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Current Practices and Challenges in Auditing Fair Value Measurements and Complex Estimates: Implications for Auditing Standards and the Academy

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SUMMARY: Auditing fair value measurements and other complex estimates (hereafter, FVMs) has received significant attention from regulators, practitioners, and researchers. Using a survey, we gather data from audit partners with FVM expertise to gain further insights in areas that have not been fully explored in the previous literature. Specifically, we extend the literature by providing a deeper understanding of the following areas: auditors' use of different substantive approaches to test higher-risk FVMs, auditors' use of pricing services and valuation specialists, and how challenges differ when auditing *financial* versus *nonfinancial* FVMs. In doing so, our findings and analyses extend prior research and coalesce pieces of several prior studies on auditing FVMs to provide a more complete picture of current auditing practices and challenges encountered by auditors. Our study provides insights useful in reconciling seemingly inconsistent findings in previous studies and provides important implications for future research, regulation, and standard-setting.

Keywords: auditing fair value measurements and other complex estimates; pricing services; valuation specialists; financial fair value measurements; nonfinancial fair value measurements.

INTRODUCTION

The subjectivity inherent in estimating future events, coupled with the potential high degree of measurement uncertainty, makes auditing fair value measurements and other complex estimates (hereafter, collectively, FVMs) challenging for auditors (Public Company Accounting Oversight Board [PCAOB] 2007a, 2007b; Bratten, Gaynor, McDaniel, Montague, and Sierra 2013; Christensen, Glover, and Wood 2012; Glover, Taylor, and Wu 2016).[1] The challenging nature of auditing FVMs is consistent with repeated and frequent PCAOB reported inspection deficiencies identified for both *financial*

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[1] Consistent with the terms used in Auditing Standard (AS) 2502 (formerly AU 328), *Auditing Fair Value Measurements and Disclosures,* and AS 2501 (formerly AU 342), *Auditing Accounting Estimates,* as well as by the PCAOB (2001, 2002, 2014a), our use of the term "fair value measurements" also includes accounting estimates.

and *nonfinancial* FVMs (e.g., PCAOB 2008a, 2010a, 2012a). The most common deficiency is failure to evaluate the reasonableness of management's underlying assumptions and methods (PCAOB 2012a; Griffith, Hammersley, and Kadous 2015a). To cope with the difficulties of auditing FVMs, auditors frequently rely on in-house valuation specialists employed by the audit firm, third-party valuation specialists engaged by the audit firm, and third-party pricing services (e.g., PCAOB 2015). However, the PCAOB has voiced additional criticisms as a result of such reliance (PCAOB 2010b, 2012a, 2015).[2]

The PCAOB and other international regulators are concerned with the persistence of repeated deficiencies related to FVMs, as deficiencies can negatively affect investors' perceptions of audit quality and financial statement reliability (e.g., International Forum of Independent Audit Regulators [IFIAR] 2014; PCAOB 2014b). Although auditing regulators' views and concerns are publicly known and available, practicing audit experts' views are not (e.g., PCAOB 2014b, 2015; Glover et al. 2016). The PCAOB (2014a, 2015) seeks to gain a better understanding of current practices and challenges to ensure that the Board's initiatives to improve auditor performance are moving in the appropriate directions. Thus, insights from audit experts are crucial for improving auditor performance, especially in light of the PCAOB's (2014a, 2015) current standard-setting initiatives related to FVMs and auditors' use of specialists. Using a field-based survey that provides a channel for practitioners to openly express their opinions and views (e.g., Smith-Lacroix, Durocher, and Gendron 2012; Glover et al. 2016), we gather data from auditors who have deep experience with FVMs and the processes by which the firms audit FVMs.

To provide a more complete picture of current practices and key challenges encountered when auditing complex FVMs, this study has three primary objectives. Our first objective is to obtain deeper insights into auditors' use of substantive approaches to audit FVMs given criticisms of auditors' substantive approaches (PCAOB 2013; Griffith et al. 2015a). We are particularly interested in two of the three approaches outlined in PCAOB (2002) Auditing Standard 2502, *Auditing Fair Value Measurements and Disclosures* (hereafter, AS 2502)—developing an independent estimate and reviewing subsequent events and transactions. Research to date has focused on the frequency of substantive approaches, who performs the procedures, and challenges encountered (Cannon and Bedard 2017; Griffith et al. 2015a), with more attention given to understanding auditors' testing of management's assumptions, valuation model, and underlying data (Griffith et al. 2015a). We extend the literature by gaining a deeper understanding of how auditors use the substantive approaches. Importantly, our study provides insights regarding auditing higher-risk FVMs that are useful in understanding seemingly inconsistent findings in previous studies (Cannon and Bedard 2017; Griffith et al. 2015a).

Our second research objective is to provide improved understanding of auditors' use of pricing services and valuation specialists (in-house and third-party) when auditing complex FVMs. Research to date has largely focused on auditors' use of in-house valuation specialists (Griffith 2016). We contribute to the literature by clearly distinguishing between auditors' use of pricing services and valuation specialists, and whether usage varies between *financial* and *nonfinancial* FVMs. We also provide insights about auditors' evaluations of the reasonableness of pricing services' and valuations specialists' assumptions and methods, as well as factors driving auditors' decisions to use pricing services versus valuation specialists. In light of the PCAOB's (2015) initiative to revise auditing standards related to use of specialists, and given the differences in the pricing services versus valuation specialists in the nature and reliability of the services provided (Harvest Investments, Ltd. 2014; Interactive Data 2014; PCAOB 2014a, 2015), gaining an understanding of how auditors use these services is important.[3]

Our third objective is to further explore challenges auditors encounter when auditing FVMs by distinguishing between *financial* versus *nonfinancial* FVMs and investigating how auditors respond when they encounter problems with management's valuation expertise and knowledge. Previous research is silent as to differences in auditing *financial* versus *nonfinancial* FVMs even though auditors, accounting standards, and inspection findings differentiate these types of FVMs (Ernst & Young [EY] 2015; Financial Accounting Standards Board [FASB] 2011; PCAOB 2012a).

Audit partners with significant experience and expertise in auditing FVMs participated in our study. The survey uses objective and qualitative questions. The qualitative data from open-ended questions provide rich information to help researchers, regulators, and standard-setters gain a deeper understanding of current practices and challenges encountered (e.g., Gibbins and Qu 2005; Gendron 2009; Malsch and Salterio 2016). We did not ask audit partners to focus on a specific

[2] Pricing services generally provide uniform price information and related data for *financial* instruments (PCAOB 2014a). Further, FVM estimates provided by pricing services are typically not customized. Instead, "a company or auditor obtains information that is developed for, and widely available to, the public" (Interactive Data 2014, 8). On the other hand, in-house or third-party valuation specialists are typically engaged to provide customized estimates for either *financial* or *nonfinancial* FVMs (Interactive Data 2014; PCAOB 2014a, 2015). Conversations with representatives of large firms suggest that each of the largest firms has a "national pricing desk" that includes valuation specialists employed who help the engagement teams develop FVM estimates, as well as evaluate management-developed FVM estimates. The national pricing desk is not considered an in-house pricing service. Instead, when pricing information is needed by the engagement teams, the national pricing desk performs a number of functions, including gathering pricing information from third-party pricing services for the engagement teams.

[3] Comment letter responses to the PCAOB's (2014a) Staff Consultation Paper, *Auditing Accounting Estimates and Fair Value Measurements,* from pricing services and valuation specialists highlight differences between pricing services and valuation specialists and encourage the Board to keep these differences in mind when considering changes to the existing auditing standards (e.g., Harvest Investments, Ltd. 2014; Interactive Data 2014).

engagement experience; instead, to increase the breadth of our study (Power and Gendron 2015), we gather audit partners' views based on their experiences with harder-to-audit FVMs (e.g., Levels 2 and 3).

Our findings provide several new insights regarding substantive approaches used when auditing higher-risk FVMs (i.e., Levels 2 and 3). When auditing complex estimates in general, Griffith et al. (2015a) find that auditors may only test management's assumptions, valuation model, and underlying data (i.e., the first approach listed in AS 2502). However, when auditing high-risk, "highly challenging" FVMs, Cannon and Bedard (2017) report that auditors frequently use multiple substantive approaches. Our findings, in context with results of these two previous studies, suggest that when auditing typical complex estimates, auditors primarily use the first approach outlined in AS 2502, but as the complexity and associated risk of the estimate increase, auditors are more likely to use a combination of substantive approaches. We also find that when auditing higher-risk FVMs, a majority of audit partners report frequently using their audit team's assumptions to form independent estimates despite PCAOB auditing standards (AS 2502) permitting auditors to use management's assumptions. Moreover, when reviewing subsequent events, we find that the nature of the security (volume, trading frequency, and market volatility) drives the length of time that is considered reasonable between the trade date and valuation date.

Regarding use of pricing services and valuation specialists (in-house and third-party), we find that auditors report more frequently obtaining estimates from multiple pricing sources than from multiple valuation specialists for both *financial* and *nonfinancial* FVMs. When auditing *financial* FVMs, qualitative responses indicate that key factors driving decisions to use in-house versus third-party valuation specialists include firm resources, nature of the security, and firm policies. We also find differences in reported use of in-house versus third-party specialists when developing independent estimates for *financial* versus *nonfinancial* FVMs. Notably, our results provide new insights regarding how auditors evaluate the reasonableness of assumptions used by pricing services and valuation specialists, as well as factors driving decisions to use pricing services versus valuation specialists when auditing *financial* FVMs.

