

Auditing Complex Estimates: Process, Problems, and Preliminary Recommendations for Improving Auditor Performance

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We perform a task analysis of auditing estimates with the ultimate goal of improving auditor performance at this increasingly important task. First, we analyze auditing standards and interview 24 audit partners and senior managers to assess how auditors perform the task and how well their performance matches the required process. Next, we rely on the interviews and a content analysis of recent PCAOB inspection reports to shed light on the difficulties auditors experience in auditing estimates. We find that while auditors' reported processes generally match standards, auditors tend to evaluate estimates by focusing on auditing the details of management's estimate instead of creating an independent one. Further, they do not report considering whether any important conditions were omitted from management's model. We also find that both auditors and regulators report auditor difficulties with over-reliance on management's process. That is, auditors sometimes fail to understand management's process for generating the estimate, fail to adequately test the underlying data and assumptions, and fail to notice inconsistencies among the estimate and other internal data or external conditions. We identify underlying causes of these problems and make recommendations for changes to auditing standards, practices, and auditor training to improve the audits of estimates.

Key Words: Accounting estimates, audit quality, fair value, impairment, interview

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1. Introduction

Estimates are items included in financial statements for which the measurement or valuation of some amounts is uncertain. Relatively simple accruals, such as accrued expenses, are included in this category as are accounts requiring more sophisticated estimation procedures such as fair value measurements and impairments. The uncertainty in the account may depend on the outcome of future events or on data that cannot be accumulated on a timely, cost-effective basis (American Institute of Certified Public Accountants (AICPA) 1988).

Recent changes in accounting principles have increased the importance of estimates, including values of post-retirement benefits, impairments of goodwill, and fair values of financial assets and liabilities, to the financial statements. The proposed implementation of International Financial Reporting Standards (IFRS) in the U.S. will likely continue this trend. In addition, economic pressures have further increased the importance of valuation allowances and impairments and have increased the difficulty in assessing the reasonableness of fair values. During the recent economic crisis, critics asserted that fair value accounting exacerbated or even caused the crisis by increasing the magnitude of reported losses (Isaac 2008). This discussion highlights the importance of estimates of fair value to the capital markets (SEC 2008).

While estimates are of increasing importance to the interpretation of financial statements, accounting estimates are, by their nature, difficult to audit. For example, model-based estimates of fair values and impairments require consideration of management's plans and intentions (e.g., how business units will be defined, whether management will commit additional resources to a particular business unit or abandon it), which are difficult to verify. In addition, the complex finance-based modeling underlying many estimates may be beyond an auditor's expertise. Thus,

the complexity of many estimates and their judgment-based nature create difficulties for auditors who attest to their reasonableness (Copeland 2005). Consistent with these concerns, recent Public Company Accounting Oversight Board (PCAOB) inspection reports for the largest audit firms cite a number of deficiencies related to auditing estimates (PCAOB 2010d).

The purpose of this paper is to analyze the process of auditing complex estimates to provide insights into how auditors accomplish this difficult task and how the actual process matches up with the mandated one, as well as to identify the points at which auditors experience problems with the task. Our ultimate goal is to provide recommendations that will help to improve auditor performance of this critical task within the current institutional framework. We rely on three sources of data for our task analysis: auditing standards, interviews with partners and senior managers, and recent PCAOB inspection reports. We focus our analysis on the audit firms that audit more than 100 public companies annually (i.e., annually inspected auditing firms).

Auditing standards require auditors to identify areas or accounts that may contain significant estimates, evaluate the reasonableness of estimates, and conclude whether estimates contain material misstatements. To evaluate the reasonableness of estimates, standards require that auditors take one or more of the following three approaches: test management's process for generating estimates; develop independent expectations of estimates; and/or review subsequent events and transactions that provide evidence relevant to estimates. The experienced auditors we interviewed reported a process that generally parallels the one outlined in the standards. However, interviewees only infrequently mentioned developing independent expectations or reviewing subsequent events data to evaluate the reasonableness of estimates; instead they focus on testing management's process for generating complex estimates. Additionally, auditors

reported performing few of the recommended steps to audit management's process, and, in particular, none described considering whether additional factors beyond the assumptions made by management should be included in management's model. These issues raise concerns that management may be able to lead auditors "down the garden path" because auditors do not tend to generate independent estimates or consider what management has neglected to include in its estimation model. Instead they appear to accept management's model as a starting point and verify aspects of that model.

Our analysis of the past two years' inspection reports for the annually inspected audit firms identifies a number of steps in the process of auditing estimates with PCAOB-identified deficiencies. These largely corroborate the steps with problems that auditors identified during our interviews. Both the PCAOB and our auditor interviewees identify problems that indicate an over-reliance on management assertions. That is, auditors sometimes fail to adequately test assumptions, fail to consider the reliability of data used in testing, and fail to consider whether additional assumptions are needed. Both sources also indicated a failure to notice and reconcile conflicting evidence (for example, external evidence about default rates that is in conflict with management's assumptions). Auditors also noted significant problems in over-reliance on the work of specialists. We view these problems as arising from two underlying issues: (1) audits of estimates tend to be too focused on verifying aspects of management's model rather than on critically evaluating the reasonableness of the estimate and (2) auditors tend to have insufficient knowledge of valuation to engage in the necessary critical analysis of management or specialist models.

Framing the task of auditing estimates as one of verification rather than evaluation allows an auditor to be led "down the garden path" to management's number, and it results in external

evidence and conflicting evidence being overlooked. We expect that the impact of this inappropriate task framing is exacerbated by the typical organization of audit programs into seemingly unrelated steps, which encourages a “check the box” mentality rather than a critical review of evidence. Accordingly, we recommend changes to auditing standards and to how firms structure and conduct audits of estimates to encourage a more effective task framing.

Auditors indicated that a lack of sufficient knowledge about accounting, auditing, and especially valuation is an important limiter of auditor performance in auditing estimates. Many audit steps are conducted by relatively inexperienced auditors who lack knowledge of how their work fits into the bigger picture. Moreover, auditors typically enlist the help of specialists in auditing estimates because they don’t have valuation expertise, and they worry that they over-rely on the specialist because of coordination issues and lack of a common vocabulary. We recommend that audits of estimates make use of more experienced auditors, and we further recommend that auditors develop expertise in valuation.

In the next section of the paper we discuss prior literature on accounting estimates. In Sections 3 and 4 we describe how estimates are audited and the problems that occur during the audit of estimates, respectively. We make our preliminary recommendations in Section 5 and we identify limitations of our analysis in Section 6.

2. Background Literature

Reporting and Use of Estimates in the Financial Statements

Estimates are items in financial statements for which the measurement or valuation is uncertain. The uncertainty may depend on the outcome of future events or on data that cannot be accumulated on a timely, cost-effective basis (AICPA 1988). For estimates to be useful in decision making, they must be relevant and representationally faithful (i.e., reliable) (FASB

2010). However, uncertainty allows room for management bias in estimates (Lundholm 1999), which reduces the decision usefulness of financial statements.

Research indicates that management biases a variety of complex estimates, including loss reserves, warranty reserves, and goodwill impairments, in response to incentives. Financially weak insurance companies understate their estimated claim loss reserves relative to stronger companies, with those nearing the threshold that invites regulatory scrutiny understating their reserves most (Petroni 1992). Loss reserves appear to be understated even for the subset of insurers that auditors are likely to scrutinize most closely (Gaver and Paterson 2007). Companies that just meet their earnings targets report significantly lower warranty accruals than their counterparts (Cohen et al. 2011). Among companies with apparently impaired assets, goodwill impairments are less likely to be taken when doing so will heighten the risk of exchange delisting (Beatty and Weber 2006) or when management bonuses or debt covenants are likely to be goodwill inclusive (Ramanna and Watts 2011). Finally, management delays recording goodwill impairments, thus inflating recorded goodwill, until there is clear evidence the impairment has occurred, resulting in the impairment lagging the operating performance of the unit by at least two years (Li and Sloan 2011). Collectively, these studies indicate that management bias is pervasive in estimates and that it survives the financial statement audit.

Consistent with this conclusion, additional evidence indicates that estimates that are more likely to be biased are less value relevant than other financial statement items. For example, the market discounts warranty accruals of firms that are more likely to understate their liability (Cohen et al. 2011), and goodwill impairment announcements that lag weak operating performance cause only small market reactions (Li and Sloan 2011). Fair values based on models (i.e., estimates using Level 3 inputs) are less value relevant than fair values based on

comparable market transactions or other observable inputs (Song et al. 2010). Types of accruals that involve less reliable measurement (i.e., more estimation) have lower earnings persistence (Richardson et al. 2005). Further, incorporating estimates into prediction models fails to improve the prediction of cash flows or earnings (Lev et al. 2010). In combination, these studies suggest that as estimates become less reliable they become less useful to capital market participants. This indicates an “urgent need to enhance the reliability of accounting estimates” (Lev et al. 2010, 805).

