

Auditing Challenging Fair Value Measurements: Evidence from the Field

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ABSTRACT: Concern about effective auditing of fair value measurements (FVMs) has risen in recent decades. Building on prior interview-based and experimental research, we provide an engagement-level analysis of challenging FVMs, using quantitative and qualitative data on audit phases from risk assessment to booking adjustments. Challenging FVMs have high estimation uncertainty, high subjectivity, significant/complex assumptions, and multiple valuation techniques. Estimation uncertainty is associated with higher inherent risk assessments, which are, in turn, predictive of client problems identified during the engagement. The use of a valuation specialist by auditors, associated with higher inherent risk and client specialist use, is a key decision: procedures performed by specialists have the highest yield in identifying problems. Auditor-client discussion of an adjustment increases with problem identification and auditors' expressions of residual concern about uncertainty post-testing. However, booked audit adjustments are infrequent; the only factors explaining income-decreasing adjustments are better evidential support and breadth of problems identified.

Keywords: auditing; fair value measurement; estimation uncertainty; materiality; valuation specialists.

I. INTRODUCTION

This paper presents engagement-level evidence on processes and outcomes of audits of challenging fair value measurements (FVMs), based on reported experiences of high-level members of engagement teams. FVMs have become increasingly prevalent in financial reporting (e.g., [Bratten, Gaynor, McDaniel, Montague, and Sierra 2013](#)) and are value-relevant to users of financial statements (e.g., [Barth and Landsman 2010](#)). Summarizing the literature to date, [Bratten et al. \(2013\)](#) note that the proliferation of complex and innovative financial instruments, use of subjective and forward-looking assumptions, and economic volatility all contribute to the inherent estimation uncertainty (EU) of these valuations. Auditors attempt to reduce EU through application of audit procedures and seeking advice from valuation specialists, consistent with auditing standards, as well as with research on decision-making under uncertainty (e.g., [Lipshitz and Strauss 1997](#)). However, [Bratten et al. \(2013\)](#) and others note that in the current regulatory and legal system, the task that auditors face in attesting to these inherently uncertain valuations is difficult, complex, and unstructured. Adding further pressure, inspection reports of the Public Company Accounting Oversight Board (PCAOB) continue to cite deficiencies in auditing fair values and related issues of impairment and estimation (e.g., [PCAOB 2012, 2013a, 2015](#); summarized by [Griffith, Hammersley, and Kadous 2015a](#)).

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Supplemental material can be accessed by clicking the link in Appendix C.

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A growing literature considers the problems in providing assurance on FVMs, using a variety of approaches. Christensen, Glover, and Wood (2012) and Mayorga and Sidhu (2012) provide case illustrations of the extent of EU in some U.S. and Australian public companies, respectively. Several studies elicit views of highly experienced auditors on practices and procedures commonly used for complex estimates or FVMs (e.g., Griffith et al. 2015a; Glover, Taylor and Wu 2016a; Griffith 2015). Some research applies experimental methods to assess issues, such as ways in which to mitigate effects of EU (e.g., Griffin 2014; Maksymov, Nelson, and Kinney 2014; Griffith, Hammersley, Kadous, and Young 2015b; Rowe 2015), while others analyze PCAOB inspection findings (e.g., Bell and Griffin 2012; Griffith et al. 2015a). However, no study to date considers a defined sample of FVM engagements and statistically analyzes associations of environmental and task characteristics with audit processes and outcomes. We address this gap in the literature by describing and statistically analyzing the audit process for a sample of FVM engagements. We look inside the “black box” of the audit process in these engagements to describe the extent of EU and then trace its influence through the audit sequence, from risk assessment, to the decision on use of a valuation specialist, to planning and execution of evidential procedures (including who performed them, the extent of challenge in performing them, and the “yield” in terms of client problems uncovered), and finally, to outcomes (discussions with client management regarding adjustments, and the extent to which client-asserted FVMs are adjusted). In so doing, we also extend the literatures on auditor/client negotiation and audit adjustments (summarized as of the mid-2000s by Brown and Wright [2008] and Church, Davis, and McCracken [2008], respectively) by examining a more comprehensive set of audit phases than in prior studies.

We conduct this investigation in the context of highly challenging FVM audits. While all accounting estimates contain some degree of judgment, the audit costs and risks associated with the most challenging tail of the FVM distribution are likely to be extensive and, thus, should be of high interest to the profession, regulators, and financial report users. We gather information on this segment of the FVM population using an experiential questionnaire, using both quantitative and qualitative responses informed by theory, prior research, auditing standards, and advice of professionals from participating firms. We provide descriptive evidence and test specific hypotheses organized by phases of the audit: (1) the environmental and task characteristics of challenging FVMs; (2) the role of EU in inherent risk assessments for these FVMs; (3) auditors’ decisions to use valuation specialists; (4) auditors’ evidential planning decisions, difficulties experienced in performing them, and problems identified; and (5) the audit outcomes for challenging FVMs. We model these phases of the audit using a series of sequential equations and supplementary path models.