Finally, the majority of our participants believe that the challenges auditors encounter when auditing FVMs differ between *financial* and *nonfinancial* FVMs, with heightened challenges presented by *nonfinancial* FVMs. The key factor increasing the audit difficulty for *nonfinancial* FVMs is the lack of observable market information. Moreover, a majority of audit partners report encountering problems with management's lack of valuation knowledge, and qualitative responses provide a deeper understanding of audit responses in such settings.

Collectively, our results provide implications for regulators, standard-setters, and practitioners, and suggest avenues for future research. We provide timely insights about specific areas where the PCAOB could clarify standards to improve auditors' performance with respect to audits of complex FVMs and use of pricing services and valuation specialists (see PCAOB 2014a, 2015). Importantly, this study is the first to document that *nonfinancial* FVMs tend to be more challenging to audit than *financial* FVMs. Thus, auditing *nonfinancial* FVMs is another area that standard-setters and researchers should consider further.

BACKGROUND AND RELATED LITERATURE

Auditing FVMs is a challenging task given the high degree of subjectivity and extreme measurement uncertainty associated with some FVMs (e.g., Christensen et al. 2012; PCAOB 2012a; Glover et al. 2016). The challenge is exacerbated when auditing standards provide limited and, at times, vague guidance. Current standards related to auditing FVMs and use of specialists provide lists of possible audit procedures with relatively little guidance (e.g., PCAOB 2001, 2002; Bell and Griffin 2012; Christensen et al. 2012; Glover et al. 2016). For instance, AS 2502 allows auditors to select from three substantive approaches: (1) testing management's assumptions, valuation model, and underlying data; (2) developing an independent estimate; and (3) reviewing subsequent events and transactions. Although inspection findings and previous research have been critical of auditors' choice of the substantive approach (PCAOB 2012b, 2013; Griffith et al. 2015a), existing standards provide no apparent ranking or preference for one approach over another or when a combination of approaches is necessary. Therefore, auditors must exercise significant professional judgment to determine their audit strategy for FVMs.

The high frequency of PCAOB reported inspection deficiencies around audits of FVMs is not surprising considering task complexity, ambiguity in existing auditing standards, and the FVMs gap (which suggests that auditors and inspectors may disagree regarding what constitutes sufficient appropriate auditing evidence) (e.g., PCAOB 2010a, 2011a; Church and Shefchik 2012; Glover et al. 2016; Griffith et al. 2015a). The frequency of reported deficiencies has increased, with valuation-related audit issues (e.g., evaluating the reasonableness of management's underlying assumptions and valuation methods) remaining one of the top deficiencies noted (Griffith et al. 2015a; Valuation Research Corporation [VRC] 2013).

Existing research suggests that in certain circumstances, auditors may lack the requisite knowledge and expertise to appropriately assess the reasonableness of management's FVMs (e.g., Smith-Lacroix et al. 2012; Bratten et al. 2013; Griffith et al. 2015a). To cope with the challenges of auditing complex FVMs, auditors often turn to pricing services and valuation specialists to evaluate complex finance and economic models (Martin, Rich, and Wilks 2006; Bratten et al. 2013; Griffith et al. 2015a; PCAOB 2015). However, extensive reliance on pricing services and valuation specialists has led to PCAOB criticisms (e.g., PCAOB 2010a, 2010b, 2012a, 2014b; Bratten et al. 2013).

Research in the area of auditing FVMs is limited (Martin et al. 2006; Bratten et al. 2013); however, a number of concurrent studies are underway.[4] Both Martin et al. (2006) and Bratten et al. (2013), as well as the PCAOB (2014a, 2015), encourage research to better understand the process of auditing FVMs and to identify major challenges encountered. Concurrent studies, using semi-structured interviews and field-based surveys, are beginning to fill this void in the literature (Cannon and Bedard 2017; Griffith et al. 2015a; Griffith 2016; Glover et al. 2016). Qualitative research provides rich observations from practitioners to help researchers better understand a "new phenomenon" such as the process of auditing complex FVMs in a regulated environment (Gendron 2009), and can help move future research in more meaningful directions relevant for practitioners, regulators, and standard-setters.

Using semi-structured interviews, Griffith et al. (2015a) gather audit partners' and senior managers' views regarding the typical process of auditing complex estimates to identify areas for improvement. Their results suggest that auditors over-rely on management's assumptions, fail to reconcile conflicting evidence, and encounter coordination difficulties with firms' in-house specialists. Griffith (2016) uses semi-structured interviews of audit partners and managers to identify challenges key auditors encounter when using in-house valuation specialists. Cannon and Bedard (2017) provide survey evidence that evaluating the reasonableness of management's assumptions and methods is one of the most frequently encountered challenges auditors face when auditing "highly challenging FVMs." They conclude that auditors have trouble proposing audit adjustments given the highly subjective nature of model assumptions and valuation methods. Finally, Glover et al. (2016) find that extreme measurement uncertainty in FVMs further exacerbates the FVMs gap and increases the task complexity, and question whether the precision expected by the PCAOB when auditing complex FVMs is truly attainable.

The three primary objectives of our study extend the previous literature by contributing to: (1) the use of multiple substantive approaches, (2) the use of different types of specialists, and (3) the challenges encountered between *financial* and *nonfinancial* FVMs. Table 1 provides key areas explored and unique contributions of the current study, and serves as a roadmap for results to be presented below.

SURVEY DESIGN

We use a field-based survey that includes both objective and open-ended questions, similar to previous studies (e.g., Gibbins, Salterio, and Webb 2001; Nelson, Elliott, and Tarpley 2002; Cannon and Bedard 2017). The survey includes multiple sections and demographic questions.[5] To ensure that our questions would be important and relevant to practitioners, regulators, and researchers, we developed preliminary questions based on recent PCAOB inspection findings, previous research, auditing standards, and results of interviews with two national-level audit partners. Moreover, the Center for Audit Quality's (CAQ) Research Advisory Board (RAB), two national-level audit partners, and one retired audit partner provided feedback regarding our initial survey questions. We refined our questions based on that feedback, as well as additional feedback from partners from each of the five participating audit firms. Last, in terms of closed-ended questions provided to participants with a list of response options (e.g., possible problems encountered in practice), those lists were developed based on existing auditing standards and discussions with audit partners to ensure that the lists covered situations typical in practice. Moreover, those lists provided an "other" option that participants could select and explain in an open-ended fashion.

DATA COLLECTION AND ANALYSIS

Data Collection

With the assistance of the CAQ's Director of Research, we distributed our survey to five firms annually inspected by the PCAOB.[6] The firms included three Big 4 accounting firms and two large international network firms. We requested that the surveys be distributed to audit partners with experience auditing FVMs.[7] The firms' contacts distributed surveys to potential

[4] We acknowledge a growing number of experimental studies that investigate how various environmental and task factors affect auditors' judgments and decisions when auditing FVMs (e.g., Backof, Thayer, and Carpenter 2015; Earley, Hoffman, and Joe 2015; Griffin 2014; Griffith, Hammersley, Kadous, and Young 2015b; Joe, Vandervelde, and Wu 2017; Joe, Wu, and Zimmerman 2016; Maksymov, Nelson, and Kinney 2015; Pyzoha, Taylor, and Wu 2016).

[5] Results presented in the current study are part of a larger survey, including results reported in Glover et al. (2016).

[6] We received approval by the Institutional Review Boards of our universities prior to distributing our survey.

[7] Firm contacts mainly targeted audit partners, but the survey was also sent to some senior managers. As shown in the next section, all participant responses included in this study are from audit partners. Further, while not a unique issue to this study, we acknowledge that responses may not reflect what participants actually do in practice and, instead, reflect what appears to "sound good." However, we believe features of our design minimize this concern. First, the highly experienced auditors we surveyed are less likely to have the incentive to provide "sound good" responses than typical social science study participants (i.e., college students), particularly because confidentiality and anonymity were assured (e.g., Gibbins et al. 2001; Nelson et al. 2002; Cannon and Bedard 2017). Second, using a survey, rather than phone or face-to-face interviews, reduces concerns that participants provided responses to simply "sound or look good" (Trochim and Donnelly 2007, 123).

TABLE 1

Key Areas Explored and Unique Contributions in this Study[a]

Research Objective 1: Current Practices—Substantive Testing Approaches

Frequency with which auditors use each of the three substantive testing approaches allowed by AS 2502[b]

Auditors' use of the second substantive testing approach—*Develop independent estimate*

- Frequency of auditors' use of management's versus auditor's assumption when developing independent estimate
- Factors that drive auditors' determination to use management's versus the audit team's assumptions
- Auditors' response when independently developed estimate differs from management's estimate by an amount greater than the auditor's tolerable range

Auditors' use of the third substantive testing approach—*Review subsequent transactions*

- Frequency of auditors' use of the most recent trades to support the FV of recorded securities
- Typical length of time between subsequent trade date and valuation date and factors driving the appropriate length of time

Research Objective 2: Current Practices—Use of Pricing Services and Valuation Specialists.

