Non-Big 4	805	43.6	14.8	12.0	29.6	806	46.2	14.9	15.8	23.2	789	39.3	14.5	15.6	30.7
Total	4,332	58.7	14.2	10.7	16.4	4,335	68.1	13.3	9.4	9.2	4,298	61.2	14.3	10.3	14.2

Panel D: Discontinuities around Conventional Materiality Thresholds

Audit Firms	Incidence of CAEs around 5% Pretax Income Threshold (1)				Incidence of CAEs around 0.5% Assets Threshold (2)				Incidence of CAEs around 0.5% Net Sales Threshold (3)			
	4%~ 4.5%	4.5%~ 5%	5% ~ 5.5%	5.5% ~ 6%	0.4%~ 0.45%	0.45%~ 0.5%	0.5% ~ 0.55%	0.55% ~ 0.6%	0.4%~ 0.45%	0.45%~ 0.5%	0.5% ~ 0.55%	0.55% ~ 0.6%
Big 4a	22	30	16	17	35	31	27	16	22	22	27	31
Big 4b	23	20	14	14	30	24	16	21	28	23	18	16
Big 4c	22	15	17	11	20	12	17	10	19	20	14	8
Big 4d	19	19	25	19	22	21	21	12	23	20	21	18
Non-Big 4	21	21	15	16	16	18	18	12	13	18	18	15
Total	107	105	87	77	123	106	99	71	105	103	98	88

Table 4 presents CAE disclosure frequency, income-increasing CAE proportions, and materiality thresholds by audit firm. Panel D examines whether there exist discontinuities around conventional materiality thresholds.

^a Infrequent (Frequent) CAE clients report fewer (greater) than the mean number of CAEs by firm-auditor pair (2.01) over our sample period.

^b II_CA E proportion represents the percentage of firms disclosing net income-increasing CAEs out of total CAE-disclosing clients per auditor (i.e. the counts in Panel B are divided by the counts from the same corresponding category in Panel A).

TABLE 5
CAE Frequency by Accounts and Industry

CAE Account	Two digit SIC Industry ^a																	
	00-19 (1)		20-29 (2)		30-39 (3)		40-49 (4)		50-59 (5)		60-69 (6)		70-79 (7)		80-99 (8)		Total (9)	
	n	Prop. ^b	n	Prop.	N	Prop.	n	Prop.	n	Prop.	n	Prop.	n	Prop.	n	Prop.	n ^c	% ^d
Revenue	137	12.9	149	14.0	388	36.5	73	6.9	56	5.3	65	6.1	109	10.2	87	8.2	1,064	22.3
Liabilities	28	2.8	119	11.8	312	30.9	72	7.1	67	6.6	125	12.4	196	19.4	92	9.1	1,011	21.2
Depreciation	45	6.4	100	14.2	117	16.6	196	27.9	36	5.1	53	7.5	118	16.8	38	5.4	703	14.7
Tax	15	4.3	43	12.4	87	25.1	38	11.0	29	8.4	51	14.7	64	18.4	20	5.8	347	7.3
Compensation	10	3.1	58	18.2	82	25.7	13	4.1	37	1.6	44	13.8	54	16.9	21	6.6	319	6.7
Other estimates	29	5.4	99	18.6	124	23.3	81	15.2	20	3.8	64	12.0	74	13.9	42	7.9	533	11.2
Cash & Receivables	5	2.6	11	5.6	22	11.3	14	7.2	4	2.1	98	50.3	17	8.7	24	12.3	195	4.1
Acquisitions	3	1.3	36	15.4	65	27.8	18	7.7	13	5.6	34	14.5	48	20.5	17	7.3	234	4.9
Inventory	4	3.4	33	27.7	52	43.7	4	3.4	14	11.8	2	1.7	1	0.8	9	7.6	119	2.5
Pension	7	8.4	19	22.9	23	27.7	18	21.7	8	9.6	4	4.8	4	4.8	0	0.0	81	1.7
Asset retirement	11	20.4	13	24.1	5	9.3	22	40.7	2	3.7	1	1.9	0	0.0	0	0.0	54	1.1
Expenses	2	3.5	16	28.1	12	21.1	7	12.3	2	3.5	7	12.3	5	8.8	6	10.5	57	1.2
PPE & Intangibles	0	0.0	6	17.7	2	5.9	6	17.7	4	11.8	4	11.8	10	29.4	2	5.9	34	0.7
Derivatives	2	11.1	2	11.1	1	5.6	3	16.7	0	0.0	9	50.0	1	5.6	0	0.0	18	0.4
Total	298	6.3	704	14.8	1,292	27.1	565	11.8	292	6.1	561	11.8	701	14.7	358	7.5	4,771	100

Table 5 presents the industry concentrations of 14 different CAE account categories available in the *Audit Analytics* database.