Our sample of 115 FVM audits is described by 96 high-level engagement team members selected by each of the Big 4 audit firms from among personnel with experience auditing FVMs. The sample predominantly comprises Level 3 fair values; financial instruments are most prominent, followed by asset impairments. Participants report very high levels of EU (equal to or greater than materiality for about 72 percent, with 21 percent over five times materiality). This pattern is consistent with concerns expressed in the literature (e.g., Bell and Griffin 2012; Christensen et al. 2012), but this study is the first to measure the extent of EU among a sample of challenging FVMs. Participants also report that the features of these FVMs (i.e., management assumptions, complexity, subjectivity, proprietary valuations, and a lack of verifiable data) all contribute to the challenges in auditing them.

In the second (risk assessment) phase of the audit, we find a positive relationship of EU with inherent risk, despite the concentration of our sample at the high end of the EU distribution. While the overall trend is consistent with auditing standards (American Institute of Certified Public Accountants [AICPA] 2011, AU-C 540; Financial Accounting Standards Board [FASB] 2011) and an experimental study (Rowe 2015), we find that inherent risk for the FVM is still assessed below maximum in some cases of very high EU. This may indicate a need for greater professional skepticism when auditing challenging FVMs (see, also, Griffith et al. 2015a) or that the flexibility of a larger range of EU reduces the likelihood of misstatement.

In the third phase, we investigate auditors’ decisions to use valuation specialists as a means of reducing risk and uncertainty. Auditor specialist use is common in our sample, consistent with the challenging nature of these FVMs. Building on interview-based studies reporting auditors’ views (e.g., Griffith 2015), our models show that inherent risk and control risk are associated with the decision to use a valuation specialist. Auditor and client specialist use are highly correlated; in fact, auditors almost always use a specialist when the client does. This association may be due to common recognition of complexity (Griffith et al. 2015a) or auditors anticipating the need for specialist support in more risky audit situations, to match the additional expertise brought by client specialists. Auditors’ qualitative explanations provide pointed examples of how the wide range of possible FVM values can lead to disagreement in findings, contributing to task difficulty.¹

In the fourth phase, we analyze auditors’ evidential planning decisions, the level of difficulty experienced in performing various procedures, and their yield in terms of problems identified. We find extensive use of each of three approaches to testing

¹ These responses are consistent with prior research (summarized by Peecher, Solomon, and Trotman [2013]) suggesting that such disagreements among experts are common.

FVMs outlined in current auditing standards. Substantive tests of the model, assumptions, or underlying data are performed in the large majority of observations. Procedures likely to provide higher-quality evidence due to less reliance on management's assertions (development of an independent estimate and subsequent events testing; Griffith et al. [2015a]) are employed somewhat less often, but are still used in over half of sample engagements. The audit firm's valuation specialists are heavily involved in developing independent estimates, as well as in testing management's model and underlying assumptions. Supplementation of engagement team expertise in performing these procedures is important, as they have a higher yield in terms of problems identified with the FVM.

In the fifth phase, we examine outcomes of audits of challenging FVMs. Audit procedures identify specific problems in most sample engagements (most commonly with assumptions used and controls over the valuation). The extent of problems identified, as well as inherent and control risk assessments, are influential in auditor discussion of a possible adjustment of management's asserted valuation. Adjustments are proposed in about half of engagements where they are discussed with management. Consistent with prior research, we focus on income-decreasing adjustments, finding that once proposed, they are more likely than not to be booked. We model income-decreasing adjustments, based on substantial prior literature on the auditor's asymmetric loss function (e.g., Nelson 2009). Model results reveal that neither EU nor risk assessments has a direct effect; rather, what matters is evidential support (e.g., an independent estimate) and a greater breadth of concrete problems identified by the auditor (see, also, Peecher et al. 2013). Further, all booked income-decreasing adjustments are Level 3 valuations and involve the auditor's use of a specialist.

Supplemental to these findings, we provide additional insight into individual auditors' reactions to environmental/task characteristics (suggested by Bratten et al. [2013]) through qualitative analysis of responses to open-ended questions. Specifically, based on the framework of Lipshitz and Strauss (1997), we measure expressions of sources of uncertainty and coping tactics. Concerning sources of uncertainty, all auditors mentioned lacking information (e.g., uncertainty about future outcomes), and half also expressed uncertainty related to "conflicting meanings" (i.e., equivocal information). Regarding coping tactics, all mentioned uncertainty reduction through collecting additional information and assumption-based reasoning (i.e., making assumptions based on general knowledge when client-specific information is lacking), and most indicated seeking advice from others (e.g., valuation specialists). Despite these tactics, 14 percent explicitly noted that residual uncertainty remained at the end of the audit. These expressions of residual uncertainty are positively associated with discussion of an audit adjustment with management, but not with whether an income-decreasing audit adjustment is booked. This suggests that residual uncertainty at the end of the audit signals situations in which auditors are less able to negotiate a downward FVM adjustment, although our research design does not permit the inference that financial reporting quality is lower when such adjustments are waived for high uncertainty FVMs.