Auditors' use of third-party pricing services for *financial* FVMs

- Auditors' perceptions of risk associated with use of pricing services
- Frequency of auditors' use of pricing services and factors that drive audit teams' decisions
- Auditors' response when evaluating the reasonableness of assumptions and methods used by the pricing services
- Auditors' response when management's recorded estimate investment securities differs from the estimate provided by a pricing service (within and outside of tolerable range)

Auditors' use of in-house and third-party valuation specialists for *financial* and *nonfinancial* FVMs

- Frequency with which auditors use valuation specialists distinguished by *financial* versus *nonfinancial* FVMs
- Factors that drive type of valuation specialist to engage (in-house versus third-party)
- Frequency with which auditors use in-house valuation specialists to develop independent estimates distinguished by financial versus nonfinancial FVMs
- Frequency with which auditors obtain estimates from more than one valuation specialist distinguished by *financial* versus *nonfinancial* FVMs
- Auditors' response when evaluating the reasonableness of assumptions and methods used by valuation specialists
- Factors driving auditors' decisions to use a pricing service versus a valuation specialist

Research Objective 3: Challenges Encountered

Challenges in auditing FVMs

- Significant challenges in auditing inputs for significant Level 2 or 3 FVMs[b]
- Identify causes when management's problems with FVMs are encountered[b]
- Auditors' response when management's knowledge and expertise of valuation processes and methodologies are relatively shallow
- Differences in challenges between *financial* and *nonfinancial* FVMs

[a] In the "Results" section, we present results in the same order as listed above.

[b] These areas are also explored in previous studies. We compare and contrast results from other studies in more detail in the "Results" section. All other areas provided in the table represent new contributions of the current study.

participants with additional follow-ups to encourage participation. Surveys were mostly completed online; a few were completed via hard copy.

Coding of Open-Ended Questions

Our survey included numerous open-ended questions to improve the richness and informativeness of the data gathered. Two of the researchers independently developed coding themes and reconciled differences to arrive at one set of coding themes for each question. Subsequently, another researcher independently read the open-ended responses and further refined the coding themes to finalize the coding rubric.[8] Two doctoral students, unaware of the study's objectives, independently coded responses based on the rubric. Qualitative responses range from a few words to a brief paragraph, such that responses could be coded to one or more themes. Further, we did not restrict the number of themes the doctoral students used to code each response. The two doctoral students subsequently resolved coding differences. For all open-ended questions in our survey, the average Cohen's Kappa measure is 0.63 (all $p < 0.01$), which is an acceptable inter-rater agreement level.[9]

[8] Each question's coding themes are presented in results tables for the associated question.

[9] Neuendorf (2002) suggests that Kappas between 0.40 and 0.70 are acceptable. Further, Landis and Koch's (1977) benchmarks suggest that Kappas between 0.61 and 0.80 represent "substantial" inter-rater agreement strength.

TABLE 2

Participant Demographics[a,b]

Extent of Involvement in the Planning, Supervision, or Execution of FVMs	
Mean (1 = "very little involvement" to 11 = "a great deal of involvement")	10.28
Total Number of Participants	32
Percent of Participants who are Audit Partners	100%
Mean Years of Audit Experience	22.3
Industry	
Financial Services/Depository/Financial Institutions/Asset Management	43.8%
Industrial Products and Manufacturing	25.0%
Consumer Products and Goods	15.6%
Energy and Public Utilities—Regulated and Non-Regulated	12.5%
Healthcare and Managed Care	9.4%
Technology	9.4%
Commercial	6.3%
Life Sciences	6.3%
Other	6.3%
Valuation and Audit Expertise in FVM	
Mean (1 = "very little expertise" to 11 = "great deal of expertise")	8.53
Specialization in a Particular Type of Estimate or FMV	
Yes	18.8%
No	81.2%
If "Yes," Areas of Specialization	
Investment Securities	66.7%
Other Financial Instruments	50.0%
Liabilities at Fair Value (e.g., asset retirement and debt obligations)	16.7%
Asset Impairment	50.0%
Real Estate Portfolio	50.0%
Business Valuation	16.7%
Goodwill	50.0%
Other	33.3%

[a] The demographic information presented in this table is the same as in Glover et al. (2016), in which we used one survey to gather data for both studies.
[b] For certain questions, participants are able to select more than one option. Thus, for those questions, the total percentage is greater than 100 percent. Percentage calculations are based on participants who finished the entire survey.

Participants

Table 2 presents the 32 participating audit partners' demographic information.[10] Mean response regarding the extent to which participants are involved in the planning, supervising, or executing of audits of significant estimates, including FVMs, is 10.28 on an 11-point scale anchored with "very little involvement" (1) and "a great deal of involvement" (11), indicating that our participants had significant experience auditing FVMs. Participants have, on average, 22.3 years of experience and practice most in the following three industries: Financial Services/Depository/Financial Institutions/Asset Management (43.8 percent), Industrial Products and Manufacturing (25.0 percent), and Consumer Products and Goods (15.6 percent). Participants' average valuation and expertise in audits of FVMs is 8.53 on an 11-point scale anchored with "very little expertise" (1) and "a great deal of expertise" (11). Nearly 19 percent of participants indicate that they specialized in a particular type of FVM, with investment securities, asset impairment, real estate, and goodwill being the most common.

RESULTS

Results are generally reported in aggregate without separating among various demographic factors, such as firm size, industry, and type of FVM specialization; however, we do highlight where there are significant differences across these

[10] Participants were not required to answer each question, although nearly all did. Thus, the sample sizes are reported by questions in the tables.

categorical factors.[11,12] We provide implications of the results and recommendations in the "Conclusion and Implications" section of the paper.

Current Practices in Auditing Fair Value Measurements

Research Objective 1: Use of Substantive Testing Approaches

To better understand current usage of the three substantive testing approaches when the inputs used to determine the FVM are not observable (i.e., Level 2 and 3 FVMs), participants reported the frequency with which their audit teams use each of the approaches individually or in combination.[13] Results in Table 3, Question 1 show that 96.9 and 84.4 percent of our participants indicate that it is common to use all three approaches or a combination of approaches for *financial* and *nonfinancial* FVMs, respectively. Griffith et al. (2015a) report that auditors frequently use only the first substantive approach outlined in AS 2502 when auditing complex estimates in general. Consistent with Cannon and Bedard (2017), we find that auditors commonly use all three approaches when auditing "highly challenging" FVMs, where market value comparisons for model inputs are not available. Thus, auditors appear more likely to deploy the second and third approaches listed in AS 2502 as the risk of the FVM increases. Findings in prior studies within the context of our study are logical in that auditors would usually begin by testing management's process, and only in situations of heightened risk and complexity employ other substantive approaches. Our study extends prior work to provide a more complete picture regarding auditors' use of the three substantive testing approaches.

According to AS 2502, auditors are permitted to develop independent estimates by using an auditor-developed model using either management's assumptions or the auditors' assumptions (PCAOB 2002, ¶40). If auditors opt to use management's assumptions, then AS 2502 requires auditors to test management's significant assumptions, the valuation model, and the underlying data as they would if using the first substantive approach. This option appears to weaken the extent to which auditors are developing a truly "independent" estimate.[14] Further, extending prior research on auditors' development of an independent estimate of FVMs (Cannon and Bedard 2017; Griffith et al. 2015a), Table 3, Question 2 shows that 25.0 percent of participants indicate frequently using management's assumptions when developing independent estimates, whereas 84.4 percent of participants indicate frequently using the audit team's assumptions (Question 3).

Regarding factors that drive auditors' decisions to use management's versus the audit team's assumptions when developing an independent estimate, Table 4, Question 1 shows that the three most frequently reported factors are (1) availability of independent data (25.4 percent); (2) the reliability of management's estimates (18.6 percent); and (3) availability of verifiable data (15.3 percent). Two partners provide relevant insights:

> It depends on the type of instrument, availability of information from outside sources, firm available resources, etc. If we are not able to develop our own assumptions independent of management, we would typically perform sensitivity analyses to validate the client's valuation and [then evaluate the] materiality of any potential differences that arise from the sensitivity analysis.

> Preferably, management's assumptions would not be used, as this would hinder the ability to call it an "independent" estimate. The audit team should be utilizing its own assumptions to create a truly independent estimate.

The last response reiterates the notion that when auditors form independent estimates using their own model and assumptions, the resulting independent estimate would be expected to be more objective and of higher quality than using management's assumptions.

To understand how auditors respond when their independent estimates differ from management's by an amount greater than the planned tolerable range, audit partners described their audit responses. Table 4, Question 2 indicates that the three most frequently reported audit responses (not necessarily by order in the audit process) are: (1) identify and consider the cause of the

[11] We present t-test results when there are significant differences in mean responses across demographic factors. In instances where the variance between the two comparison groups is unequal, we present the Welch t-test (or the Satterthwaite method), along with the adjusted degrees of freedom rounded to the nearest whole number.

[12] Mean valuation and audit expertise self-rated by audit partners who practice in financial industries (9.04) is significantly higher ($t_{(30)} = 2.07$, $p = 0.05$, two-tailed) than partners who practiced in nonfinancial industries (8.11). Further, only six of our 32 participants (18.8 percent) indicate that they specialize in a particular type of FVM and find no difference between mean ratings ($t_{(30)} = 0.59$, $p = 0.56$, two tailed) of valuation and audit expertise between those who specialize in a type of FVM (8.46) and those who do not (8.83).