While the common view is that estimates are not useful to market participants because they are biased and unreliable, an additional possibility is that investors’ cognitive limitations in interpreting and using estimates cause the reduced association between reported estimates and market outcomes. For example, investors have difficulty understanding how fair values of liabilities relate to firm value (Koonce et al. 2010). Moreover, investors over-correct for reduced estimate reliability when judging the fair value of assets (Kadous et al. 2011), and this could dampen market reactions to estimates with apparently low reliability.

Auditor Judgments Regarding Estimates

There is considerable research into auditor judgments about estimates. An important finding is that auditors are less conservative in light of ambiguity in estimates than financial statement users (Nelson and Kinney 1997). The authors attribute the difference to auditors’ incentives to please clients. Much of the subsequent research uses accounting estimates as a rich setting in which to explore the impacts of auditors’ incentives and prior beliefs on their decisions rather than focusing on the process of auditing estimates, per se, or on how to improve that process. That is, in addition to allowing management the opportunity to bias estimates, uncertainty about the proper reporting of a financial statement item allows auditors’ incentives to

influence their judgments either directly or through motivated reasoning (Johnstone et al. 2001; Kadous et al. 2003). Consistent with this idea, heightened engagement risk (i.e., an incentive to require conservative reporting) reduces auditors' willingness to permit aggressive reporting of uncollectible receivables (Hackenbrack and Nelson 1996) and enhances generation of alternative accounting methods for complex revenue recognition among auditors with better revenue knowledge (Johnstone et al. 2002). In contrast, pressure from management increases the likelihood that auditors will accept management's aggressive revenue recognition method and even view that method as "best" (Kadous et al. 2003), and biases auditors' judgments about contingent liability disclosures (Jenkins and Haynes 2003) and inventory obsolescence (Haynes et al. 1998) towards managements' preferences.

Auditors' initial beliefs about an estimate also affect their evaluation of the estimate. Auditors process evidence that is consistent with their own prior beliefs about fair values less deeply than inconsistent information, resulting in an increased tendency to overlook or underweight problems signified by the evidence (Earley 2002). Additionally, auditors with less knowledge about revenue recognition generate fewer alternative accounting methods when they inherit a method than when they do not (Johnstone et al. 2002). Finally, awareness of managements' estimates or preferences prior to developing expectations in analytical procedures or evaluating evidence biases outcomes in favor of those estimates (McDaniel and Kinney 1995; Jenkins and Haynes 2003). Collectively, these studies suggest that auditors experience difficulty overcoming initial beliefs, whether they originate from management or are self-generated.

Recent research demonstrates that the presence of supplemental disclosures changes how auditors evaluate uncertain estimates. That is, auditors tend to require adjustment to management's fair values that are more subjectively determined and more imprecise in the

absence of supplemental disclosures, but not when such disclosures are present (Griffin 2011). Thus, characteristics of an estimate and its context also affect auditors' judgments about estimates.

These studies indicate that when auditing an estimate, auditors are likely to over-rely on management's preferences and on their initial beliefs about the estimate or the appropriate method. The uncertainty underlying estimates allows for direct effects of incentives and encourages use of cognitive processes that make preference-consistent choices appear more favorable and that makes preference-inconsistent and belief-inconsistent information more difficult to notice and process. Further research into the process of auditing estimates is needed to improve auditor performance. Martin et al. (2006) call for more research on the audit steps and procedures used to audit fair values and other estimates. Similarly, Nelson and Tan (2005, 47) note that ". . . it is incumbent on researchers to shed insights on the tasks that auditors perform and on emerging audit practices" to better address problems in specific areas such as auditing estimates.

3. How Are Estimates Audited?

We examine the process by which accounting estimates are audited by analyzing auditing standards, which describe the ideal (and required) process, and interview data from very experienced auditors, which describe the actual process used.

Standards about Auditing Estimates

Auditors are responsible for evaluating the reasonableness of management's accounting estimates. Statement on Auditing Standards (SAS) No. 57, SAS No. 101, and International Standards on Auditing (ISA) No. 540 identify several important processes that are required when auditing estimates (AICPA 1988, 2003; International Federation of Accountants (IFAC) 2008).

We discuss the steps involved below based on the U.S. standards' requirements, which are substantively the same as the international standards. We summarize these steps in Figure 1.

[Insert Figure 1 here]

When evaluating estimates, auditors first must determine whether management has identified all the circumstances that require material estimates. Next, the auditor must evaluate the reasonableness of management's estimates. To do this, the auditor must obtain an understanding of the process management uses to develop the estimates. This includes understanding both the model management uses to generate the estimates and why management chose this model. Based on this understanding, the auditor then decides how to evaluate the reasonableness of management's estimates. Standards permit the auditor to: (1) review and test management's process for generating estimates, (2) develop an independent expectation for the estimate, and/or (3) review subsequent events or transactions that are related to the estimates.

If the auditor decides to review and test management's process, he or she must select any combination of the following steps that will provide sufficient evidence about the estimate: test controls over preparation of the estimates; test the relevance, reliability and sufficiency of the data used in the model; test the accuracy of the computations made in applying the model to management's situation; evaluate the appropriateness of the assumptions used in the model; and finally, compare the estimate to external evidence.

Alternatively, the auditor may develop an independent expectation for the estimate based on his or her understanding of management's circumstances. Developing an independent expectation requires that the auditor or specialist produce an estimate using a model and assumptions based on his or her understanding of management's situation. Finally, in addition to or instead of the other two methods, the auditor may consider whether there are any subsequent

events or transactions that provide evidence about the reasonableness of estimates or the assumptions used to produce the estimates. The final step in auditing estimates requires the auditor to evaluate the reasonableness of the estimate relative to the financial statements taken as a whole and to consider whether there is a misstatement of the estimate that requires adjustment.

Auditors' Process of Auditing Estimates

We interviewed 24 partners and senior managers from six large audit firms to understand how estimates are actually audited. We focused on very experienced auditors as participants because we wanted people whose positions would allow them to see the whole process of auditing estimates, rather than people who would be focused on completing a few steps in the process as might be the case with staff or seniors. We believe experienced interviewees would best understand the factors that affect how audits of estimates are conducted and what are the underlying causes of problems with this task. We sought evidence from interviewees about the major steps in the process of auditing complex estimates, how they go about completing those steps, the order in which the steps are completed, and the rank of the auditor primarily responsible for preparing each step. Additionally, we asked auditors about the difficulties they commonly encounter when auditing estimates.

We identified participants by asking contacts at each of the annually inspected firms that operates in our geographical area to provide us with contact information for one or two senior managers, partners, and technical consultation directors for the office or region. The firms we contacted are BDO Seidman, Deloitte, Ernst and Young, Grant Thornton, KPMG, and PricewaterhouseCoopers. Participating auditors were from five cities and their audit experience ranged from 8 to 41 years, with an average of 19 years. Additional demographic information is provided in Table 1.

[Insert Table 1 here]

Two authors conducted phone interviews during October and November of 2010. Interviews were structured according to a script. We asked questions in the order they appear in the script, but we allowed participants to elaborate as they wished, and we documented the interviews by taking notes on a copy of the script. Interviews ranged from 50 to 120 minutes in length, with an average time of 69 minutes.

We began our interviews by asking auditors to think about the process of auditing a complex estimate such as a fair value or impairment analysis. We asked them to walk us through the key steps in the process and to describe what level auditor typically performs the steps and the order in which they usually take place.¹ Two authors, one of whom did not participate in the interviews, independently coded the process steps the interviewees described into the 10 steps identified in the auditing standards plus five additional steps not identified in the standards. Initial inter-rater agreement was 92.1%; the coders met to resolve the differences and that data are reported here. Cohen's Kappa, a measure of inter-rater agreement beyond that predicted by random chance, was 0.91 ($p < 0.01$).

We summarize the key steps auditors described and how they described performing those steps in Table 2, and we discuss the results below.² We also report in Figure 1 the percentage of interviewees that describe performing each step included in that process. At the end of this section we discuss the consensus among auditors for the order in which these steps are applied and the level of auditor performing each step.

[Insert Table 2 here]

¹ We added this topic to the script after conducting three interviews; therefore, only 21 auditors answered this item.

² Sixteen of 21 auditors referred to one or more specific types of estimates as they described the audit process. They described auditing the following accounts: impaired assets (9); fair values (7); revenue (3); other unspecified complex estimates (2); derivatives, pensions, self-insurance, and vendor promotional allowances (1 each).

We prompted auditors by asking whether identifying accounts with significant estimates or impairments was the first step in the process and all 21 agreed that it was. For the remaining steps in the process, we asked interviewees to identify the steps they believe are important when auditing estimates but we did not prompt them with any additional steps. We did not prompt them further because we were interested in learning which steps very experienced auditors believe are most important and are commonly performed when auditing complex estimates, and in what order they are performed. Additional prompts could interfere with the auditors' thought processes or could have communicated to the auditors that we considered certain steps to be important.

When asked how they identify accounts with significant estimates, 16 auditors described identifying estimates based on their understanding of the transactions management engages in and management's business and industry.³ Four auditors supplement this process with their knowledge of estimates present in prior years' financial statements and two supplement this by asking management which accounts contain estimates. Six auditors described first identifying material accounts and then considering whether significant estimates were required in these accounts. Seven auditors described identifying accounts with significant estimates during the brainstorming and risk assessment processes during audit planning. Finally, three auditors reported getting a specialist involved at this stage to help with identification of accounts containing estimates.