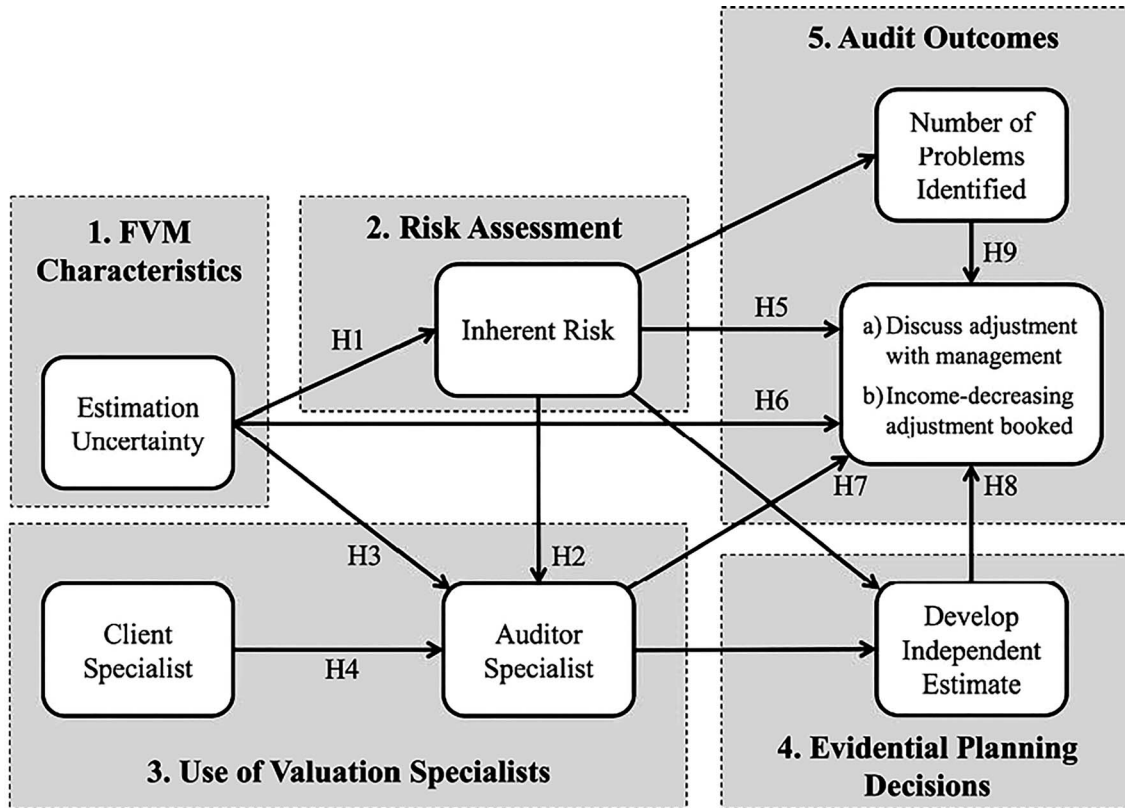
In summary, our results contribute to our extant understanding of the roles of environment and task factors in auditors' judgments and decisions for challenging FVMs. Illustrative quotes from participants and qualitative analysis provide depth and insight beyond results of statistical models. Overall, we find a high level of engagement effort and use of specialists in sample engagements, and expressions of personal concern about the valuation, and yet few audit adjustments are booked. This picture contrasts with the view that auditors are insufficiently skeptical in audits of FVMs.

The remainder of this paper proceeds as follows. Section II summarizes the regulatory background for auditing FVMs. Section III presents prior research relevant to our key topics, organized by phases of the audit, and develops specific hypotheses. Section IV discusses research methods, Section V provides results, and Section VI presents conclusions and implications of our findings.

II. BACKGROUND

Over recent decades, there has been a significant increase in FVMs included in financial statements, and a corresponding increase in financial reporting complexity (Bratten et al. 2013; Christensen et al. 2012; Glover et al. 2016a). While FVMs are recognized as useful to market participants (FASB 2010; Barth and Landsman 2010), they are frequently subjective and unobservable. Thus, considerable judgment is required by preparers in developing financial statements and related disclosures that "faithfully represent" transactions and balances. Explosive growth in complex and novel financial instruments (e.g., collateralized debt obligations, derivatives, interest rate swaps, funds of funds), the requirements of accounting standards (FASB 2011, ASC 820), and economic turmoil have all contributed to the significant increase in difficulties for financial statement preparers and users (Bell and Griffin 2012; Bratten et al. 2013; Christensen et al. 2012; Glover et al. 2016a; Griffith et al. 2015a). Given the confluence of these factors, the auditor plays a critical role in providing assurance to the capital markets, which is underscored by increased regulatory attention by the PCAOB. Thus, gaining a better understanding of the fair value audit process and identifying potential problem areas should be an important priority for academic research, as well as for the profession.

FIGURE 1
Schematic of Audit Phases and Hypotheses



This figure shows the organization of this study, including the audit phases examined, specific variables measured within each phase, and hypothesized associations.