[13] Although not the primary focus of the current study, we asked participants whether their audit teams stratify the security portfolio by risk and type of instrument before selecting and testing a sample from the portfolio. An overwhelming percentage of our participants (over 90 percent) reported "yes," suggesting that auditors take into account risk and potential lack of homogeneity in populations when designing their audit security portfolio testing. Glover et al. (2016) point out that PCAOB inspectors may not appropriately factor risk into their FVM inspection processes and, thus, audit partners report instances in which sampling is abandoned and 100 percent of the population is tested.

[14] We thank an anonymous reviewer for this observation.

TABLE 3

Current Practices
Substantive Testing Approaches

Question	Scale Rating: 1–5 More Uncommon	6 Neither Uncommon nor Common	7–11 More Common	Mean n = 32	Difference of Mean to Scale's Midpoint[a]: t	p-value
1. According to AS 2502, *Auditing Fair Values and Disclosures,* substantive tests of fair value measurements may involve any of the following approaches listed below. Please indicate how common is it for your audit teams to use each of the approaches individually, or in combination, when the inputs used to determine fair value are not necessarily observable (i.e., Level 2 and Level 3 fair value measurements).						
For audit work performed addressing *financial instruments:*						
• Test management's significant assumptions, the valuation model, and the underlying data	0.0%	3.1%	96.9%	9.94	16.30	<0.01
• Develop independent estimates	9.4%	3.1%	87.5%	8.84	7.46	<0.01
• Review subsequent events and transactions	18.8%	6.2%	75.0%	8.06	5.07	<0.01
• A combination of the above approaches	3.1%	0.0%	96.9%	9.16	9.74	<0.01
For audit work performed addressing *nonfinancial instruments and liabilities:*						
• Test management's significant assumptions, the valuation model, and the underlying data	0.0%	6.2%	93.8%	9.94	16.30	<0.01
• Develop independent estimates	25.0%	9.4%	65.6%	7.22	2.72	0.01
• Review subsequent events and transactions	21.9%	9.4%	68.7%	7.34	2.90	<0.01
• A combination of the above approaches	6.2%	9.4%	84.4%	8.38	6.62	<0.01
	1–5 Infrequently	6 Neither Infrequently nor Frequently	7–11 Frequently			
2. Based on your experience, when developing independent fair value estimates, how frequently does the audit team develop the estimate using management's assumptions?	53.1%	21.9%	25.0%	5.22	−2.11	0.04
3. Based on your experience, when developing independent fair value estimates, how frequently does the audit team develop its own assumptions to make comparisons with management's fair value measurement?	6.2%	9.4%	84.4%	8.28	7.17	<0.01

[a] We performed t-tests to determine whether the mean rating for each question differs from the midpoint of the scale (p = two-tailed).

TABLE 4

Current Practices
Substantive Testing Approaches
Open-Ended Responses

Responses by Themes	Frequency (%)
Question 1: What key factors drive determination of whether to use management's assumptions versus the audit team's own assumptions when developing an independent fair value estimate? (n = 32)	
1. Availability of independent data (i.e., third-party data)	25.4%
2. Reliability of management's estimates (reasonableness and consistency of management's assumptions/models and historical accuracy)	18.6%
3. Availability of verifiable data	15.3%
4. Nature of the asset/liability (including degree of subjectivity and materiality)	11.9%
5. Nature of assumptions (number, complexity, sensitivity, etc.)	10.2%
6. Auditors always develop own assumptions for independent estimates	6.8%
7. Management's expertise *vis-à-vis* complexity of valuation process and related controls	8.5%
8. Management's use of third-party valuation specialists	3.3%
Question 2: For an audit area considered to be "higher" risk, what is your audit response when the independently developed fair value estimate is outside the tolerable range? (n = 32)	
1. Identify and consider cause of difference	28.6%
2. Propose an adjustment for the material audit difference	20.6%
3. Evaluate the appropriateness of assumptions/methods used by management	19.0%
4. Discuss the situation with management	11.1%
5. Perform additional audit procedures (including subsequent event testing)	9.5%
6. Engage a third-party valuation specialist or obtain third-party estimate	6.3%
7. Involve in-house valuation specialists	3.2%
8. Consider internal controls	1.7%
Previous Question: Based on your experience, do audit teams use the most recent trades that have occurred in the market, if any, to support the fair values of recorded securities? (n = 30 "Yes" and n = 1 "No")	
Question 3: If "yes," to the previous question, what is the average length of time between the trade date and the valuation date that is considered reasonable in determining that such information provides sufficient competent audit evidence?	
1. Relatively short/A few days	44.4%
2. Depends on nature of the security	27.8%
3. Three months or less	13.9%
4. Unknown	11.1%
5. Greater than three months, but less than one year	2.8%

difference (28.6 percent); (2) propose an adjustment for the material audit difference (20.6 percent); and (3) evaluate the appropriateness of assumptions/methods used by management (19.0 percent). Responses from two participating audit partners provide additional insight:

> While the audit response depends on the facts and circumstances, it would generally begin with developing an understanding of what assumptions are driving the difference and whether based on individual company facts and circumstances there would need to be refinements made to our independently developed assumptions. The difference between the Company's estimate and our estimate would also be evaluated for materiality, as a tolerable range around an individual financial instrument may not necessarily be material to the financial statements as a whole, and would then be accumulated [on the summary of audit differences] along with other audit differences.

> Consideration of whether there is bias by management and where such bias may be elsewhere in the portfolio or broader financial statements. Also, consideration of what assumptions may have caused management's fair value to differ from the independently developed value.

Finally, we gather additional insight regarding auditors' use of reviewing subsequent events and transactions as a substantive testing approach. In untabulated results, we find that 96.8 percent (n = 30) of participants use the most recent trades to support the FVMs of recorded securities. For participants who indicated use of this substantive approach, we asked what length of time between the trade date and the valuation date is considered reasonable. Table 4, Question 3 presents the most

TABLE 5

Questions Regarding Auditors' Use of Third-Party Pricing Service

Question	Scale Rating: 1–5 More Strongly Disagree	Scale Rating: 6 Neither Agree nor Disagree	Scale Rating: 7–11 More Strongly Agree	Mean	Difference of Mean to Scale's Midpoint[a]: t	Difference of Mean to Scale's Midpoint[a]: p-value
1. Thinking back four or five years, the use or reliance on third-party pricing services by the issuer and the auditor was usually considered a relatively "low-risk" audit area.	10.0%	13.3%	76.7%	8.40[b]	5.76	<0.01
2. Due to the recent economic crisis and/or increased focus by the PCAOB inspectors, the use or reliance on third-party pricing services by the issuer and/or the auditor is now considered to present relatively "higher" audit risk.	3.3%	16.7%	80.0%	8.70[b]	6.87	<0.01
	1–5 Infrequently	6 Neither Infrequently nor Frequently	7–11 Frequently			
3. Based on your experience, how frequently does the audit team obtain security prices from a different pricing service than the one used by management?	3.2%	9.7%	87.1%	9.87[c]	11.60	<0.01
4. Based on your experience, how often is the audit team unable to obtain sufficient proprietary information from the third-party pricing service to support the model and assumptions management used to determine the fair value of these investments?	50.0%	16.7%	33.3%	5.57[c]	−0.99	0.33
5. Based on your experience, when using pricing services in the audit work performed over investment securities, how frequently do your audit teams obtain estimates from more than one pricing service?	38.7%	16.1%	45.2%	6.61[c]	1.12	0.23

[a] We performed t-tests to determine whether the mean rating for each question differs from the midpoint of the scale (p = two-tailed).
[b] Only 30 of the 32 participants answered these questions.
[c] Only 31 of the 32 participants answered these questions.

frequently mentioned responses: (1) relatively short/a few days (44.4 percent); (2) depends on nature of the security (27.8 percent); and (3) three months or less (13.9 percent). Qualitative responses suggest that for more frequently traded securities, the length of time is shorter than those with less active markets.

Research Objective 2: Auditors' Use of Pricing Services and Valuation Specialists

In this section, we first present results on auditors' use of pricing services and valuation specialists. PCAOB inspection reports identify numerous deficiencies related to auditors' use of pricing services when auditing *financial* FVMs (e.g., PCAOB 2008a, 2008b, 2011a, 2012c, 2012d). PCAOB inspection findings, as well as the formation of the Board's Pricing Source Task Force, suggest that the risks of using pricing services have increased (PCAOB 2011a, 2012d). As presented in Table 5, Question 1, 76.7 percent of audit partners agree that four to five years ago, issuers' and auditors' reliance on pricing services was usually considered a relatively low-risk audit area. Further, Table 5, Question 2 indicates that 80.0 percent agree that due to the recent economic crisis and/or increased focus by PCAOB inspectors, the use of pricing services by the issuer and/or the auditor is now considered to present relatively higher audit risk. Our results raise the question of whether use of pricing services really manifests higher audit risk or merely higher "inspection risk" driven by increased regulatory activity (Glover and Prawitt 2013; Glover et al. 2016). Our results suggest that both risks have increased.

PCAOB inspection reports also cite deficiencies where auditors have used the same pricing service as management (e.g., PCAOB 2011a, 2012d). Contrary to the inspection findings, Table 5, Question 3 shows that 87.1 percent of audit partners

report frequently obtaining security prices from different pricing services than those used by management, with financial industry partners reporting more frequently obtaining security prices from different pricing services than those outside the financial industry ($t_{(18)} = 2.74$, $p < 0.01$, two-tailed).