Eighteen auditors (85.7%) described understanding management's process for preparing the estimate as an important step in the process. Fifteen auditors reported that they do this by determining the model used to generate the estimate and the rationale for the model. This

³ Interviewees often described more than one way to complete each step. Thus, the total number of responses to a step can exceed the number of auditors that report completing the step.

includes understanding the controls over the process (noted by five auditors), the data used in the model (noted by three auditors), the assumptions used in the model (noted by five auditors) and which elements of the estimates are the key drivers or represent the biggest risk (noted by four auditors). Additionally, six auditors reported identifying who prepares management's estimate and their qualifications, including whether management uses a third party to prepare the estimate. Three auditors reported understanding the method used by performing a walkthrough of the transaction flow; one reported using a specialist to understand the method. Overall, the goal of this step of the process was to understand enough about how management generated its estimate to determine how to audit it. This includes understanding what judgments go into the estimate and where the "soft spots" are in the process.

We now detail the methods auditors described using to audit estimates. Auditors described using each of the three methods standards allow (i.e., testing management's process, preparing independent estimates, and reviewing subsequent events); however, testing management's process was the most common method described. Nineteen auditors (90.5%) described performing one or more steps required to test management's process.

Only two auditors (9.5%) specifically described understanding and evaluating the controls related to the estimation process. Both discussed evaluating whether the controls were designed to adequately address the risks in the estimation process and testing the effectiveness of controls over the estimation process and data used in the estimate.

Twelve auditors (57.1%) described testing the data used in the model. The auditors described this largely as a mechanical process using tests of details of balances to verify the data used. More specifically, eleven auditors described reconciling the numbers used in the model to the financial statements or accounting records, two described checking the mathematical

accuracy of the model inputs, and three described using substantive testing to verify the completeness and accuracy of the data.

Seventeen auditors (80.1%) reported evaluating the appropriateness of model assumptions, and they described this step in many ways. Fifteen auditors described identifying what assumptions are used in the model and testing their reasonableness. Of these, four described performing sensitivity tests on the assumptions to determine which are the key drivers of the estimate. This allows them to determine which assumptions require the most attention. Four elaborated that they evaluate the reasonableness of assumptions by making sure that any discount rates or growth rates used are valid and are corroborated. Two auditors noted that they use a specialist for determining the appropriateness of assumptions, particularly for discount rates. Nine auditors reported that they evaluate the accuracy of management's past estimates using a "look back" procedure, comparing prior estimates to actual realizations to determine whether management is consistently optimistic or otherwise biased. Finally, nine auditors reported checking the assumptions contained in the model for consistency with information used in other forecasts. They reported evaluating whether estimates are computed consistently over time, whether forecasts used in estimates are the same as those shared with analysts and as used in other estimates, and whether the forecasts make sense in light of all the available information. There are thus a variety of methods available to auditors for evaluating the appropriateness of assumptions, and each of our interviewees tended to describe several of these.

Four auditors (19.0%) reported that they test managements' calculations as a part of their process. They report recalculating the model to make sure that inputs are used in the correct way and that the model makes sense.

Eight auditors (38.1%) reported considering whether to use the second method of auditing estimates—preparing an independent expectation of the estimate to compare to management’s estimate. Two auditors described having the firm’s specialists use benchmark models that are then compared to management’s estimate. Seven reported that they would sometimes prepare independent expectations, but they varied considerably on the conditions that require this. Only one auditor reported that independent estimates are always necessary. Five auditors noted that whether they prepare an independent expectation depends on the type of estimate being audited; however, three elaborated that independent expectations are used for complex estimates such as goodwill or fair values while a fourth indicated that independent expectations are only prepared for routine estimates such as the allowance for doubtful accounts or inventory obsolescence. This fourth auditor reasoned that only routine estimates clearly indicate the appropriate model to be used. The fifth auditor noted that an independent expectation is prepared when management does not use an appropriate model or cannot justify its estimate. Overall, auditors appear to generate independent estimates only infrequently, and there was little consensus about when this would be done.

Auditors also use the third method of auditing estimates—reviewing subsequent events—only infrequently. Two auditors (9.5%) described reviewing subsequent events data to provide evidence about the appropriateness of recorded estimates. They described this as useful for evaluating assumptions at year-end. They noted that this was useful for evaluating accruals but not for fair values.

Fourteen auditors (66.7%) described the process of concluding whether the estimate is fairly stated or requires adjustment. Ten auditors reported they consider whether the estimate is reasonable based on materiality. Four auditors reported that they conclude about the estimate by

comparing their independent expectation of the estimate to management's number. If there are problems or inconsistencies between the auditor's expectation and management's estimate, one auditor also noted that the problem would be referred back to the auditor's specialist for further testing or clarification.

In addition to the steps discussed above, which were expected to be important based on professional standards, auditors indicated additional steps are commonly performed when auditing estimates. Eleven auditors (52.4%) reported that after they understood management's method, but before they started testing, they decided which approach to auditing estimates would be most appropriate in the circumstances. Seven auditors reported deciding whether to audit management's process or prepare an independent estimate at this point; only one auditor reported considering whether using subsequent events data would be useful. These auditors reported that independent expectations are more likely to be prepared when management has low expertise or used a poor process to develop its estimate or when the account is high risk. One auditor noted that independent estimates are rarely prepared unless there is a single commonly accepted method because using a model other than management's generates differences in the estimate, which require examination. He argued that the process of resolving the differences essentially results in an audit of management's process, so they are better off using that route from the beginning. Additionally, seven auditors reported deciding at this point whether a specialist would be needed to audit the estimate. They reported that specialists are more likely to be used for more complex assumptions and accounts, high risk accounts, or when the audit team lacks expertise or technical experience with the estimate or model.

Four auditors (19.0%) described evaluating the reasonableness of management's model before beginning to audit management's process. The audit firms' specialists usually perform

this assessment if a valuation estimate is being audited; however, the audit team will evaluate the method if the estimate is less complex and does not require finance-based assumptions.

Four auditors (19.0%) described evaluating the reasonableness of the estimate prior to concluding about the fairness of the estimate. These auditors described stepping back to understand how the estimate fit with the rest of the financial statements, whether it made sense given updated information about management, and assessing what could go wrong with management's estimate.

Finally, five auditors (23.8%) described the process of documenting the work done; three auditors described this as a process that is integrated with the audit process while two auditors described documentation as a separate step that is completed at the end of the process. Overall, interviewees described all of the steps identified in the professional standards, except that they did not describe considering external evidence as a separate step. This may indicate that this step is rarely performed or it may indicate that auditors consider this part of evaluating assumptions.

Nonetheless, the order of performance of steps varies across auditors. We summarize and describe the consensus about the order below and in Figure 2. All auditors began as prompted by identifying accounts with significant estimates. This was generally followed by understanding management's process or model used to develop the estimate and then by deciding which method to use to audit management's estimate. Next, auditors perform the various procedures to actually audit the estimate. The order and inclusion of these steps varies by auditor. After these steps, the auditors complete the process by determining whether the estimate is reasonable. If the estimate does not appear reasonable considering the rest of the audit evidence and the financial statements taken as a whole, they iterate back through the original process to collect additional evidence, or, in some cases, they decide that their initial approach

was inappropriate or inefficient and choose a new approach (e.g., preparing an independent expectation of the estimate instead of testing management's estimation process). Once the evidence is sufficient, auditors make a conclusion about whether the estimate contains a material misstatement.

[Insert Figure 2 here]

Auditor Rank and the Process of Auditing Estimates

We asked our interviewees to identify the rank of the auditor typically preparing each step in the audit of complex estimates. Table 3 reports the results. We find that seniors and managers are the most common primary preparers of every major step in the process of auditing estimates. Seniors were more likely than managers to be named as the primary preparer for every step except identifying accounts with estimates (seniors 28.1% versus managers 31.6%), evaluating the sufficiency of evidence (27.3% versus 36.4%), and concluding about the account (22.2% versus 44.4%). These are the steps likely requiring the most judgment, but it is notable that while managers are more likely to be identified as the primary preparer for these tasks, seniors also commonly prepare this work. Additionally, it is notable that staff auditors were listed as primary preparers for nearly every step in the process, though they are more likely to be the preparer on mechanical tasks such as testing the data used in the model or testing management's calculations. Partners are most likely to be involved as preparers in the early stages of auditing estimates (i.e., identifying accounts with estimates, understanding management's method, selecting the audit approach, and evaluating the reasonableness of management's method) and the final stages (i.e., evaluating the sufficiency of evidence and concluding about the account). Specialists are most involved in the early stages of the audit of

estimates (i.e., understanding management method, selecting the audit approach, and formulating an independent expectation).