AU 342 (AICPA 1989) provides auditing guidance for U.S. public companies, covering auditing accounting estimates in general, and AU 328 (AICPA 2003) addresses considerations specific to FVMs and disclosures.² In the following sections, we briefly discuss provisions of auditing standards that relate to our research purpose and hypothesis tests, focusing primarily on AU 328 as our sample consists of FVMs.

III. RESEARCH FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Figure 1 provides a guide to our multi-phase study of inputs, processes, and outcomes of the challenging FVM audit. In the sections below, we examine these phases of the audit and develop specific hypotheses on key relationships within the audit process for difficult FVMs, as shown in Figure 1.

Environmental and Task Characteristics of Challenging FVMs

Phase 1 of Figure 1 concerns environmental and task characteristics of FVMs that contribute to auditors' perceptions of difficulty in providing reasonable assurance. While research has not comprehensively investigated the features of specific FVMs that make them more challenging to audit, auditing standards (e.g., AU 328.24) and academic literature (e.g., Bratten et al. 2013) prominently cite the importance of EU. International auditing standards (International Federation of Accountants [IFAC] 2008, International Standard on Auditing [ISA] 540) define EU as "the susceptibility of an accounting estimate and its

² AU 328 includes derivatives, financial instruments, intangible assets, asset retirement obligations, stock-based compensation, and certain impairment issues, while AU 342 includes uncollectible receivables, depreciation and amortization, warranty claims, and insurance company loss reserves. See PCAOB (2007a) for a comparison of these standards, and Bratten et al. (2013), Griffith et al. (2015a), and Martin, Rich, and Wilks (2006) for further discussion.

related disclosures to an inherent lack of precision in its measurement.” As noted by [Bratten et al. \(2013\)](#), EU can result from factors such as model assumptions and management’s selection of measurement models. Higher EU implies greater subjectivity, which, according to prior research (e.g., [Nelson and Kinney 1997](#)), may lead the auditor toward a more conservative approach throughout the engagement. On the other hand, recent articles (e.g., [Bell and Griffin 2012](#); [Christensen et al. 2012](#); [Bratten et al. 2013](#)) note that high EU can complicate the normal audit process of reducing risk to reasonable levels through accumulation of evidence (summarized in Exhibit 3.2 of [Bell, Peecher, and Solomon \[2005\]](#)). A broader range of possible values means that management’s estimate may be more likely to lie within the auditor’s estimated uncertainty range even when this range exceeds materiality and, thus, seem as reasonable as other estimates.

While the importance of EU is generally recognized, data on its distribution in actual engagements are rare.³ [Christensen et al. \(2012, 143\)](#) identify examples of extreme EU in two public companies, concluding that transaction and reporting complexity “may have outstripped auditors’ ability to provide the level and nature of assurance currently required on estimates with extreme EU by auditing standards and regulators.” We contribute to understanding the extent of EU experienced by auditors in challenging FVM engagements by describing its level relative to materiality. We further describe the nature of these valuations and the factors that made them challenging and/or complex to audit.

Estimation Uncertainty and Risk Assessments

We next investigate how EU affects auditors’ inherent risk assessments (Phase 2 of Figure 1). Theories of decision-making under uncertainty (e.g., [Lipshitz and Strauss 1997](#)) hold that people are generally uncomfortable with uncertainty, and will take actions to understand its sources and to reduce it if possible.⁴ In the auditing context, professional standards (AU 328.24; AU 342.05; ISA 540.A36) acknowledge that EU contributes to valuation complexity and audit risk. Thus, both general theory and professional norms lead to the expectation that auditors should assess higher inherent risk when EU is greater and incorporate it into their decision processes. [Rowe \(2015\)](#) summarizes several prior auditing studies in various contexts, finding results consistent with uncertainty aversion. He then tests whether EU affects auditor judgments in an experimental FVM context, finding that inherent risk assessments are greater under extreme than moderate EU.⁵ We extend [Rowe \(2015\)](#) by investigating the link between EU and inherent risk assessments in actual audit engagements across a variety of FVM types.

H1: Auditors will assess higher inherent risk for FVMs as estimation uncertainty increases.

Use of Valuation Specialists

As the engagement proceeds, the auditor may enlist a valuation specialist (Phase 3 of Figure 1). Academic papers on audit practice ([Johnstone and Bedard 2001](#); [Bell et al. 2005](#)) show that use of specialists is a frequently employed audit risk mitigation strategy. In the FVM context specifically, AU 336.06 ([AICPA 1994](#)) notes that auditing complex or subjective accounts may require knowledge and skills beyond those normally possessed by the financial statement auditor. Further, the [PCAOB \(2007b\)](#) indicates that significant use of unobservable inputs and complexity of the valuation technique (consistent with high EU) should be considered in making this determination.⁶ Prior research investigating the auditors’ decision to use a specialist for any purpose is limited, and we are aware of only two such studies that directly address valuation specialists, both based on interviews of engagement personnel. [Boritz, Robinson, Wong, and Kochetova-Kozloski \(2016\)](#) find that experienced auditors frequently mention the level of risk as a key reason for engaging any of a variety of specialist types.⁷ However, their discussion focuses on company-level risk factors, such as size and regulatory status (control variables in our models), rather than account-specific factors. [Griffith \(2015\)](#) studies experienced auditors’ views on factors affecting use of valuation

³ Quantitative disclosure of the reasonable range of EU for FVMs is not required in the U.S. [Mayorga and Sidhu \(2012\)](#) analyze EU disclosures by the 20 largest Australian companies, finding those disclosures to be inadequate in helping users assess the extent and sources of EU in those companies.