Consistent with Cannon and Bedard (2017), results presented in Table 5, Question 4 show that 33.3 percent of our participants reported frequently being unable to obtain sufficient information on the third-parties' proprietary models or assumptions.[15] Given the multiple valuation approaches that pricing services use (PCAOB 2014a), as well as instances in which auditors are unable to obtain information regarding valuation methods, to expect that auditors may need to obtain estimates from more than one pricing service is reasonable. Our results support this notion given that audit partners report that 45.2 percent of audit teams frequently obtain estimates from more than one pricing service when auditing investment securities (Table 5, Question 5), with audit partners at Big 4 firms reporting more frequently obtaining multiple estimates than partners of non-Big 4 firms in our sample ($t_{(29)} = 3.12$, $p < 0.01$, two-tailed). Furthermore, when considering whether to obtain evidence from pricing services, the three most frequently mentioned factors, as reported in Table 6, Question 1, are: (1) nature of the securities (25.0 percent); (2) required per firm policies (18.2 percent); and (3) availability, reliability, or cost of other data (and materiality and risk, which tied for third place) (13.6 percent).[16]

Pricing services largely provide estimates that are not customized for a particular audit firm or company, as these services typically provide consensus prices (PCAOB 2014a). However, in some instances, pricing services may also use their own valuation methodology and assumptions, based on market information and other sources, to arrive at the estimate (PCAOB 2014a). We ask questions directed at better understanding how auditors assess the reasonableness of assumptions and methods used by pricing services. Results in Table 6, Question 2 indicate that for audit areas considered to be "higher" risk, participants most frequently mentioned using the following top three approaches to assess the reasonableness of assumptions, methods, and models used by pricing services: (1) involve the firm's in-house specialists (26.7 percent); (2) gain an understanding of the pricing methodology—e.g., method, model, and assumptions (24.4 percent); and (3) comparison with auditor's independent estimate, another pricing service, or similar instrument (22.2 percent). Consistent with the previous research (Cannon and Bedard 2017; Griffith 2016), our findings indicate that audit teams rely significantly on in-house specialists to assist with evaluating the most subjective aspects of management's estimates. The following audit partners' responses elaborate on approaches used by audit teams to assess the reasonableness of assumptions used by the pricing service:

> The firm has evaluated the relevance and reliability of pricing information received from certain third-party pricing services for certain securities. For those securities that the prices obtained have not been determined to be relevant and reliable, the audit team will work with the firm's valuation specialists in assessing the reasonableness of management's estimates. This can include getting more pricing data from other third-parties, looking at pricing over periods of time, evaluating the assumptions/model used by the third-party or developing an independent estimate.

> [We] compare information to other related/comparable pricing providers, if available, or comparison to other clients with similar investments. We also utilize our internal valuation team as they have a broader view of such instruments and provide assistance to us if the investments are less liquid or rare.

Next, we investigate how auditors address situations where management's recorded estimate of "higher" risk investment securities differs from the estimate provided by a pricing service. We ask participants whether the audit team typically performs additional audit procedures when the difference between the issuer's estimate and the pricing service's price is *within* the auditor's tolerable range. Untabulated results show that only approximately 23 percent ($n = 7$) responded "yes." For those who responded "yes," the two most frequently mentioned audit responses (Table 6, Question 3) are (1) perform additional procedures to test management's assumptions, the valuation model, and the underlying data (44.4 percent); and (2) obtain an estimate from a different pricing service (22.3 percent). Conversely, when the difference between the issuer's estimate and the pricing service's estimate is *outside* the auditor's tolerable range, approximately 97 percent ($n = 29$) of participants responded "yes." For those who responded "yes," the two most frequently mentioned audit responses, reported in Table 6, Question 4, are to understand the cause of the difference (28.6 percent) and perform additional audit procedures (20.4 percent). These audit partner responses provide further insights:

> The response varies based on type of investment. We would need to understand the differences in assumptions and methodologies used and make a determination as to which was more appropriate and/or do our own corroborative testing including seeking internal or different third party evidence.

[15] Recently, the PCAOB (2014a, 44) noted, "pricing sources are increasingly providing products that could provide auditors with insight as to how their prices or estimates are developed."

[16] To clarify, according to audit partners' responses, reliability of the pricing service refers to the caliber (i.e., qualifications) of that pricing service.

TABLE 6

Questions Regarding Auditors' Use of Third-Party Pricing Services and Valuation Specialists (In-House and Third-Party) Open-Ended Responses

Responses by Themes	Frequency (%)
Question 1: What key factors drive the audit team's decision regarding whether to obtain evidence from third-party pricing services when auditing fair values of investment securities? (n = 31)	
1. Nature of the securities (e.g., complexity and subjectivity)	25.0%
2. Required per firm policies	18.2%
3. Availability, reliability, or cost of other data	13.6%
4. Materiality and risk	13.6%
5. Availability, reliability, or cost of pricing services	11.4%
6. Regulator expectations	9.1%
7. Management's valuation methodology	9.1%
Question 2: When estimates are obtained from a third-party pricing service in an audit area considered to be "higher" risk, what does the audit team usually do to assess the reasonableness of specific assumptions, methods, and models used by the pricing service to value the specific financial instruments in order to establish a basis for reliance on the information provided by the pricing service? (n = 30)	
1. Involve firm's in-house specialists	26.7%
2. Gain understanding of the pricing methodology (e.g., method, model, and assumptions)	24.4%
3. Comparison with auditor's independent estimate, another pricing service, or similar instrument	22.2%
4. Assess qualifications and reliability of information supplied by pricing service	20.0%
5. Assess the pricing service's policies and procedures	6.7%
Previous Question: When testing the fair values of investment securities considered to be "higher" audit risk and the issuer's recorded fair value estimate for a security differs from the price provided by the third-party pricing service, but is *within* the auditor's tolerable range, does the audit team typically perform additional audit procedures? (n = 7 "Yes" and n = 23 "No")	
Question 3: If yes, what is the typical audit response, and does it vary based on the type of investment securities?	
1. Perform additional procedures to test management's significant assumptions, the valuation model, and the underlying data	44.4%
2. Obtain an estimate from a different third-party pricing service	22.3%
3. Develop independent estimate	11.1%
4. Obtain explanation from management	11.1%
5. Consider management's potential bias	11.1%
Previous Question: When testing the fair values of investment securities considered to be "higher" audit risk and the issuer's recorded fair value estimate for a security differs from the price provided by the third-party pricing service and is outside the auditor's tolerable range, does the audit team typically perform additional audit procedures? (n = 29 "Yes" and n = 1 "No")	
Question 4: If yes, what is the typical audit response, and does it vary based on the type of investment securities?	
1. Understand cause of difference	28.6%
2. Perform additional audit procedures	20.4%
3. Obtain an estimate from a different third-party pricing service	18.4%
4. Treat as an error and propose audit adjustment	16.3%
5. Involve firm's in-house specialists	8.1%
6. Develop independent estimate	4.1%
7. Consider management's bias	4.1%
Question 5: What key factors are considered when determining which type of specialist (a third-party specialist or a valuation specialist employed by your firm) to retain? (n = 30)	
1. Consideration of audit firm's resources (costs/benefits, expertise, efficiency)	43.2%
2. Firm policy requires use of in-house specialist	21.6%
3. Nature of security being audited (e.g., complexity and materiality)	21.6%
4. Based on discussion with management's third-party specialists	5.4%
5. Whether multiple prices are available	5.4%
6. PCAOB recommended practices	2.8%
Question 6: If the valuation specialist's work used to support the audit involves use of significant assumptions and methods, how does the audit team test the data and assess the reasonableness of those assumptions and methods? (n = 31)	
1. Obtain support/audit evidence for data used in model (internal and external sources)	30.2%

(continued on next page)

TABLE 6 (continued)

Responses by Themes	Frequency (%)
2. Reliance on audit firm's valuation specialist to evaluate appropriateness of assumptions	24.5%
3. Auditor gains understanding of key assumptions (via the firm's valuation specialists)	15.1%
4. Comparison to company's historical information	13.2%
5. Test completeness and accuracy of data used in management's valuation	9.4%
6. Follow firm and/or PCAOB recommended practices	5.7%
7. Search for contrary evidence	1.9%
Question 7: For investment securities in inactive markets and/or more complex financial instruments in which market prices are not readily available, in general, what key factors determine whether the audit team uses a third-party pricing service versus a valuation specialist (whether third-party or employed by your firm) to provide security prices? (n = 30)	
1. Availability of independent/reliable pricing from third-party pricing services	26.8%
2. For this category of securities, generally use internal specialists	22.0%
3. Materiality and risk of misstatement	19.5%
4. Nature of security (uniqueness and complexity)	17.1%
5. Ability to understand how the pricing service determined its valuation	4.9%
6. Prior experience with similar securities	4.9%
7. Efficiency and Cost	2.4%
8. Management's process for valuation	2.4%

> We consider whether a bias in management judgment may exist, and to what extent. We consider whether this is pervasive and perhaps impactful to other financial statement areas. And we consider expanding the sample size (if done on sample basis) to determine if the results are representative of the broader population.
>
> We understand and test management's assumption that results in the different value and such difference must be audited to the level that is within the tolerable range.