^a 00-19 (Agriculture and Construction), 20-29 (Manufacturing 1), 30-39 (Manufacturing 2), 40-49 (Transportation and Utilities), 50-59 (Wholesale and Retail), 60-69 (Finance), 70-79 (Hotels and Services), 80-99 (Health, Legal, and Education)

^b Prop. is the concentration of each industry in each CAE account and calculated by dividing the number CAEs in each industry by the total number of CAEs in each account category.

^c The total of 4,771 is greater than the sample of 4,335 CAEs because 9.9% of all changes are associated with more than one account.

^d % is the number of CAE effects in each account category over the total number of CAE effects (4,771).

TABLE 6
CAE Account Analysis

Panel A: CAE Sizes and Disclosure Venues by CAE Account and Income Effect

CAE Account	Absolute-value CAEs (1)					Income-increasing CAEs (2)					Income-decreasing CAEs (3)				
	n	Mean (\$mill)	Median (\$mill)	S.D. (\$mill)	10-K prop. (%)	n	Mean (\$mill)	Median (\$mill)	S.D. (\$mill)	10-K prop. (%)	n	Mean (\$mill)	Median (\$mill)	S.D. (\$mill)	10-K prop. (%)
Revenue	1,064	34.2	4.7	107.6	21.7	691	41.6	6.2	122.2	19.5	373	-20.3	-2.7	71.2	25.7
Liabilities	1,011	23.1	2.0	121.5	36.2	546	8.1	1.7	24.2	33.0	465	-40.6	-2.5	175.7	40.0
Depreciation	703	9.2	1.7	38.1	33.1	313	11.4	1.6	44.6	24.9	390	-7.4	-1.7	31.9	39.7
Tax	347	287.9	4.2	4,539.8	35.5	246	400.2	4.5	5,390.8	36.2	101	-14.2	-3.5	43.5	33.7
Compensation	319	2.9	0.8	7.1	25.4	210	2.5	0.8	5.9	21.0	109	-3.7	-0.9	8.9	33.9
Other estimates	533	21.4	2.1	140.3	36.2	249	8.9	1.7	28.2	39.8	284	-32.3	-2.5	189.9	33.1
Cash & Receivables	195	86.8	2.8	368.3	36.9	104	96.5	1.7	400.0	36.5	91	-75.8	-6.0	330.2	37.4
Acquisitions	234	7.4	1.0	30.0	38.0	136	4.4	0.9	9.7	45.6	98	-11.5	-1.4	44.7	27.6
Inventory	119	10.5	1.4	44.2	55.5	44	3.1	1.8	3.9	45.5	75	-14.8	-1.3	55.3	61.3
Pension	83	48.9	5.1	116.7	49.4	59	31.7	4.0	88.1	42.4	24	-91.3	-6.5	162.4	66.7
Asset retirement	54	16.3	4.6	27.7	42.6	27	17.3	4.5	30.4	33.3	27	-15.3	-5.0	25.3	51.9
Expenses	57	4.5	1.5	6.4	35.1	35	4.8	1.4	7.6	28.6	22	-4.0	-2.2	4.2	45.5
PPE & Intangibles	34	6.0	1.4	12.9	26.5	16	6.8	1.0	15.8	25.0	18	-5.2	-1.8	10.0	27.8
Derivatives	18	86.3	17.9	156.4	22.2	9	45.6	5.8	77.6	22.2	9	-127.1	-32.0	205.5	22.2
Total	4,771	43.0	2.2	1,230.4	32.5	2,685	56.5	2.2	1,635.8	29.6	2,086	-25.6	-2.2	136.8	36.2