⁴ [Lipshitz and Strauss \(1997\)](#) propose three conceptualizations of uncertainty that are useful here: (1) lack of information (incomplete/unreliable information); (2) inadequate understanding due to equivocal information, novelty, or instability; and (3) conflict among alternatives. While the first characterizes all audits, the second and third are likely to characterize the FVM context. [Lipshitz and Strauss \(1997\)](#) also identify a number of tactics for coping with uncertainty, including collection of evidence and seeking advice. We apply their framework in supplemental qualitative analysis.

⁵ Indirect evidence is also provided by [Ettredge, Xu, and Yi \(2014\)](#), who find that audit fees increase with the extent of Level 3 assets in banks’ portfolios, consistent with a risk premium and/or greater audit effort. [Landsman \(2007\)](#) notes that Level 3 valuations are more susceptible to management discretion and measurement error. This can lead to moral hazard (i.e., managers using their private information to value the asset to their personal advantage) and adverse selection (i.e., the market may not be able to distinguish truly different assets priced similarly).

⁶ [Gold, Knechel, and Wallage \(2012\)](#) further note that the choice to consult with a valuation specialist may be made to shift risk by transferring responsibility to the specialist.

⁷ In another specialist context, [Janvrin, Bierstaker, and Lowe \(2008\)](#) report that use of IT specialists by audit engagement teams varies by audit firm size (59.3 percent for Big 4 versus 3.5 percent for small firms) and increases with client complexity. Also, [Jenkins, Negangard, and Oler \(2016\)](#) find that the use of forensic professionals is associated with riskier engagements and the number of internal control deficiencies and identified frauds.

specialists, citing account-specific risk,⁸ as well as account complexity and input levels. Given the direction in auditing standards and limited prior research, we expect that audit engagement teams will more often use specialists when EU and inherent and control risk are high, while controlling for other features of the account and the client:

H2: Auditors will be more likely to use a valuation specialist to assist the engagement team as estimation uncertainty for the FVM increases.

H3: Auditors will be more likely to use a valuation specialist to assist the engagement team as inherent and control risk assessments for the FVM increase.

Further, we study the interplay between auditor and client decisions to use a valuation specialist. The literature presents two rationales supporting a positive association. First, [Gibbins, Salterio, and Webb \(2001\)](#) and [McCracken, Salterio, and Gibbins \(2008\)](#) note that the position of the parties in auditor/client negotiations improves with greater expertise. Because auditors may choose to employ a specialist to bolster their negotiating position, they may be more likely to strategically use a specialist when the client also employs one. Second, client and auditor might both use specialists on a given FVM because both recognize the complexity of the valuation. While this view is expressed by a majority of partners in [Griffith's \(2015\)](#) study, some of her participants provide a contrasting view: that auditors are *less* likely to use a specialist when the client employs one, as the auditor can obtain comfort when the client's valuation is supported with greater expertise. While recognizing that there is some tension in this issue, we propose that auditors will more often use a valuation specialist when the client uses a specialist:

H4: Auditors will be more likely to use a valuation specialist to assist the engagement team when the client also uses a specialist to help value the FVM.

Evidential Planning Decisions

Following the above steps, auditors plan evidential procedures (Phase 4 of Figure 1). AU 328 does not prescribe specific substantive procedures for auditing FVMs, but instead allows auditors to select from several options, including: (1) testing management's assumptions, model, and data; (2) developing an independent fair value estimate; and (3) reviewing subsequent events and transactions. The nature and extent of evidence that auditors bring to bear on FVMs and complex estimates is an important question, but concurrent interview-based studies provide conflicting evidence on the extent to which these approaches are used. [Griffith et al. \(2015a\)](#) conclude that auditors most often focus on testing management's process for developing the estimate, and infrequently engage in critical analyses such as developing independent estimates. In contrast, [Glover et al. \(2016a\)](#) find that auditors frequently use all three options allowed by standards. We provide further evidence describing the frequency of specific tests used for challenging FVMs, who performed the test (engagement team or specialist), the extent of challenges encountered, and the extent to which the procedure provided evidence of client problems.