The third most frequently mentioned audit response is to obtain an estimate from a *different* pricing service (18.4 percent). In terms of how audit teams use estimates from different pricing services, the following responses provide additional insights:

> The audit response is to first quantify the extent to which the security's value, or securities' values when dealing with a population, falls outside the tolerable range in order to assess the materiality of the potential misstatement. If believed to be material, our next response would be to work with both the third-party pricing service and management to hopefully identify the driver of the pricing variance. In some circumstances, we may also seek pricing from yet another third-party pricing service as a means to help resolve the pricing variance.
>
> We typically get more than one price estimate and evaluate where the client's estimate is relative to the multiple estimates we get. If the client is always at higher or lower range of estimates we may perform additional procedures. We try to understand which assumptions are driving the differences and evaluate them.

Our participants' responses suggest that when the difference between management's estimate and the pricing service's estimate is *within* the auditor's tolerable range, the overwhelming majority do not perform any additional audit procedures. Conversely, when the difference is *outside* the auditor's tolerable range, nearly all participants report performing additional audit procedures. Our results suggest that audit teams are reacting to the increased risk of material misstatement in instances where pricing services provide estimates that differ significantly from management's estimates.

We now turn to auditors' use of valuation specialists (in-house and third-party) when auditing *financial* and *nonfinancial* FVMs. Untabulated results indicate that approximately two-thirds (one-third) of our participants reported that they use in-house (third-party) valuation specialists to support the audit work performed for *financial* FVMs. Moreover, approximately 87 percent (13 percent) of the audit partners indicated that they use in-house (third-party) valuation specialists to support the audit work for *nonfinancial* FVMs. Cannon and Bedard (2017) and Griffith (2016) find that audit teams extensively use in-house specialists when auditing FVMs in general, and our results add to the literature by demonstrating that reliance on in-house specialists is highest for *nonfinancial* FVMs.

We also investigate factors that drive auditors' decisions to use in-house versus third-party valuation specialists. Table 6, Question 5 reports that the three most frequently mentioned factors audit partners consider when determining which type of specialist to use are (1) audit firm's resources in terms of costs/benefits, expertise, efficiency (43.2 percent); and tied for second are (2) the nature of the security being audited (21.6 percent), and (3) firm policy requires use of in-house valuation specialist

(21.6 percent). Two audit partners' responses provide further insight regarding factors driving the type of valuation specialists to use:

> I would say that generally we would look to the client's third-party valuation specialist first and then, depending on complexity and materiality, have our internal [in-house] specialists review the outside valuation related to both financial and nonfinancial FVMs.

> Our firm has deep valuation competencies, so it is very rare we would have to go to a third-party [specialist]. The key factors considered are experience in valuing the type of asset and reputation.

Cannon and Bedard (2017) report that audit teams frequently use in-house specialists to develop independent estimates. Our study extends their research by providing additional insights regarding whether the frequency of using in-house specialists to develop independent estimates differs between *financial* and *nonfinancial* FVMs. Table 7, Question 1 shows that for both *financial* and *nonfinancial* FVMs, auditors commonly use valuation specialists (in-house or third-party) to develop independent estimates (86.7 percent for *financial instruments* and 80.0 percent for *nonfinancial assets/liabilities,* respectively). We also find that for *financial* FVMs, audit partners in financial industries report more frequently using valuation specialists to develop independent estimates ($t_{(19)} = 2.95$, $p = 0.01$, two-tailed).

To further distinguish between use of in-house valuation specialists and third-party valuation specialists, results presented in Table 7, Question 2 indicate the frequency with which in-house specialists, third-party specialists, or members of the audit team are utilized to develop independent estimates. A majority of audit partners report using in-house specialists to develop independent estimates for both *financial* and *nonfinancial* FVMs; 83.4 percent and 96.7 percent, respectively. However, our results show that less than 50 percent of audit partners report frequently using audit team members and third-party specialists to develop independent estimates for both *financial* (46.7 percent versus 40.0 percent, respectively) and *nonfinancial* FVMs (46.7 percent versus 23.3 percent, respectively). Also, we find that 40.0 (23.3) percent of audit partners report using third-party specialists to develop independent estimates for *financial* (*nonfinancial*) FVMs. Consistent with Griffith (2016), our results indicate some differences between Big 4 and non-Big 4 firms in this area. Specifically, for both *financial* and *nonfinancial* FVMs, in-house valuation specialists are used more frequently to develop independent estimates for Big 4 firms than non-Big 4 firms ($t_{(28)} = 2.76$, $p = 0.01$, two-tailed; $t_{(28)} = 3.86$, $p < 0.01$, two-tailed, respectively). Thus, third-party valuation specialists are more frequently used by non-Big 4 firms to develop independent estimates than Big 4 firms ($t_{(28)} = 2.84$, $p < 0.01$, two-tailed). Finally, results suggest that for *nonfinancial* FVMs, engagement team members in non-Big 4 firms are more likely to develop independent estimates than those of Big 4 firms ($t_{(27)} = 3.58$, $p < 0.01$, two-tailed).

Depending on the inputs, assumptions, methods, and models used, estimates from one valuation specialist compared to another can differ. As reported in Table 7, Question 3, for both *financial* and *nonfinancial* FVMs, participants report infrequently obtaining estimates from more than one valuation specialist (16.7 percent and 6.7 percent, respectively). Moreover, for *financial* FVMs, we find that financial industries' audit partners report more frequently obtaining multiple estimates than nonfinancial industries' partners ($t_{(28)} = 2.44$, $p = 0.02$, two-tailed). Results previously presented indicate that approximately 45 percent of participants frequently obtain estimates from more than one pricing service. Importantly, our findings indicate that the frequency with which auditors obtain multiple estimates differs between valuation specialists and pricing services.

We next examine how audit teams test the data and assess the reasonableness of assumptions and methods when a valuation specialist's work is used to support the audit. Table 6, Question 6 reports that the three most frequently mentioned approaches are (1) obtain support/audit evidence for data used in the model from both internal and external sources (30.2 percent); (2) reliance on the audit firm's in-house valuation specialist to evaluate the appropriateness of assumptions (24.5 percent); and (3) the auditor gains understanding of key assumptions via the in-house valuation specialists (15.1 percent). In terms of how the audit team evaluates the assumptions and relies on the in-house valuation specialist, two partners elaborate:

> If it is an assumption that relates to the company's activities/operations, those would be audited by the engagement team to determine whether they were reasonable/appropriate. For items such as WACC [weighted average cost of capital], discount rates, or other direct valuation inputs, those are determined by the [in-house] valuation specialist and not separately tested by the audit team.

> Our [in-house] valuation specialists are required to provide the support (articles, studies, output from Bloomberg, etc.) as part of their documentation. We will validate that information on a test basis. For those assumptions that require judgment of our [in-house] valuation specialists, we generally have two or more specialists involved in each area, both of which are required to sign the audit documentation memorandum, indicating review of these inputs by more than one qualified specialist.

TABLE 7

Questions Regarding Auditors' Use of Valuation Specialists

Question	Scale Rating: 1–5 Infrequently	6 Neither Infrequently nor Frequently	7–11 Frequently	Mean (n = 30)	Difference of Mean to Scale's Midpoint[a]: t	p-value
1. In your experience, how frequently do audit teams use third-party valuation specialists or valuation specialists employed by your firm to assist with developing independent fair value measurements for each of the following situations:						
• Investment securities in inactive markets and/or more complex financial instruments in which market prices are not readily available (e.g., asset-backed securities, derivatives, auction-rate securities)	10.0%	3.3%	86.7%	9.10	6.59	<0.01
• Nonfinancial assets/liabilities (e.g., those related to goodwill, business combinations, or discontinued operations)	13.3%	6.7%	80.0%	8.30	4.57	<0.01
2. Based on your experience, when an independent fair value measurement is developed, how frequently does each of the following perform the task?						
For audit work performed over *financial instruments*						
• A valuation specialist employed by your firm	13.3%	3.3%	83.4%	8.53	5.609	<0.01
• A third-party valuation specialist	53.3%	6.7%	40.0%	5.37	−1.127	0.27
• Member(s) of the engagement team who are not valuation specialists, but have the requisite knowledge and experience	40.0%	13.3%	46.7%	5.67	−0.736	0.47
For audit work performed over *nonfinancial assets/liabilities*						
• A valuation specialist employed by your firm	3.3%	0.0%	96.7%	9.37	11.04	<0.01
• A third-party valuation specialist	70.0%	6.7%	23.3%	4.33	−3.64	<0.01
• Member(s) of the engagement team who are not valuation specialists, but have the requisite knowledge and experience	40.0%	13.3%	46.7%	5.67	−0.74	0.47
3. Depending on the inputs, assumptions, methods, and models used, estimates from one valuation specialist can differ from another specialist's estimates. Thus, when using third party specialists, how frequently do your audit teams obtain estimates from more than one specialist?						
• For audit work performed over *financial* instruments	70.0%	13.3%	16.7%	4.00	−3.94	<0.01
• For audit work performed over *nonfinancial* assets/liabilities	80.0%	13.3%	6.7%	3.23	−6.82	<0.01

[a] We performed t-tests to determine whether the mean rating for each question differs from the midpoint of the scale (p = two-tailed).

These results are consistent with previous research (Cannon and Bedard 2017; Griffith 2016) and our findings regarding use of pricing services. That is, auditors extensively rely on in-house valuation specialists to test components of the estimate where significant subjectivity exists. This approach, however, potentially exposes auditors to regulators' criticisms of overreliance on valuation specialists (e.g., PCAOB 2011a, 2012d).