[Insert Table 3 here]

Comparison of Standards and Actual Process of Auditing Estimates

We find that auditors describe a process for auditing estimates that is broadly consistent with that required by the auditing standards. Standards require that auditors use at least one of three approaches to audit estimates. We find that auditors most commonly audit management's process for generating the estimate rather than prepare an independent expectation or use subsequent events data to validate an estimate.

We also find that auditors collectively describe this process of auditing management's estimate as involving four of the major steps mentioned in standards: testing controls, testing the data, testing management's calculations, and evaluating the assumptions used, plus evaluating the reasonableness of management's model, a step not contemplated by the standards. However, on average, auditors reported performing only an average of 1.7 of the 5 steps standards mention. While these steps are not all strictly required by standards, our view is that it would be difficult to collect sufficient evidence about the reasonableness of the estimate without performing all steps in most cases. In addition, in summarizing their process, none of the auditors mentioned the fifth step—considering whether there were additional factors or assumptions beyond those already incorporated in the model that should be taken into account. Instead they described using historical or prospective internal and external data to help evaluate the appropriateness of the model. It may be that alternative factors are commonly considered, but were not mentioned during the interviews. Alternatively, this omission by the auditors may indicate that this step does not receive much attention during the audit of estimates.

4. What Problems do Auditors Encounter in Auditing Estimates?

We now consider the problems that auditors encounter in auditing estimates. We base our analysis on PCAOB inspection reports, which tell us what types of auditing deficiencies occur and where they tend to occur, and on interviews with very experienced auditors, which describe problems from the auditors' perspective.

Analysis of PCAOB Inspection Reports

In this section, we examine the problems related to auditing estimates that the PCAOB identified in the 2008 and 2009 inspection reports for the annually inspected auditing firms.⁴ The PCAOB must annually inspect firms that audit more than 100 issuers (i.e., public companies). We analyze the extent to which accounts containing estimates are identified as problematic, what the accounting and auditing issues associated with these accounts are, and in which steps in the process of auditing estimates the deficiencies occur. Church and Shefchik (2011) examine the content of inspection reports for annually inspected firms for an overlapping period (2004 - 2009). However, their analysis does not focus on audits of estimates. They report more generally on the severity of deficiencies identified, whether the deficiencies resulted in misstatement, the frequency of deficiencies, accounts affected over time, and audit firm responses to inspection reports.

The PCAOB takes a risk-based approach when selecting the audits to be inspected by choosing audits that they believe have higher risk of material misstatement (PCAOB 2008). They further choose the areas of these audits they view as most likely to pose the biggest accounting, auditing, or compliance challenges (Olson 2008). In 2009, for the first time, the

⁴ In 2008, there were ten annually inspected firms: BDO Seidman, Crowe Horwath, Deloitte, Ernst and Young, Grant Thornton, KPMG, KPMG Canada, Malone and Bailey, McGladrey and Pullen, and PricewaterhouseCoopers. In 2009, there were only eight annually inspected firms as KPMG Canada and Malone and Bailey did not require annual inspection.

PCAOB reported the number of audits examined for each audit firm. That year they reported deficiencies for 56 of the 371 audits they examined for the annually inspected firms. The PCAOB does not report how many financial statement accounts they examine for the audits they inspect. Because the PCAOB's inspection process is not intended to be random, the deficiencies reported in the inspection reports are not necessarily representative of all deficiencies that might exist on audit engagements. However, the reports do provide evidence about the types of problems auditors have when auditing material, higher risk areas. Consequently, to the extent that the PCAOB examines accounts containing estimates, the problems identified are likely to represent the more difficult and important issues that auditors encounter when auditing estimates.

Two authors independently read and coded the content of the inspection reports. For each issuer listed in each audit firm's report, we identified the financial statement account group(s) with PCAOB-identified auditing deficiencies. When the PCAOB identified deficiencies in more than one account group per issuer, we included each account group identified as a separate deficiency to be coded. For example, in BDO Seidman's 2009 inspection report, the PCAOB identified eight issuers with auditing deficiencies. For Issuer A, the PCAOB identified four account groups with deficiencies (i.e., fixed-maturity securities, available-for-sale investments, claims losses, and revenue). When disclosed, we also collected the general accounting or auditing issue for the account; the accounting and auditing issues for BDO Seidman's Issuer A included fair value, impairment, estimation, and meeting audit objectives, respectively, for the above identified accounts (PCAOB 2010a). Account group(s) and accounting or auditing issue were clearly stated in the inspection reports, so there were no coding disagreements for these items.

Table 4 summarizes the accounts with PCAOB-identified auditing deficiencies and how frequently these accounts were identified as having deficiencies. The PCAOB identified accounts with deficiencies 168 times, with 99 (58.9%) of these related to four particularly judgment-lade accounts: revenue, investments and securities, goodwill, and allowance for loan losses. Other accounts with deficiencies similarly require significant judgment to audit and many contain estimates (i.e., intangibles, income taxes, accounts receivable, derivatives, and long-lived assets). This analysis corroborates the PCAOB's statements that they focus their inspection efforts on material accounts with complex accounting and auditing issues. Additionally, the evidence indicates that accounts that require significant judgment or estimation figure prominently among accounts with PCAOB-identified auditing deficiencies,

[Insert Table 4 here]

Table 5 summarizes the accounting and auditing issues that the PCAOB identified as related to the deficiencies. The table reveals that fair value, impairments, and estimation accounted for 88 of 130 (67.7%) issues identified. This indicates that the deficiencies identified by the PCAOB related to more subjective accounting. This reiterates the importance of improving auditor judgment related to these issues.

[Insert Table 5 here]

Next, for each account group, two authors independently coded the PCAOB-identified auditing deficiency(ies) based on the description in the inspection report. We developed a coding scheme describing 14 unique auditing deficiencies. The first six deficiency types in the coding scheme identify problems with how auditors use valuation or other models that underlie estimates. These deficiencies include: inappropriate omission of items from evaluation; failure to test data used in the calculation of the estimate; insufficient testing of model assumptions;

failure to sufficiently understand management's method; failure to consider external evidence when evaluating the model; and failure to test controls over inputs to the model. See the appendix for further description of these categories and the remaining eight categories that are not specifically related to use of models.

For each account group, we coded each cited deficiency, such that each account group could have multiple deficiencies. For example, for BDO Seidman's first account group on Issuer A (i.e., fixed-maturity securities) the PCAOB identified two auditing deficiencies: relying on controls without testing their effectiveness and failure to test data used in valuation models. The coders' initial agreement was 71.9 percent; Cohen's Kappa was 0.68 ($p \leq 0.01$). Coders mutually agreed on the final category codes, which are used in the analysis.

In Table 6, we summarize the types of auditing deficiencies the inspectors identified and their relative frequencies. Inspectors identified a total of 331 deficiencies. Deficiencies specific to valuation models or methods used in auditing estimates were common and were noted in 234 out of 331 total deficiencies identified (70.7 percent). The PCAOB noted 73 instances in which auditors failed to test or understand the assumptions used in a model or method, 51 instances in which auditors failed to test the data they relied on when using a valuation or other model, 35 instances in which auditors relied on controls without testing the effectiveness of the control or without identifying an existing material weakness, 26 instances in which auditors failed to consider the effect of external evidence or trends on the reasonableness of inputs to the model, 25 instances in which they failed to understand or evaluate the method or model used to compute valuation, and 24 instances in which auditors omitted certain categories of items from consideration for evaluation. Of the other deficiencies noted in the table, some are clearly not related to audits of estimates (e.g., problems with analytical procedures and confirmations), and

others may or may not relate to estimates (e.g., failure to collect sufficient evidence).

Additionally, the PCAOB noted problems with nearly every step that standards describe for the process for auditing estimates, including considering external evidence, the step that our interviewee auditors did not indicate they performed. The exception is that the PCAOB made no specific mention of problems specifically related to preparation of independent estimates or review of subsequent events.

[Insert Table 6 here]

Difficulties Identified by Auditors

We sought corroborating evidence from our interview participants about which steps in auditing estimates, if any, they see as causing difficulties for auditors.⁵ We were interested in whether their views of the general issues matched those of the PCAOB, but we also expected auditors to be able to provide information relevant to the underlying causes of the problems they identified and the ways in which these problems affect the audit. This allows us to go beyond merely documenting types of problems auditors experience to provide evidence that many of these problems are related to a few underlying causes. Figure 2 shows how frequently the auditors reported problems for each step of the process of auditing estimates.⁶

Four auditors (16.7%) described problems with identifying accounts containing significant estimates. Three described the problem as starting the audit work without fully understanding the area. This makes it difficult to see where the risk is, resulting in a misallocation of effort or in framing the problem incorrectly so that the analysis that follows is

⁵ All 24 interviewees answered this question.

⁶ The same two authors who coded the process responses also coded the problems the auditors identified into the 17 categories depicted in Figure 2; they followed the same resolution procedures used for the process responses. Initial inter-rater agreement was 74.0% and Cohen's Kappa was 0.71 ($p < 0.01$).

inappropriate (e.g., an auditor could misidentify the reporting level for a goodwill impairment, causing him or her to include the wrong accounts in the analysis).