Audit Outcomes

Problem Identification

As shown in Phase 5 of Figure 1, we provide a detailed view of the final phase of the audit, including identification of specific problems, discussion of those issues with client personnel, proposal of an audit adjustment, and booking/waiving proposed adjustments.⁹ Prior research recognizes that auditors and client personnel commonly negotiate over the specific content of financial statements and disclosures. [Gibbins et al. \(2001\)](#), citing literature in psychology, note that the negotiation process begins with a set of issues to be considered. In the FVM context, auditors accumulate and consider evidence about the client, and management's proposed amounts and disclosures. Considering management's assertions within the context of industry norms, economic conditions, and regulatory standards, auditors may develop a set of concerns (i.e., potential areas of disagreement) that will form the basis of discussion with management. While the issues identified by auditors preparing for negotiation are important, evidence on their nature is scarce; the only auditing study of which we are aware that discloses the

⁸ While both [Boritz et al. \(2016\)](#) and [Griffith \(2015\)](#) indicate a positive relationship between risk and valuation specialist usage, neither study distinguishes between inherent and control risk. Absent evidence to the contrary, we predict the same relationship for both inherent and control risk.

⁹ While we requested information on all audit adjustments, our hypotheses and models focus on income-decreasing adjustments. Most earnings management attempts by clients are aimed at increasing income ([Nelson, Elliott, and Tarpley 2002](#)). Prior research (e.g., [Dechow, Sloan, and Sweeney 1996](#); [St. Pierre and Anderson 1984](#)) finds that Securities and Exchange Commission (SEC) sanctions and litigation against auditors are associated with overstated income. [Patterson and Smith \(2003\)](#) show that auditor conservatism increases with greater uncertainty, which characterizes the FVM context.

specific nature of issues considered is [McCracken et al. \(2008\)](#), who study nine engagements. We provide descriptive evidence on the problems that auditors identified in our sample of challenging FVM engagements.

Discussion of Audit Adjustments and Booking/Waiving of Proposed Adjustments

Following problem identification, the auditor may decide to discuss a possible audit adjustment with client personnel in order to gain information on their perspectives and justification for their assertions. The auditor will then consider whether to propose an adjustment and, if so, for what amount. Following negotiation with the client, the adjustment will either be booked (in full or in part) or waived. In the following subsections, we organize our discussion by factors affecting these decisions.

Inherent/control risk and estimation uncertainty. While the literature recognizes the importance of auditor-management discussions (e.g., [McCracken et al. 2008](#)), there is little evidence on factors that affect the first step in this process; i.e., the auditor's decision to enter into a discussion with a client on a possible audit adjustment.¹⁰ One study ([Gibbins et al. 2001](#)) reports audit partners' views that negotiation between auditor and client often arises from unclear standards, and also depends on account factors such as risk, complexity, and materiality/significance (which, according to AU 328.24, AU 342.05, and ISA 540.A36, are associated with EU). While prior research directly on point is scant, we propose that in the FVM context, auditors will be more likely to discuss a possible adjustment with management in the presence of greater inherent/control risk and EU:

H5a: The likelihood of auditors discussing a possible audit adjustment with client management will increase as estimation uncertainty for the FVM increases.

H6a: The likelihood of auditors discussing a possible audit adjustment with client management will increase as inherent and control risk assessments for the FVM increase.

We next consider whether audit adjustments are booked or waived following negotiation with clients, focusing on the effects of risk and EU. Prior archival studies of audit adjustments (most of which use data from the 1980s and 1990s) generally find that an audit adjustment is more likely for accounts with higher inherent and/or control risk (e.g., [Bell, Knechel, Payne, and Willingham 1998](#); [Braun 2001](#); [Ruhnke and Schmidt 2014](#)); however, Joe, A. Wright, and S. Wright (2011) (set after the Sarbanes-Oxley Act [SOX]) do not find a risk effect.¹¹

Research has not yet directly examined the impact of EU in the FVM context, but a broader range of possible values suggests that auditors may have difficulty justifying a proposed adjustment. According to current auditing standards ([PCAOB 2010](#), ¶13), management's FVM estimate is ordinarily not misstated unless it falls materially *outside* of the range of reasonable estimates. Further, prior studies summarized by [Church et al. \(2008\)](#) find that adjustments are more often waived by auditors when the proper accounting treatment is ambiguous (e.g., [A. Wright and S. Wright 1997](#); [McCracken et al. 2008](#)). While these studies suggest that greater EU might decrease audit adjustments, prior research in auditing (e.g., [Bratten et al. 2013](#); [Rowe 2015](#)) and in general ([Lipshitz and Strauss 1997](#)) supports the proposition that auditors are uncertainty-averse. If so, then they should be more conservative when EU is high (see, also, [Patterson and Smith 2003](#)). The archival results of [Joe et al. \(2011\)](#) support more booking of adjustments for subjective accounts, and [Griffin's \(2014\)](#) experiment shows that auditors are more likely to adjust FVMs when the valuations are both more subjectively determined and more imprecise in outcome. Given unclear directions for the effects of both risk and EU on audit adjustments, we propose null hypotheses:

H5b: The likelihood of booking an audit adjustment that decreases income will not differ based on the estimation uncertainty for the FVM.

H6b: The likelihood of booking an audit adjustment that decreases income will not differ based on the level of inherent and control risk assessments for the FVM.