Panel B: Pretax Income Percentage by CAE Account and Income Effect

CAE Account	Income-Increasing CAEs (1)				Income-Decreasing CAEs (2)			
	n	Mean %	Median %	S.D. %	n	Mean %	Median %	S.D. %
Revenue	691	50.9	4.5	428.2	373	39.5	5.5	231.1
Liabilities	546	25.3	2.1	301.8	463	41.4	3.1	274.7
Depreciation	313	20.2	2.1	183.4	390	19.1	3.4	77.1
Tax	246	69.2	7.9	229.6	101	27.7	5.4	71.7
Compensation	210	11.4	2.0	49.9	109	8.7	1.0	43.3
Other estimates	249	56.7	3.7	453.5	283	107.4	4.3	1,122.5
Cash & Receivables	104	11.0	3.8	22.3	91	48.4	12.8	145.1
Acquisitions	136	16.4	2.9	64.6	98	18.8	2.6	50.9
Inventory	44	15.4	3.9	34.9	75	86.2	9.4	358.4
Pension	59	18.5	1.0	51.9	24	164.0	6.1	713.0
Asset retirement	27	13.7	3.3	41.9	27	25.7	4.2	55.6
Expenses	35	7.4	2.2	12.7	20	30.7	3.8	80.3
PPE & Intangibles	16	7.2	3.9	10.5	18	40.9	4.5	139.2
Derivatives	9	104.7	6.2	288.4	9	14.2	4.6	17.5
Total	2,685	35.6	3.1	307.5	2,081	45.3	4.0	459.5
Pearson Chi-square, df, p-value	165.2, 13, <0.001							

Panel C: Materiality Thresholds by CAE Account and Income Effect

CAE Account	Income-Increasing CAEs (1)					Income-Decreasing CAEs (2)				
	n	Percentage of CAEs in Pretax Income Intervals				n	Percentage of CAEs in Pretax Income Intervals			
		< 5%	5%~10%	10%~20%	> 20%		< 5%	5% to 10%	10%~20%	> 20%
Revenue	691	53.4	19.3	14.0	13.3	373	48.0	14.2	15.0	22.8
Liabilities	546	70.9	9.5	8.2	11.4	463	62.0	12.3	7.8	17.9
Depreciation	313	66.8	15.0	10.5	7.7	390	60.0	14.1	10.5	15.4
Tax	246	40.7	15.5	13.0	30.9	101	47.5	13.9	7.9	30.7
Compensation	210	74.3	11.4	5.7	8.6	109	80.7	9.2	3.7	6.4
Other estimates	249	55.8	13.3	13.3	17.7	283	53.7	14.1	9.9	22.3
Cash & Receivables	104	59.6	16.4	10.6	13.5	91	28.6	15.4	19.8	36.3
Acquisitions	136	63.2	12.5	10.3	14.0	98	60.2	14.3	7.1	18.4
Inventory	44	56.8	13.6	13.6	15.9	75	38.7	14.7	14.7	32.0
Pension	59	71.2	8.5	8.5	11.9	24	33.3	29.2	20.8	16.7
Asset retirement	27	66.7	18.5	3.7	11.1	27	55.6	7.4	14.8	22.2
Expenses	35	71.4	14.3	2.9	11.4	20	55.0	30.0	5.0	10.0
PPE & Intangibles	16	56.3	31.3	6.3	6.3	18	55.6	11.1	22.2	11.1
Derivatives	9	33.3	22.2	22.2	22.2	9	55.6	11.1	0.0	33.3
Total	2,685	60.7	15.5	10.9	13.9	2,081	55.3	13.7	10.7	20.2

Table 6 presents the results of CAE account analyses. Panel A reports the CAE size and disclosure venue analysis by income effect and CAE account. Panel B compares income-increasing CAEs with income-decreasing CAEs after normalizing their sizes by pretax income. Panel C shows the relative frequency of CAEs that fall into four materiality threshold intervals by income-effect and CAE account.

TABLE 7
CAE Materiality Across All Three Quantitative Thresholds

Frequency of CAEs below each quantitative threshold

Only one threshold						Two thresholds						All three thresholds		None		Total	
Pretax Income		Assets		Net Sales		Pretax Income + Assets		Pretax Income + Net Sales		Assets + Net Sales		Pretax Income + Assets + Net Sales					
n	%	N	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
218	5.0	264	6.1	119	2.8	240	5.5	60	1.4	424	9.8	2,026	46.7	984	22.7	4,335	100.0

Table 7 presents the results of the CAE size analysis across all three quantitative materiality thresholds for our sample of 4,335 CAEs. The table reflects the number (n) and percentage (%) of CAEs out of the full sample that fall BELOW the thresholds of 5% of pretax income (Pretax Income), 0.5% of total assets (Assets), and 0.5% of net sales (Net Sales) individually and concurrent with other thresholds.