Six auditors (25.0%) described problems with understanding management's method or model. Specifically, these auditors noted that they sometimes fail to understand what the model's key risk drivers are due to a lack of knowledge about the methods or models used and therefore they misinterpret which assumptions are critical. Two auditors (8.3%) described problems with choosing the audit approach. They noted that they sometimes fail to involve a specialist to provide input on the method or assumptions contained in the estimate or they fail to reconsider whether the planned audit method is best even if a better approach is available.

Additionally, six auditors (25.0%) described problems with evaluating the reasonableness of management's model. They noted that when their attention is focused on auditing management's numbers, they sometimes fail to consider whether management's method is inappropriate or has changed from the prior year without reason. Additionally, they noted that auditors' knowledge of the models used to formulate the estimates is frequently inadequate. Consequently, auditors sometimes treat the model as a black box and over-rely on specialists when they should understand the process themselves.

Six auditors (25.0%) described problems related to testing the underlying data used to prepare the estimate. All six characterized the issue as auditors overlooking the possibility that the data underlying the estimate is incomplete or inaccurate. In fact, four auditors described receiving reports from management or a third party and relying on the report without considering whether the underlying data was reliable. Similarly, three auditors (12.5%) described a failure to understand and test relied-upon controls. They attributed this problem to an oversight, as well as

to overreliance on management. These issues can prevent auditors from identifying when the estimate is based on inaccurate or inappropriate data.

Fourteen auditors (58.3%) described problems with validating the assumptions that underlie estimates. Seven reported that auditors often lack knowledge or experience with the finance methodology that forms the basis for discount rates and other elements of models and that this impairs their ability to evaluate the assumptions. This lack of knowledge makes it difficult to ask appropriate follow up questions to challenge assumptions and causes them to rely on surface level analysis that may not make sense when considered more carefully. Two auditors noted that auditing assumptions requires directly challenging managements' choices; they noted that this sometimes causes them to stop investigating once they receive evidence supportive of the assumption without analyzing its relevance. Three auditors also reported difficulty in validating assumptions when unusual market conditions are present or when dealing with small industries or private companies.

Four auditors (16.7%) noted problems with considering how external evidence should affect the estimate or assumptions. Two auditors noted that they sometimes fail to make use of relevant external benchmarks while another noted that they sometimes fail to evaluate inconsistencies between the estimate or underlying assumptions and implications of the current economic environment. Another noted that they fail to evaluate relevant industry trends because they do not always understand how industry or economic information affects the company.

Seven auditors (29.2%) described problems with evaluating whether the estimate is reasonable given the evidence collected and the pattern of information in the rest of the financial statements. Five auditors reported that auditors have trouble seeing the big picture that surrounds the estimate and so may fail to realize how negative evidence collected during the

audit should impact the estimate. Additionally, three auditors reported that auditors sometimes fail to notice that management's estimates are all at the positive end of the reasonable range, indicating potential bias. They indicated that taking a step back to see the big picture at this stage helps them to avoid these problems.

Our interviewees also reported some general problems that likely affect multiple steps in the process of auditing estimates. Four auditors (16.7%) described problems relating to auditor inexperience with complex accounts or lack of knowledge of relevant accounting rules related to auditing estimates. They reported that this lack of experience and knowledge makes it hard for auditors to know what questions to ask or to understand the significance of the evidence.

Four auditors (16.7%) noted that problems arise with coordinating the work of specialists. Two auditors noted that either relying too heavily on the specialist's analysis or failing to involve a specialist can result in auditors failing to obtain an understanding of management's method or model. One auditor noted that third party specialists are sometimes reluctant to disclose their proprietary models, and this can prevent the auditor from getting an understanding of models. Finally, three auditors noted problems with coordinating who is responsible for testing which assumptions, gaining access to specialists when needed, and understanding what information the specialist needs. In general, coordination issues that limit access to specialists and dependence on specialists to understand the models prevent auditors from gaining a sufficient understanding of the models to effectively evaluate the audit work around estimates. In addition, coordination issues can lead to some work being overlooked.

The problems auditors identified were largely focused on auditing management's process for preparing the estimate. Twenty (83.3%) of our interviewees described one or more problems with this approach, while only one auditor (4.2%) described a problem with each of the other two

approaches (preparing independent estimates and using subsequent events data to evaluate estimates). Regarding independent estimates, one auditor described difficulty in estimating fair values. In particular, a poorly developed estimate of one element of a projection (e.g., a terminal value) is added to the otherwise rigorously determined estimate because the auditor does not understand the significance of doing so. Regarding use of subsequent events data, one auditor reported that not enough time has passed at the point the estimates must be audited to make using this approach feasible, suggesting that short financial reporting deadlines limit the effectiveness of this approach. The relative infrequency of problems cited with independent estimates may indicate that auditors treat these as a product of a black box process that they do not adequately understand, or it may reflect the fact that this audit approach is not used much. Similarly, the fact that the deficiencies cited by the PCAOB focus exclusively on the steps involved in auditing management's process is likely attributable to the fact that the other methods are not used nearly as frequently in practice.

In sum, the interviews indicate that auditors experience problems throughout the process of auditing estimates. In addition to problems with auditing management's process, auditors noted problems with choosing which accounts to evaluate and which audit approach to take in the early stages of the audit and with evaluating the reasonableness of the estimate at the end of the process. It is clear that auditors believe that the problems primarily occur in the steps that require the most judgment to complete: understanding management's method or model; evaluating the reasonableness of the model used; evaluating the appropriateness of the assumptions used in the model; and evaluating the reasonableness of the estimate. Auditors seem to struggle in the final stages of auditing estimates because they must consider two types of information not contained within the estimate or model itself—external information about

economic and industry conditions and information about other aspects of the audit that may be inconsistent with the estimate or may otherwise indicate potential problems with the estimate.

Overall, the interviews make clear how inter-related the individual steps are in the audit of estimates and how problems at one stage often cascade to affect other steps. That is, a failure to understand management's model often means the auditor doesn't understand the significance of a particular assumption or the sensitivity of the estimate to changes in that assumption. This makes evaluating the appropriateness of the assumption and evaluating the reasonableness of the estimate difficult.

5. Preliminary Recommendations

Accounting estimates are difficult to audit. Whereas some accounts can be verified mechanically, estimates are, by their nature, not verifiable. Our interviews with auditors reveal that while, in the broadest sense, auditors' process follows standards, auditors tend to focus on a limited set of methods and steps. Of the three broad approaches to auditing estimates identified in standards, auditors tend to test management's process rather than formulate an independent estimate or review subsequent events. And, while there is some diversity in reported types of work performed when auditors test management's process, auditors report performing, on average, only 1.7 of the 5 steps recommended for this audit approach. Moreover, most auditors who test management's process focus on evaluating the appropriateness of model assumptions and testing the data used in the model, while none report considering whether factors and assumptions not considered by the model should be incorporated.

These findings indicate a potential concern with over-reliance on management's assertions. Auditing estimates requires some reliance on management because estimates frequently depend on management's plans and intentions with respect to an item (e.g.,

management's plans to develop a business unit in the case of goodwill impairment testing). However, auditors tend to choose the method of auditing the estimate that relies most on management and least on external data. That is, they overwhelmingly focus on testing management's process. Moreover, they do not view consideration of external evidence as an important step in testing management's process. This combination of factors could result in auditors collecting too little evidence and collecting a too high proportion of their evidence regarding an estimate from management.

Our content analysis of inspection reports indicates that auditors have trouble with a number of aspects of auditing estimates, including omitting items from evaluation, failure to understand management's model or process, failure to adequately test controls and underlying data before relying on them, failure to adequately test assumptions, and failure to consider external evidence. These problems also indicate a consistent theme of over-reliance on management assertions and failure to get a good understanding of the estimate or how the estimate relates to its context.

The very experienced auditors that we interviewed highlighted many of these same issues. They identified the major problems as relating to understanding management's method or model, evaluating the reasonableness of the model used, evaluating the appropriateness of the assumptions used in the model, and evaluating the reasonableness of the estimate, especially when external evidence must be reconciled with management's estimate. Auditors also indicated problems in coordinating with specialists and with auditors preparing the work on estimates having insufficient knowledge. Again, these problems likely result in over-reliance on management's assertions, including management's assumptions, data, etc.

We view these problems as arising from two underlying issues: (1) audits of estimates tend to be too focused on verifying aspects of management's model rather than critically evaluating the reasonableness of the estimate and (2) auditors tend to lack the types of knowledge they need to be effective at auditing estimates. Regarding the first issue, evidence about auditors' process indicates that they tend to view the task of auditing an estimate largely as one of verifying individual aspects of management's estimation model, rather than that of assessing the reasonableness of the estimate. This task framing causes auditors to accept management's premise (or model) and proceed to testing the steps of the model, making it more difficult to notice and process inconsistencies and more difficult to identify useful external evidence not incorporated by management (e.g., Koehler 1991). Thus, auditors with this task framing are more likely to overlook or justify conflicting evidence, and can more easily be led "down the garden path" to management's number.