Finally, we investigate factors that drive auditors' decisions to use a pricing service versus a valuation specialist when auditing investment securities in inactive markets and/or more complex financial instruments. Table 6, Question 7 shows that the three most frequently reported factors that drive this decision are (1) availability of independent/reliable pricing from pricing services (26.8 percent); (2) for this category of securities, generally use in-house specialists (22.0 percent); and (3) materiality and risk of misstatements (19.5 percent). To further elaborate, two audit partners noted the following:

> The decision is primarily driven by our past experience in valuing similar securities/instruments. We would typically use a pricing service by default to the extent possible and then move to a valuation specialist in instances where a pricing service was unable to value the security or where we had concerns over the quality of what a pricing service could provide based on the nature of the security and our understanding of the methodologies they employ.

> For those types of securities, while we may obtain price information from a third-party pricing service, we will also use our [in-house] valuation specialists given the nature of these securities, the price obtained from the pricing service may not be relevant and reliable.

Research Objective 3: Challenges in Auditing Fair Value Measurements

In this section, we examine challenges encountered when auditing Level 2 and 3 FVMs and potential causes when problems with FVMs are identified. Several concurrent survey studies (Cannon and Bedard 2017; Griffith et al. 2015a; Griffith 2016; Glover et al. 2016), along with PCAOB (2010a, 2010b, 2011b, 2014b) inspection findings, identify challenges that contribute to deficient performance when auditing FVMs. Similar to findings in prior studies, participants report the following top three challenges when auditing complex FVM inputs (presented in Table 8, Question 1): (1) lack of verifiable and corroborative evidence (42.9 percent); (2) high degree of subjectivity involved in estimates (14.3 percent); and (3) degree of difficulty in assessing reasonableness of assumptions and benchmarks (14.3 percent).

To identify the nature and frequency of problems auditors encounter when issues with FVMs are identified, we asked participants to rate the frequency of each problem given the list provided in Table 9, Question 1.[17] Findings in Table 9 are consistent with findings in Cannon and Bedard (2017), and the three most frequently encountered problem areas are: (1) appropriateness of management's assumptions (90.6 percent); (2) adequacy of management's documentation (65.6 percent); and (3) sufficiency of expertise and experience of those determining the estimate (62.4 percent). Moreover, non-Big 4 partners report more frequently encountering issues associated with the appropriateness of management's method/model than Big 4 partners ($t_{(30)} = 2.77$, $p < 0.01$, two-tailed). Further, audit partners in financial industries report more frequently encountering issues with management's assumptions than those in nonfinancial industries ($t_{(30)} = 2.17$, $p = 0.04$, two-tailed).

We extend the previous literature by delving deeper into auditors' responses when management lacks expertise, creating additional challenges for audit teams. As shown in Table 9, Question 2, 58.1 percent of participants report frequently encountering situations where management's knowledge and expertise of valuation processes and methodologies is relatively shallow. Our participants' responses, presented in Table 8, Question 2, indicate that the top three audit responses in such cases include (1) auditor expects that management will place greater reliance on third-party specialists (20.7 percent); (2) consider impact on internal control effectiveness (19.0 percent); and (3) auditors place greater reliance on valuation specialists and perform additional audit procedures, tied for third place at 17.2 percent.

Qualitative responses provide further insight regarding the form of additional reliance on valuation specialists. Audit partners report expecting management to seek assistance from knowledgeable third-party valuation specialists. Moreover, audit teams place greater reliance on valuation specialists (in-house and/or third-party) to assist with developing independent estimates and evaluation of models. Further, our results suggest that when management's expertise regarding valuation and methods is limited, auditors assess control risk to be higher and perform more substantive tests. To further elaborate, one audit partner stated:

> If management is not knowledgeable of valuation methodologies, there would be a communication to the Board or Audit Committee of such a finding as we are required to bring such communications to those with oversight responsibilities. Our [substantive] testing would therefore be more detailed and sample sizes would increase.

Another audit partner provides additional insight on how the audit team responds when management knowledge regarding valuation methodologies is shallow:

[17] The list was developed by reviewing the previous literature and detailed discussions with audit partners, the CAQ RAB, and national office partners assigned to our project by the CAQ. Further, we provided an "other" option that allowed participants to indicate any other problems not listed. Some problems identified in the "other" category include lack of sufficient monitoring activities and management's overreliance on valuation specialists.

TABLE 8

Challenges in Auditing FVMs
Open-Ended Responses

Responses by Themes	Frequency (%)
Question 1: In your opinion, what are the most significant challenges in auditing inputs for significant Level 2 or 3 fair value measurements that are not observable and where small changes to the inputs have potentially material changes to the reported value? (n = 32)	
1. Lack of verifiable/corroborative evidence (including lack of third-party evidence)	42.9%
2. High degree of subjectivity involved in estimates	14.3%
3. Degree of difficulty in assessing reasonableness of assumptions and benchmarks	14.3%
4. Developing a range and placing point estimate within the range	9.5%
5. Inability to audit to the level of precision desired	7.1%
6. Lack of disclosure about imprecision	4.8%
7. Removing management bias	4.8%
8. Ensuring the competency and expertise of the valuation specialists	2.3%
Question 2: Based on your experience, what is your audit response when management's knowledge of valuation processes and methodologies is relatively shallow, and how does this impact your audit procedures when testing the issuer's fair value measurements? (n = 31)	
1. Auditor expectation that management will place greater reliance on third-party specialists	20.7%
2. Consider impact on internal control effectiveness	19.0%
3. Auditors place greater reliance on valuation specialists	17.2%
4. Perform additional audit procedures	17.2%
5. Reconsider auditor's risk assessment	10.3%
6. Auditor to develop independent estimate	8.6%
7. Increase skepticism and scrutiny	5.2%
8. Communication with board or audit committee	1.8%
Previous Question: Do you believe the audit challenges are different between *financial* versus *nonfinancial* assets/liabilities? (n = 20 "Yes" and n = 12 "No")	
Question 3: If "yes," please briefly describe the differing challenges.	
1. Difference in availability and relevance of market data	56.5%
2. Degree of auditor familiarity	13.0%
3. Difference in perceptions of precision by regulators and users	8.8%
4. Degree of consistency possible when applying processes, methods, models, and/or assumptions	8.8%
5. Difference in dollar amounts (i.e., size)	4.3%
6. Degree of subjectivity	4.3%
7. Complexity of models	4.3%

> One would expect less reliance on management's assumptions/methodologies surrounding complex financial instruments and more reliance on independent valuation methods and sources of information. Also, determination may be made that controls are not sufficient in this area to be considered effectively designed and operating, thereby requiring more substantive testing.

Last, to better understand challenges encountered when auditing FVMs, we asked whether participants believe the challenges they described are different between *financial* versus *nonfinancial* FVMs. Untabulated results indicate that roughly 63 percent (n = 20) of partners report that challenges differ between *financial* versus *nonfinancial* FVMs; the three most frequently mentioned differences, noted in Table 8, Question 3, are (1) difference in availability of market data (56.5 percent); (2) degree of auditor familiarity (13.0 percent); and (3) difference in perceptions of precision by regulators and users, and degree of consistency possible when applying processes, methods, and/or assumptions, tied for third place at 8.8 percent. Three partner responses clarify why *financial* and *nonfinancial* FVMs present different challenges:

> It has been my experience, that when dealing with nonfinancial assets/liabilities you are typically having to rely on management prepared data (e.g., forecasts), where for many financial assets you are able to source some other independent data.

> Financial instruments are more likely to have some observable market comparisons than non-financial instruments.

TABLE 9

Challenges in Auditing FVMs

Question	Scale Rating: 1–5 Infrequently	Scale Rating: 6 Neither Infrequently nor Frequently	Scale Rating: 7–11 Frequently	Mean n = 32	Difference of Mean to Scale's Midpoint[a]: t	Difference of Mean to Scale's Midpoint[a]: p-value
1. Based on your experience, when problems with management's fair value measurements are identified during the audit, how frequently do these problems relate to the following?						
• Appropriateness of management's assumptions	0.0%	9.4%	90.6%	8.47	10.79	<0.01
• Appropriateness of management's method/model	21.9%	21.9%	56.2%	6.56	1.71	0.10
• Incorrect rationale used by management to arrive at fair value measurement	18.8%	37.5%	43.7%	6.84	2.55	0.02
• Documentation of management's assumptions that does not adequately evidence its understanding and evaluation of information obtained from third-party pricing services and the methods and assumptions used by the third party	0.0%	34.4%	65.6%	7.84	6.11	<0.01
• Errors in underlying data used by management as inputs	43.8%	15.6%	40.6%	5.97	−0.08	0.93
• Lack of sufficient expertise and experience of those determining the fair value measurements (whether issuer employees or third-party valuation specialists)	18.8%	18.8%	62.4%	6.88	2.50	0.02
• Footnote disclosures that do not appear responsive to the nature and extent of required disclosures	37.5%	34.4%	28.1%	5.66	−0.86	0.39
• Other internal control deficiencies not noted above around the fair value measurement processes	34.3%	46.9%	18.8%	5.63	−1.10	0.28
2. Based on your experience, how frequently do auditors encounter situations in which management's knowledge of valuation processes and methodologies is relatively shallow?	29.0%	12.9%	58.1%	6.74	1.94	0.06

[a] We performed t-tests to determine whether the mean rating for each question differs from the midpoint of the scale (p = two-tailed).