TABLE 8

Multivariate Logistic Regression of CAE Disclosure Below Traditional Thresholds

	<i>Pretax Income</i> (5%)	<i>Total Assets</i> (0.5%)	<i>Net Sales</i> (0.5%)
<i>Prior_Restatement</i>	-0.199 (0.191)	0.277 ** (0.043)	0.237 ** (0.035)
<i>Critical</i>	-2.109 *** (0.000)	-2.103 *** (0.000)	-2.271 *** (0.000)
<i>Size</i>	0.128 *** (0.000)	0.311 *** (0.000)	0.455 *** (0.000)
<i>Income_Effect</i>	0.221 *** (0.009)	0.224 *** (0.007)	0.159 * (0.052)
<i>10-K</i>	-0.462 *** (0.000)	-0.504 *** (0.000)	-0.583 *** (0.000)
<i>Big4</i>	0.285 ** (0.046)	0.317 * (0.054)	-0.144 (0.349)
<i>Repeat</i>	0.034 (0.712)	0.152 (0.141)	0.044 (0.652)
<i>Litigation_Risk</i>	0.045 (0.734)	0.148 (0.250)	-0.075 (0.640)
<i>Leverage</i>	-0.279 * (0.100)	-0.743 *** (0.009)	-0.006 (0.978)
<i>MTB</i>	0.005 (0.710)	-0.024 ** (0.014)	-0.031 ** (0.016)
<i>Z-score</i>	0.002 (0.850)	0.009 (0.671)	0.044 ** (0.014)
CAE Account Fixed Effects	Included	Included	Included
Industry Fixed Effects	Included	Included	Included
Year Fixed Effects	Included	Included	Included
Sample size	3,675	3,675	3,675

Table 8 presents the regression results of a multivariate logistic regression model of the following form:

$$\text{logit}(\text{Pr}[BMT=1]) = \beta_0 + \beta_1 \text{Prior_Restatement} + \beta_2 \text{Critical} + \beta_3 \text{Size} + \beta_4 \text{Income_Effect} + \beta_5 \text{10-K} + \beta_6 \text{Big4} + \beta_7 \text{Repeat} + \beta_8 \text{Litigation_Risk} + \beta_9 \text{Leverage} + \beta_{10} \text{MTB} + \beta_{11} \text{Z-score} + \text{Account_Fixed_Effects} + \text{Industry_Fixed_Effects} + \text{Year_Fixed_Effects} + \varepsilon \quad (1)$$

where *BMT* has a value of 1 if a disclosed CAE is below the traditional materiality thresholds of 5% of pretax income, 0.5% of total assets, or 0.5% of net sales, and 0 if a disclosed CAE is above that threshold. *Restatement* is an indicator taking on a value of 1 if a firm filed a restatement within the same or previous four quarters as a CAE was filed and 0 otherwise. *Critical* is an indicator taking on a value of 1 if the size of the disclosed CAE would have been sufficient to either push its pre-CAE net income above or below zero, and a value of 0 otherwise. *Size* is the natural log of net sales at the beginning of the year in which a CAE is disclosed. *Income_Effect* equals 1 if a CAE increases income, and 0 otherwise. *10-K* equals 1 if a CAE is disclosed via a 10-K, and 0 otherwise. *Big4* equals 1 if a CAE is disclosed by a client of a Big 4 auditor, and 0 otherwise. *Repeat* equals 1 if a CAE is disclosed by a company disclosing more than

one CAE during the sample period. *Litigation_Risk* equals 1 if a CAE is disclosed by a company with a SIC code of 2833–2836, 8731–8734, 3570–3577, 7370–7374, 3600–3674, or 5200–5961 (Francis, Philbrick and Schipper 1994). *Leverage* is defined as total debts divided by total assets reported in the last 10-K before a CAE. *MTB* is defined as the market value of equity divided by the book value of equity reported in the last 10-K before a CAE. *Z-score* is measured using Altman’s Z-score applied to the last 10-K before a CAE. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors clustered at the two-digit SIC industry level are reported in parentheses.