An initial recommendation, then, is for audit firms to re-frame the auditor's task with respect to estimates as that of critically evaluating the reasonableness of the overall estimate rather than verifying the individual elements of management's model or process. This reframing likely requires revising the firms' audit program tools, training materials, technical materials, and even hallway discussions to ensure sending a consistent message about this goal.

We believe that the impact of this inappropriate task framing on audit quality is exacerbated by the content of auditing standards and by the typical organization of audit programs into seemingly unrelated steps. Auditing standards require audits of estimates to begin with the auditor developing an understanding of management's method for developing the estimate (AICPA 1988). However, once auditors have invested effort in understanding management's model, they are likely to view it as easier and more efficient to test that model

than to generate an independent estimate. Investing effort in causal reasoning to understand the model is also likely to increase the plausibility of the model to auditors (Koehler 1991), and so exacerbates the over-reliance problem. In addition, becoming well versed in management's model before considering alternatives likely makes the auditor less able to generate independent estimates or to identify missing considerations (i.e., because of output interference). Thus, we recommend that auditing standards omit this step. The auditor may need to rely on management for some aspects of the audit of estimates, but it stands to reason that having the auditor first identify a reasonable means of making an estimate (e.g., a model or process that would be sensible, in the circumstances, and a set of considerations and assumptions) and then generating a reasonable estimate (e.g., based on an independent expectation or a subsequent realization) for comparison with management's estimate would produce higher quality audits of estimates than simply verifying various aspects of management's estimate.

We also noted that audit firms tend to break up the work surrounding estimates (and, indeed, all audit work) into lists of seemingly unrelated tests. Our view is that this format encourages a "check the box" mentality rather than a critical review of evidence. Auditors are encouraged to view each test as a separate task that must be individually documented and concluded upon, so it is natural that they would frame their work surrounding audits of estimates as a series of separate verification tasks rather than as a single exercise in critical reasoning. This task format discourages identification and reconciliation of external evidence and of conflicting evidence, and it leads to a risk of gathering insufficient evidence. For example, any information that arises that was not anticipated in the audit program is unlikely to be noticed, and therefore is unlikely to be resolved by further evidence collection or analysis.

We recommend several changes to the way audits of estimates are planned and documented to address these issues. First, whenever possible, auditors should choose a method of auditing the reasonableness of management's estimate that is independent of management's process. That is, they should generate an independent expectation and/or review subsequent events rather than verify aspects of management's model. We acknowledge that this will require auditors to invest in modeling and valuation knowledge, but we believe that such an investment has additional benefits (see below) and therefore is invaluable.

Second, to the extent it is feasible, audits of estimates should be conducted by true interacting teams, as opposed to being split into apparently unrelated parts performed by different individuals. Our interviewees indicated that seniors and managers are the primary preparers of much of the audit work in this area. These individuals, particularly seniors, likely lack the experience and knowledge to see how their work fits into the bigger picture. We believe that much of the work is sufficiently complex that less experienced auditors would benefit from the mentoring that comes from working side by side with partners and experienced managers. Moreover, audits of estimates may benefit from group discussion and brainstorming similar to that done for fraud detection.

Third, to the extent auditors continue to choose the path of auditing management's estimation process, we recommend using a judgment framework that ensures that auditors explicitly consider all important aspects of auditing that process. While auditors could choose to omit various steps, such as consideration of external evidence, use of a framework would ensure that skipping a step was purposeful, rather than an oversight.⁷ Fourth, to facilitate the suggested

⁷ While use of a judgment framework is the easiest suggestion to implement, we caution against treating it as a panacea. Without a simultaneous task re-framing, there is a risk that a judgment framework, like any other decision aid, will displace critical thinking, such that a "check the box" mentality results. Further, without a change in task framing, a judgment framework is unlikely to increase auditors' ability to take into account conflicting evidence,

reframing of the task of auditing estimates, we recommend that audit firms employ a more open-ended format that facilitates a bigger picture view for both audit programs and documentation of audit evidence. If audits of estimates are performed by interacting teams, then audit programs need not be divided into sets of steps for different individuals—a judgment framework could serve as a general audit plan. Open-ended documentation would force the audit team to consider what evidence is needed and ensure the final estimate is well supported.

Finally, we identified insufficient knowledge of accounting, auditing, and especially valuation, as an important limiter of auditor performance in auditing estimates. Our interviewees implicated lack of knowledge as underlying many problems. We believe it also underlies the difficulties they highlighted with understanding management’s models, understanding specialists’ models, and coordinating work with specialists. As we previously noted, knowledge problems cascade because a lack of understanding of an appropriate model indicates lack of knowledge about which assumptions are critical, how to validate those assumptions, and so forth, with the ultimate result of over-reliance on management’s assertions. In addition, lack of knowledge of valuation forces reliance on the work of specialists, which creates coordination issues and potential over-reliance on specialists. Specialists are not, in most cases, auditors, and so they lack knowledge of the financial statement context of the estimate, and they lack other specific company knowledge, as well. Therefore, if a specialist is used, it is critical that the auditor and the specialist communicate. Auditor knowledge of valuation may not allow auditors to forego using specialists for the most complex estimates, but it will provide a common language, an understanding of which information needs to be communicated to the specialist, and a better understanding of which assumptions are most important to the final estimate, with an

even if it is noticed because of the framework. Thus, we believe a judgment framework is likely to increase audit quality only in combination with our other recommendations.

ultimate result of getting better estimates from the specialist. Therefore, we recommend that auditors build expertise in valuation.

6. Limitations

Our analysis is subject to limitations. Most importantly, in embarking on this project, we elected to work within the existing institutional framework to make recommendations for improving audits of estimates. We did this because we believed this focus would result in recommendations that could have immediate impact on audit quality. Thus, we make recommendations about the content of auditing standards and how audit firms structure and conduct audits, but we did not consider other sorts of changes, such as in who conducts audits or how auditors are engaged or compensated. It is likely that these sorts of institutional changes could more effectively produce the re-framing of the decision task that we believe is critical for improved audit quality. However, as the PCAOB Chairman recently noted, while the current practices for hiring and paying auditors conflict with auditor objectivity and independence, there is no solution on the horizon so the PCAOB's initiatives will focus on reducing risks that follow from these conflicts (Doty 2011).

In addition, we previously noted that PCAOB inspections are performed using a risk-based approach, and so the difficulties that inspectors noted are not necessarily representative of the universe of difficulties auditor experience. We relied on the reports specifically to identify the nature of problems auditors experience in auditing estimates, and we believe the data are useful for this purpose.

We kept our interview sample size small so that we could conduct longer interviews (in order to gain rich data) with very experienced auditors. We did not randomly select participants. Auditors we spoke to made a significant time commitment, and we expect they were perhaps

more interested in the topic of our research than the average auditor. While this lack of random selection of interviewees may limit generalizability, we believe that it also improves the accuracy of our data collection because our interviewees are likely to have previously engaged in introspection about the issues involved in auditing estimates.

Finally, our interview time was limited and we did not give auditors questions in advance, so it is possible that they did not give us a complete accounting of the steps they take in performing audits of estimates or of the troubles they encounter. We believe that the high level of experience among our interviewees minimizes the chances that they omitted steps in the process, but this should be considered in interpreting our results.

APPENDIX

Categories Used to Code Inspection Report Deficiencies

Model-specific Deficiencies:

1. **Omitted Items.** Items coded into this category pertain to instances in which auditors inappropriately omit items from their evaluation, indicating a failure to recognize that some categories or sub-categories of items were not considered for evaluation. For example, one inspection report describes a deficiency in which the auditor’s “analysis of possible impairment excluded from the group certain tangible assets that should have been included and that the issuer had included in its analysis. Had the Firm’s analysis included the carrying value of these tangible assets in the asset group, the projected cash flows would have been less than the carrying value of the asset group” (PCAOB 2009c, 10).
2. **Test Data.** These items reflect the failure to test data used in valuation or other models. For example, one inspection report describes a deficiency in auditing a goodwill impairment assessment. The report notes, “the Firm failed to test the claims data that the issuer had provided to the issuer’s actuary for purposes of determining the issuer’s self-insurance reserves” (PCAOB 2010b, 6).
3. **Test Assumptions.** These items reflect the failure to evaluate the appropriateness and reasonableness of the assumptions used in the issuer’s model or method for generating an estimate. In one inspection report, a deficiency in testing the estimated fair value of auction rate securities is coded in this category. The deficiency is described as a failure “to evaluate the reasonableness of the discount rate the issuer used in light of the contractual maximum rates and the credit and liquidity risks that suggested the discount rate should have been considerably higher” (PCAOB 2010c, 5).
4. **Understand Method.** These items concern the auditor’s understanding and evaluation of the method used by the issuer to derive an estimate. In these deficiencies, the auditor fails to understand, evaluate, or consider the appropriateness of the method used by an issuer or a specialist engaged by the issuer to generate an estimate. For example, one inspection report notes that “in evaluating the issuer’s reserve analysis for two impaired loans, the Firm failed to perform procedures, beyond management inquiries, to evaluate the appropriateness of the methods. . . that the issuer and certain specialists engaged by the issuer used in estimating the fair value of certain assets that collateralized the loans” (PCAOB 2009b, 7).
5. **External Evidence.** These items reflect the failure to consider external evidence such as market conditions when auditors evaluate estimates. One inspection report describes a deficiency in evaluating the allowance for loan losses in which “the Firm failed to perform a sufficient analysis of whether the deteriorating conditions [i.e., declining collateral values in certain markets] should have prompted further increases in the qualitative adjustments included in the allowance for loan losses” (PCAOB 2009a, 6).
6. **Controls.** These items pertain to control-related deficiencies. These deficiencies include instances of auditors relying on controls without testing them adequately or failing to identify a weakness in internal controls. For example, an inspection report describes a deficiency in testing the claims information used to estimate claims losses in which “the Firm identified a control related to the approval of certain claims, but inappropriately tested only one claim because the Firm incorrectly considered the control to be an

automated control. The Firm did not test any other controls over the completeness and accuracy of claims information entered into the processing system from which the approval was based” (PCAOB 2010a, 5).