¹⁰ [Brown and Wright \(2008\)](#) provide a review of the auditor negotiation literature as of the mid-2000s. At that time and since, research tends to focus on negotiation strategies (e.g., [Bame-Aldred and Kida 2007](#); [Hatfield, Agolia, and Sanchez 2008](#); [Hatfield, Jackson, and Vandervelde 2011](#)) or ways in which negotiation outcomes can be improved (e.g., [Trotman, A. Wright, and S. Wright 2005](#)), rather than factors associated with entering into negotiation.

¹¹ While our focus is on the role of greater risk and EU in audit adjustments, prior research identifies other significant factors. For archival studies, these include the relative subjectivity of accounts ([Kreutzfeldt and Wallace 1986](#); [Joe et al. 2011](#)), the precision of accounting standards ([Nelson et al. 2002](#)), the audit context (e.g., auditor tenure/rotation; [Joe et al. \[2011\]](#) and [Lennox, Wu, and Zhang \[2014\]](#)), prior adjustments ([Kinney 1979](#)), and auditor effort ([Ruhnke and Schmidt 2014](#)). Experimental studies find that key factors include environmental factors, such as management's preferences and incentives ([Nelson and Kinney 1997](#); [Cohen, Gaynor, Krishnamoorthy, and Wright 2011](#)), qualitative materiality factors ([Ng and Tan 2007](#)), and prior client concessions ([Hatfield et al. 2011](#)).

Auditor's use of a valuation specialist. Partners interviewed by Griffith (2015) report that valuation specialists are often involved in determining whether the client's asserted value is reasonable, and Boritz et al. (2016) find that specialists are highly involved in evidence evaluation. These results imply key roles for specialists at the end of the audit. Other research reinforces this point by showing that auditor success in negotiation is determined by expertise and objectivity. Gibbins et al. (2001) and McCracken et al. (2008) point out that the auditor's position improves with greater expertise; thus, engagement teams may strategically choose to engage a valuation specialist to bolster their arguments. Further, Boritz et al. (2016) imply that specialists are likely to be more objective, as they are less subject to client pressure to retain the engagement. Taken together, these results suggest the following:

H7a: The likelihood of auditors discussing a possible audit adjustment with client management will increase when a valuation specialist is used by the engagement team.

H7b: The likelihood of booking an audit adjustment that decreases income will increase when a valuation specialist is used by the engagement team.

Evidential choices. Based on research on auditors' tendency to gather more evidence to justify their positions (e.g., Koonce, Anderson, and Marchant 1995; Power 1995; Peecher 1996; Gibbins et al. 2001), we further predict that use of higher-quality procedures will increase audit adjustments. Of particular interest is development of an independent estimate for the FVM that relies less than other procedures on management representations, employing "integrated audit processes rather than compartmentalized verification steps, thereby addressing the root causes of current problems" (Griffith et al. 2015a; 860). Fitzgerald, Wolfe, and Smith (2016) theorize that the act of developing an independent estimate helps to create distinct boundaries between the auditor's independently developed evidence and potentially biased management's estimates, which, in turn, can lead auditors to contrast their judgments away from the biasing influence of management (Bless and Schwarz 2010; Wilcox, Roggeveen, and Grewal 2011). Their experimental results support this theory, as auditors who developed independent estimates were more likely to assess management's estimate as unreasonable. Thus, H8 proposes:

H8a: The likelihood of auditors discussing a possible audit adjustment with client management will increase when an independent estimate of the FVM is developed.

H8b: The likelihood of booking an audit adjustment that decreases income will increase when an independent estimate of the FVM is developed.

Extent of problems identified. Last, we study specific problems identified during the engagement. Prior empirical research on audit adjustments primarily focuses on the role of inputs (e.g., risk assessments/factors and characteristics of accounts). But as audit procedures are performed, initial risk assessments are revised as specific client problems are identified (including accounting practices, relevant internal controls, concerns about management intent, etc.), which should influence the auditor's reasoning regarding whether the client's account balances and related disclosures are fairly stated. To our knowledge, no prior research examines the role of specific identified problems in discussing and booking an audit adjustment. We first describe the nature of problems that auditors identify when auditing FVMs, and then test the following hypotheses:

H9a: The likelihood of auditors discussing a possible audit adjustment with client management will increase as the extent of identified problems increases.

H9b: The likelihood of booking an audit adjustment that decreases income will increase as the extent of identified problems increases.

IV. METHOD

Questionnaire Design and Collection Procedures

We used an experiential questionnaire to capture auditors' descriptions of a specific engagement experience involving the auditing of a highly challenging FVM. The Center for Audit Quality (CAQ) distributed the instrument directly to a pool of highly ranked personnel from a range of geographic regions with experience auditing challenging FVMs, identified by national/regional partners or HR offices at each of the Big 4 firms. (While random selection of participants would have been ideal, this was not an available option.) The instrument was completed by 67.1 percent of those individuals and returned directly to the CAQ. The firms advised that senior managers and managers would have the best working knowledge of engagement and FVM details; 95 percent of the sample are from those ranks. One firm preferred that each participant report two instances; the 115 observations are from 96 participants.