> There seem to be more third party [pricing-services and] valuation [specialists] involved in valuing financial assets/liabilities. The valuation for nonfinancial assets/liabilities relies more heavily on management's assumptions.

The primary challenge audit partners report is obtaining verifiable and corroborative evidence from independent sources for *nonfinancial* FVMs, thus increasing challenges when auditing *nonfinancial* FVMs compared to *financial* FVMs. When such evidence is not available, auditors must focus on management's assumptions and analyses.

SUGGESTIONS FOR FUTURE RESEARCH

Our results provide several avenues for future research. Given differences in current practice noted by our study and concurrent research (e.g., Cannon and Bedard 2017; Griffith et al. 2015a), future research can investigate more fully the key factors that drive auditors' choice in substantive testing approaches when auditing FVMs. Additionally, researchers can theorize about when auditors should develop independent estimates instead of testing management's processes and whether developing independent estimates ultimately improves audit quality. Moreover, our results suggest that future research on auditing FVMs may need to consider the nature of the estimate, as well as differences in the risks and challenges encountered between *financial* versus *nonfinancial* FVMs. Our findings suggest that other fruitful research questions exist. For instance, do

auditors' risk assessment techniques, control testing, or substantive testing approaches differ significantly between *financial* and *nonfinancial* FVMs? If so, how?

Our findings suggest areas where PCAOB auditing standards may require revision. Future research can investigate the likely effects of possible modifications to existing standards on auditors' performance when auditing FVMs. Future research can also investigate whether other alternatives (i.e., changes in firm methodology) or combinations of alternatives may be more effective at mitigating key challenges auditors encounter and, thus, improve audits of FVMs and reduce the frequency of repeated PCAOB inspection deficiencies.

We find that the most common response to a difference in the auditor's independent estimate and management's FVMs for higher-risk areas is proposing an audit adjustment. As previously noted, Cannon and Bedard (2017) find that the likelihood of proposing adjustments depends on whether the auditor uses a valuation specialist. Our open-ended question only asked participants to consider audit responses where an independently developed FVM estimate is outside the tolerable range for a higher-risk area. Thus, future research could pursue additional insights into the specialist's role in prompting auditors to propose adjustments.

With respect to differences between management's and pricing services' FVM estimates, we did not specifically ask audit partners to provide causes for those differences; thus, responses do not provide sufficient detail to fully understand factors driving such differences. Our survey question was designed to understand auditors' responses when such differences arise. Thus, another avenue for future research is to identify causes of such differences. Last, the additional insights we provide regarding auditors' use of various types of valuation specialists and pricing services provide questions academics can address as they investigate specific characteristics related with the use of valuation specialists that may unknowingly influence auditors' judgments and decisions (e.g., Joe et al. 2016, Joe et al. 2017).

CONCLUSION AND IMPLICATIONS

To provide a more complete picture of current practice and key challenges encountered when auditing FVMs, we surveyed audit experts with FVM expertise from several firms annually inspected by the PCAOB. The rich qualitative data we gathered from audit partners enhance regulators', standard-setters', and researchers' understanding of current practices and challenges in auditing FVMs and provide several avenues for future research. Moreover, we provide timely insights for regulators and standard-setters relating to areas specifically highlighted in the PCAOB's request for comments to better understand current practices, and we highlight areas where standards could be improved to enhance auditor performance (PCAOB 2014a, 2015). Our three primary research objectives are designed to provide insights regarding audits of FVMs in the following areas: (1) substantive audit approaches, (2) audit team use of pricing services and valuation specialists, and (3) significant challenges encountered.

With respect to Research Objective 1, our study provides a more in-depth understanding of current audit practices related to auditors' use of substantive approaches outlined in AS 2502. Our results, taken together with prior studies (Cannon and Bedard 2017; Griffith et al. 2015a), suggest that auditors are likely to use the first substantive approach (i.e., test management's assumptions and underlying data) when auditing typical or lower-risk estimates, but as audit risk and complexity increase, they are more likely to use a combination of approaches. Moreover, despite AS 2502 allowing auditors to use management's assumptions when developing an independent estimate, our results indicate that auditors typically opt instead to use the audit team's own assumptions to develop the estimate. We provide insights into auditors' responses when their independently developed estimate is outside of the tolerable range for "high-risk" FVMs. We note that the PCAOB standards currently provide little guidance regarding situations where it is, or is not, appropriate to use management's assumptions instead of developing the team's own assumptions to derive independent estimates. Our results also raise concerns as to whether using management's assumptions to develop an independent estimate is truly "independent" and has potential audit quality implications. Therefore, an area for the PCAOB to reconsider when revising existing auditing standards is to contemplate when, if at all, auditors should use management's assumptions when developing independent estimates.

With respect to Research Objective 2, our results provide several important new insights, including more clearly distinguishing between auditors' use of pricing services and valuation specialists and factors that drive this decision, as well as provide additional insights regarding differences in the use of valuation specialists for *financial* and *nonfinancial* FVMs. For instance, we find that a greater percentage of audit partners report using third-party valuation specialists to develop independent estimates for *financial* FVMs than for *nonfinancial* FVMs. Regarding the audit team's decision to use a pricing service or a valuation specialist (whether in-house or third-party) when auditing complex *financial* FVMs, our results indicate that reliability of the pricing service is one important factor that informs this decision. Our results highlight potential differences in reliability and risks associated with using pricing services versus valuation specialists. The valuation methods and assumptions used by third-party valuation specialists tend to go through more scrutiny than those used by pricing services and, thus, auditors should assess pricing services' reliability (Harvest Investments, Ltd. 2014). Relatedly, we also find differences in the likelihood

of obtaining multiple estimates between pricing services and valuation specialists. Possible reasons why auditors are less likely to obtain multiple estimates when using valuation specialists compared to when using pricing services include: (1) easier and less costly to obtain pricing quote from another pricing service than to obtain another custom estimate from a different valuation specialist, (2) for in-house valuation specialists, his or her knowledge, skills, and ability have been evaluated and, thus, considered a trusted and reliable source of information, and (3) valuation specialists' work may be more reliable than pricing services given that they typically assume expert liability for the work they performed (Interactive Data 2014).

Our results also highlight several important areas where auditors need clearer guidance from the standard-setters regarding use of pricing services and valuation specialists (PCAOB 2014a, 2015). In one instance, we note that the PCAOB's (2015) initiatives to revise standards related to use of specialists exclude pricing services. However, inspection findings suggest that auditors' use of pricing services and third-party valuation specialists are subject to similar requirements of the PCAOB (1998) Auditing Standard 1210 (formerly AU 336), *Using the Work of a Specialist,* in that auditors are required to "obtain an understanding of the methods and assumptions used by the specialist" (or pricing service). Moreover, we find similarities between auditors' use of pricing services and valuation specialists, thus suggesting that the PCAOB should consider whether excluding pricing services from its revisions to the existing standards is appropriate. If auditors' use of pricing services should differ from use of valuation specialists, then auditing standards should clarify how audit approaches and procedures should differ between the two. Our results, consistent with Cannon and Bedard (2017), emphasize the frequency with which auditors are unable to obtain sufficient information on the pricing services' proprietary models or assumptions. We recommend that regulators continue to work with the pricing industry to foster cooperation in sharing information with auditors. Our findings also suggest that the PCAOB should consider providing additional guidance to address situations when pricing services will not share proprietary information.

With respect to Research Objective 3, our results shed new light on whether audit challenges differ for *financial* versus *nonfinancial* FVMs; a majority of our participants believe that challenges do differ and the key reason is the lack of observable market information for *nonfinancial* FVMs. Our participants also report problems with management's lack of valuation process knowledge. In such situations, auditors expect management to increase reliance on third-party valuation specialists, with the audit team evaluating the impact on internal controls, performing additional procedures, and placing more reliance on in-house valuation specialists. This is an area for which standard-setters could provide additional guidance for situations where auditors rely heavily on management's assumptions because little or limited market data are available for *nonfinancial* FVMs. Our results also raise concerns regarding auditability of estimates with extreme measurement uncertainty. Thus, this is an important area for regulators to consider, particularly given that Cannon and Bedard (2017) and Glover et al. (2016) report that auditors frequently encounter measurement uncertainty greater than materiality when auditing highly complex estimates.

Our results also identify areas where auditors' reported behavior differs from PCAOB inspection findings. For example, contrary to PCAOB (2012a, 2012d) inspection findings, audit partners indicate that audit teams investigate significant differences between the independent estimates developed by the audit team and those by management. In another instance, contrary to PCAOB (2011a, 2012d) inspection reports citing auditors for using management's pricing service, we find that auditors frequently obtain security prices from pricing services other than those used by management. The difference in behavior characterized by inspection findings and behavior reported by auditing experts in our study could be due to the inspection process resulting in improved auditor performance, the inspection results not being representative of auditor performance given the PCAOB's non-representative risk-based selection process, or disagreements between inspectors and auditors (see Glover et al. 2016).

This study is subject to limitations. First, we gather audit partners' views from firms annually inspected by the PCAOB; thus, our results may not reflect practices and challenges encountered in smaller audit firms. Second, our study focuses on auditors' experiences when auditing higher-risk, harder-to-audit FVMs; therefore, our results may not be representative of audit experiences for more general FVMs. Despite these limitations, this study provides important insights regarding current practices and challenges encountered when auditing high-risk FVMs.

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