Non-model specific deficiencies:

7. **GAAP.** Failure to identify an existing GAAP departure.
8. **Sample Selection.** Failure to choose representative samples or samples that are large enough given the risk factors present.
9. **Fraud.** Failure to adequately consider or follow up on fraud risk factors;
10. **Errors.** Errors in inferences.
11. **Confirmation.** Failure to use appropriate skepticism regarding authenticity of returned confirmations or failure to perform alternative procedures on unreturned confirmations.
12. **Analytics.** Performance of analytical procedures at too high of a level of aggregation so that inferences made were ineffective for the purpose or relationships examined did not make sense, making inferences ineffective.
13. **Sufficient Evidence.** Failure to gather sufficient audit evidence (i.e., failure to completely test an assertion).
14. **Journal Entries.** Failure to use appropriate skepticism regarding the appropriateness of journal entries and support for journal entries.

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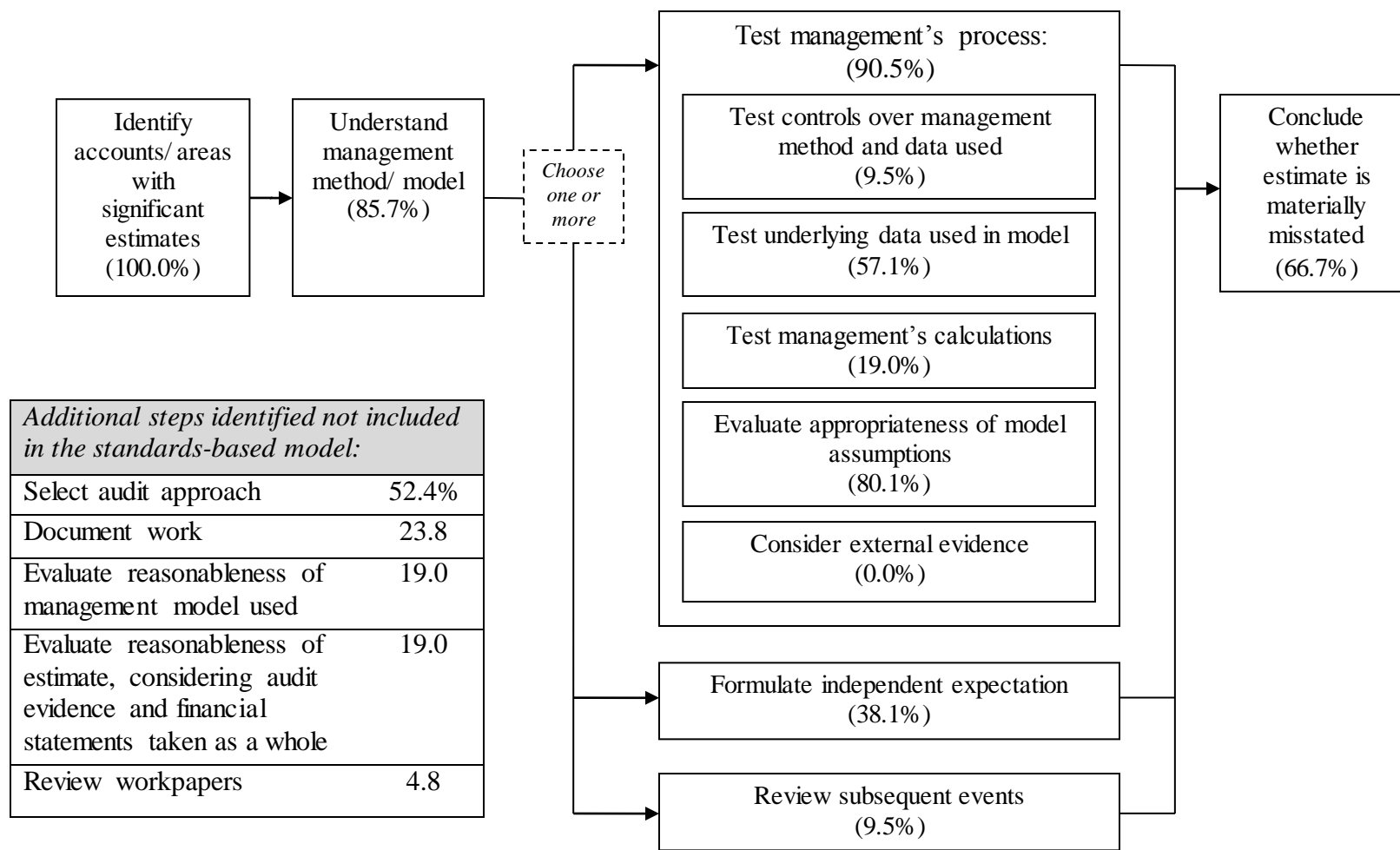
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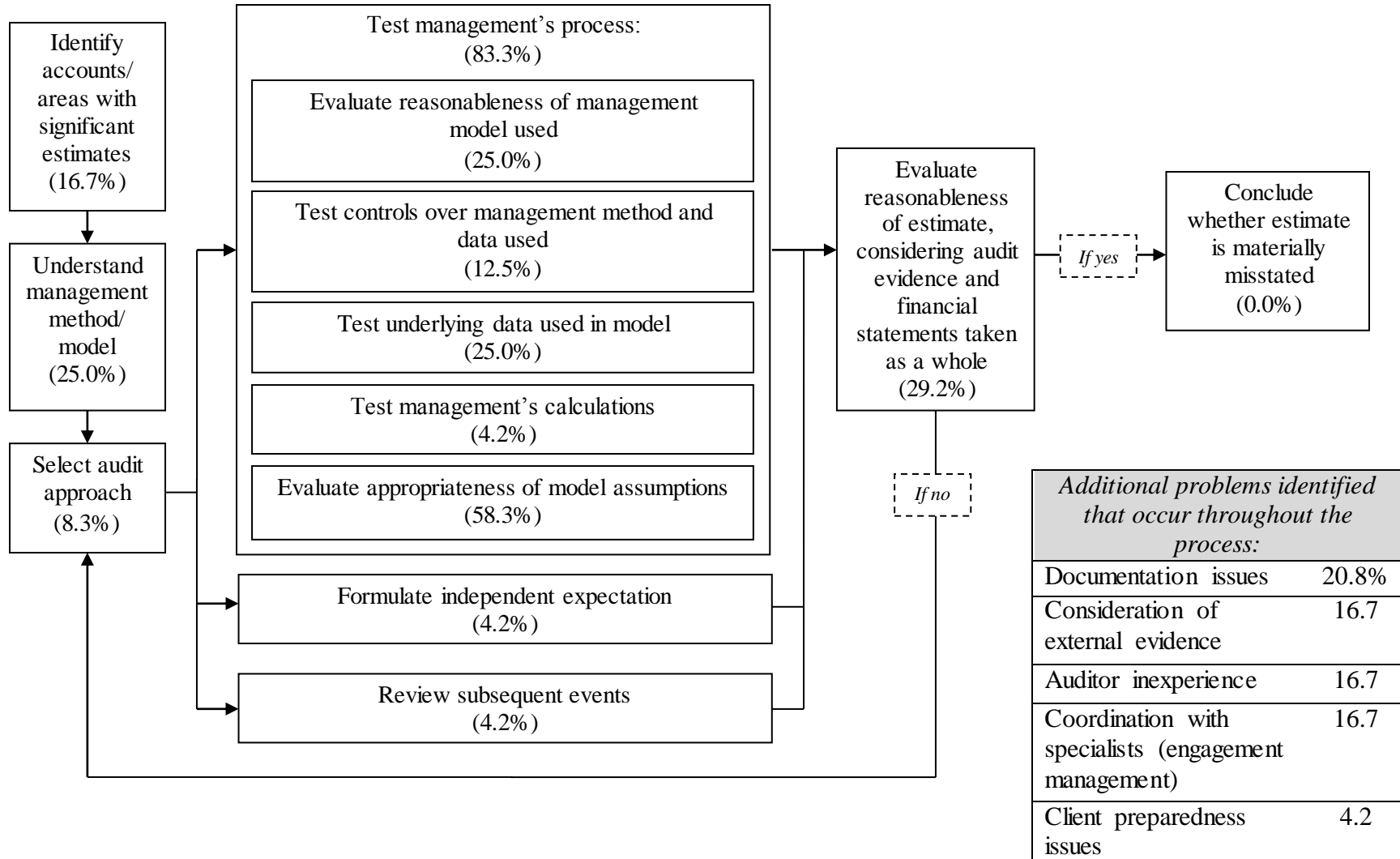
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Figure 1 Standards-based model of the process of auditing estimates^a



^a Percentage of interviewees who discussed the step is shown in parentheses.

Figure 2 Interview-based model of the process of auditing estimates and auditor-identified problems within this process^a



^a Percentage of interviewees who discussed problems associated with each step is shown in parentheses.

Table 1
Interview Participant Demographics

	Partner	Manager
Number	13	11
Number with technical consultation responsibilities	9	2
Average experience (years)	25.5	11.3
Range of experience (years)	13 – 41	8 – 20
Number of firms represented	6	5
Number of cities represented	5	2

Table 2
Process Performed when Auditing Estimates Described by Interviewees

Panel A: Steps included in standards-based model

Steps and sub-steps described by interviewees	Number of interviewees describing (n = 21)	Percentage
Identify accounts/areas with significant estimates	21	100.0%
a. Develop an understanding of management's business and industry to identify existing estimates	16	76.2
b. Perform risk assessment and brainstorming during planning phase to identify risky or subjective areas	7	33.3
c. Establish materiality to guide identification of significant accounts that may contain estimates	6	28.6
d. Use experience with management and prior year's workpapers to identify existing estimates	4	19.0
e. Involve valuation specialist to identify estimates	3	14.3
f. Ask management which accounts contain estimates	2	9.5
Understand management's method/model	18	85.7
a. Understand management's process for generating estimate and consider underlying rationale for that process	15	71.4
b. Understand who prepares estimate and their qualifications	6	28.6
c. Understand assumptions underlying method/model	5	23.8
d. Identify and understand controls around the process of generating estimate	5	23.8
e. Determine which elements of estimate are key drivers to identify primary risks associated with estimate	4	19.0
f. Understand inputs and data in the method/model	3	14.3
g. Walk through the transaction flow related to estimate	3	14.3
h. Use valuation specialist to obtain understanding of method/model	1	4.8

Test controls over management’s method and data used	2	9.5
a. Test controls around process used to generate estimate	2	9.5
Test underlying data used in model	12	57.1
a. Verify inputs and data used in model	11	52.4
b. Gather substantive evidence about assumptions and data used in model	3	14.3
c. Verify mathematical accuracy of inputs used in model	2	9.5
Evaluate appropriateness of model assumptions	17	81.0
a. Consider consistency of assumptions with each other and sensitivity of estimate to changes in assumptions	15	71.4
b. Assess historical accuracy of management projections	9	42.9
c. Check for consistency with other forecasts and over time	9	42.9
d. Verify growth rates, discount rates, etc. used in model	4	19.0
e. Use specialist to evaluate and document appropriateness of assumptions	2	9.5
Consider external evidence	0	0.0
Test management’s calculations	4	19.0
a. Test calculations used to translate assumptions and key factors into estimate	4	19.0
Formulate independent expectation	8	38.1
a. Develop and compare independent expectation of estimate to management estimate	7	33.3
b. Use specialist to develop independent expectation	2	9.5
Review subsequent events	2	9.5
a. Use transactions posted after year-end to support assumptions	2	9.5
Conclude whether estimate is materially misstated	14	66.7
a. Analyze evidence and conclude, considering materiality	10	47.6
b. Compare independent expectation to management estimate	4	19.0
c. Reconcile differences between management estimate and auditor’s expectation if possible	1	4.8

Panel B: Steps not included in standards-based model

Steps and sub-steps described by interviewees	Number of interviewees describing (n = 21)	Percentage
Evaluate reasonableness of management model used	4	19.0%
a. Determine whether model is reasonable given company condition and whether it is used in a reasonable way to generate estimate	4	19
Select audit approach	11	52.4
a. Choose to audit management's process or to formulate an independent expectation	7	33.3
b. Determine whether a valuation specialist is needed	7	33.3
Evaluate reasonableness of estimate, considering audit evidence and financial statements taken as a whole	4	19.0
a. Consider whether the estimate makes sense given other evidence obtained during the audit	2	9.5
b. Consider whether the estimate makes sense in terms of the rest of the financial statements	1	4.8
c. Assess what could go wrong in management's process and calculation	1	4.8
Document work	5	23.8
a. Document work throughout process	3	14.3
b. Document work after completing audit of estimate	2	9.5
Review workpapers	1	4.8

Table 3
Primary Preparers of Steps in the Process of Auditing Estimates

Step	Primary Preparers Identified by Interviewees^a					
	Staff	Senior	Manager	Partner	Specialist	Team
Identify accounts/areas with significant estimates	1.8%	28.1%	31.6%	17.5%	1.8%	19.3%
Understand management's method/model	4.2	35.2	31.0	11.3	14.1	4.2
Select audit approach	18.5	25.9	25.9	18.5	11.1	-
Test controls over management's method and data used	-	50.0	50.0	-	-	-
Test underlying data used in model	37.5	41.7	12.5	4.2	4.2	-
Test management's calculations	25.0	50.0	25.0	-	-	-
Evaluate appropriateness of model assumptions	13.6	57.6	20.3	5.1	3.4	-
Evaluate reasonableness of management model used	-	40.0	40.0	20.0	-	-
Formulate independent expectation	23.1	38.5	7.7	7.7	23.1	-
Review subsequent events	25.0	50.0	25.0	-	-	-
Evaluate reasonableness of estimate, considering audit evidence and financial statements taken as a whole	9.1	27.3	36.4	27.3	-	-
Conclude whether estimate is materially misstated	5.6	22.2	44.4	22.2	5.6	-
Document work	16.7	16.7	33.3	16.7	16.7	-
Review workpapers	-	-	-	100.0	-	-

^a The table shows the percentage of total responses indicating each position as primary preparer. Note that some interviewees indicated more than one primary preparer.

Table 4
Accounts with PCAOB-Identified Deficiencies

Account	Number	Percentage
Revenue	32	19.0
Investments and securities	31	18.5
Goodwill	19	11.3
Allowance for loan losses	17	10.1
Pension plan assets	12	7.1
Inventory	7	4.2
Intangibles	7	4.2
Income tax accounting	6	3.6
Accounts receivable	4	2.4
Contingent liability	4	2.4
Derivatives	3	1.8
Long-lived assets	3	1.8
Assets	2	1.2
Controls	2	1.2
Going concern	2	1.2
Other	17	10.1
Total	168	100.0

Table 5
Accounting Issues for Accounts with PCAOB-Identified Deficiencies

Accounting Issue	Number	Percent
Fair value	41	31.5
Impairment	30	23.1
Estimation	17	13.1
Revenue recognition and measurement	9	6.9
Existence	6	4.6
Valuation	5	3.8
Completeness, existence, and accuracy	4	3.1
Existence and valuation	4	3.1
Classification	3	2.3
Existence and accuracy	3	2.3
Other issues	8	6.2
Total	130	100.0

Note that the PCAOB did not identify the accounting or auditing issue for the remaining 38 accounts with deficiencies.

Table 6
PCAOB-Identified Auditing Deficiencies

Auditing Deficiencies	Number	Percentage
Test assumptions	73	22.1
Test data	51	15.4
Sufficient evidence	50	15.1
Controls	35	10.6
External evidence	26	7.9
Understand method	25	7.6
Omitted items	24	7.3
Analytics	15	4.4
GAAP	10	3.0
Sample selection	7	2.1
Error	6	1.8
Confirmations	5	1.5
Fraud	3	0.9
Journal entries	1	0.3
Total	331	100.0

Auditing deficiency definitions:

Omitted items: failure to recognize that some categories or sub-categories of items were not considered for important evaluation (i.e., failed to consider whether a certain class of assets required impairment analysis)

Test data: failure to test data used in valuation or other models

Test assumptions: failure to test or evaluate assumptions used in issuer's models or methods

Understand method: failure to understand, evaluate, or consider the appropriateness of an issuer's model or method used

External evidence: failure to consider external evidence about assumptions, allocations, or classifications

Controls: reliance on controls either without testing them or without identifying an existing material weakness

GAAP: failure to identify an existing GAAP departure

Sample selection: chose a sample that was not representative of the population about which inferences were made or the sample was too small given the risk factors present

Fraud: failure to adequately consider or follow up on fraud risk factors

Error: the auditor made an error in inference

Confirmations: failure to use appropriate skepticism regarding authenticity of returned confirmations or failed to perform alternative procedures on unreturned confirmations

Analytics: performed analytical procedures at too high of a level of aggregation so that inferences made were ineffective for the purpose or relationships examined did not make sense making inferences ineffective

Sufficient evidence: failure to gather sufficient audit evidence (i.e., failed to completely test an assertion)

Journal entries: failure to use appropriate skepticism regarding the appropriateness of journal entries and support for entries