We developed the questionnaire using relevant auditing standards, results of PCAOB inspections, and prior related research.¹² It asks respondents to recall a specific situation during a recent engagement in which auditing an FVM was among the most challenging and important issues in the audit. Several days prior to receiving the survey instrument, we asked the participating firms to send participants a letter explaining the nature of the study so that they would have ample time to consider the most appropriate engagement to discuss and to review engagement information. We also followed prior research (e.g., Gibbins et al. 2001; Nelson et al. 2002) in attempting to reduce bias by assuring confidentiality and anonymity, and highlighting the study's importance by noting support of the CAQ and approval by the firm. The Online Appendix presents all questions included in the instrument, including summary statistics on responses, and notes those questions from which variables were derived (see Appendix C for the link).

Models and Variables

Model (1), an ordinary least squares (OLS) regression, tests the prediction in H1 that inherent risk assessments will increase with EU, due to lack of objective audit evidence supporting the valuation and increased complexity. Table 1, Panel A defines variables used in this model. The dependent variable is *INHERENT_RISK*, assessed on a scale ranging from 1 = low to 11 = high. We measure EU through two variables: *UNCERTAINTY* is an assessment measured on a five-point scale from "less than materiality" to "greater than 5X materiality"; and *LEVEL3* is an indicator equal to 1 if the FVM is classified as Level 3 in the ASC 820 fair value hierarchy, and 0 otherwise. (In this and following models, test variables are bold and hypothesis numbers noted.)

$$\begin{aligned} INHERENT_RISK = & \beta_0 + \beta_1 UNCERTAINTY(\mathbf{H1}) + \beta_2 LEVEL3(\mathbf{H1}) + \beta_3 CONTROL_RISK + \beta_4 SPEC_CLIENT \\ & + \beta_5 SEC_NOTAF + \beta_6 ACCELERATED + \beta_7 SALES + \beta_8 TYPE_FININST + \beta_9 TYPE_IMPAIR + \varepsilon \end{aligned} \quad (1)$$

Model (1) also contains control variables reflecting FVM and client characteristics.¹³ *CONTROL_RISK* is the auditor's assessment on a scale ranging from 1 = low to 11 = high; we expect a positive coefficient, consistent with prior research (e.g., Haskins and Dirmsmith 1995; Dusenbury, Reimers, and Wheeler 2000; Messier and Austin 2000; Vandervelde, Tubbs, Schepanski, and Messier 2009; Miller, Cipriano, and Ramsay 2012). *SPEC_CLIENT* equals 1 if the client uses a valuation specialist, and 0 otherwise; we expect a positive coefficient as the presence of a client specialist implies a more complex valuation (Griffith 2015). *SEC_NOTAF* and *ACCELERATED* are indicators equal to 1 if the client is an SEC registrant or accelerated filer, respectively, and 0 otherwise. We expect positive coefficients due to greater regulatory risk. Client size is measured as *SALES*, based on five broad ranges of revenues at the request of participating firms. We do not predict a sign, as larger firms are more complex, but also are more stable, with better controls and more management expertise. The model also controls for the most frequent FVM types: *TYPE_FININST* (*TYPE_IMPAIR*) equals 1 the FVM is a financial instrument (asset impairment), and 0 otherwise.

In the third phase of the audit, we investigate auditors' use of specialists and the environmental and task factors predicting auditor specialist involvement. Model (2), a logistic regression, tests three hypotheses regarding the auditor's decision to use a valuation specialist. The dependent variable, defined in Table 1, Panel B, is *SPEC_AUDITOR*. Independent variables include the factors in Model (2), as well as *INHERENT_RISK* and *CR * IR*, the interaction of control and inherent risk (as the combined effects of both sources of risk may be synergistic).

$$\begin{aligned} SPEC_AUDITOR = & \beta_0 + \beta_1 UNCERTAINTY(\mathbf{H2}) + \beta_2 LEVEL3(\mathbf{H2}) + \beta_3 INHERENT_RISK(\mathbf{H3}) \\ & + \beta_4 CONTROL_RISK(\mathbf{H3}) + \beta_5 CR*IR(\mathbf{H3}) + \beta_6 SPEC_CLIENT(\mathbf{H4}) + \beta_7 SEC_NOTAF \\ & + \beta_8 ACCELERATED + \beta_9 SALES + \beta_{10} TYPE_FININST + \beta_{11} TYPE_IMPAIR + \varepsilon \end{aligned} \quad (2)$$

H2 predicts positive coefficients on *UNCERTAINTY* and *LEVEL3* due to increased need for specialist assistance to deal with conditions of subjectivity and complexity. H3 predicts positive coefficients on *INHERENT_RISK*, *CONTROL_RISK*, and *CR * IR*, as auditors will likely seek the help of valuation specialists to reduce audit risk to target levels. H4 predicts a positive coefficient on *SPEC_CLIENT* because clients and auditors may employ specialists due to a common view of the FVM (Griffith 2015), or because the auditor specialist could be needed for support of the auditor's position in negotiations at the end of the engagement. We also expect *SEC_NOTAF* and *ACCELERATED* to have positive coefficients due to increased regulatory complexity associated with SEC oversight, but do not predict signs for other control variables.

¹² To ensure close alignment with audit practice, we conducted a series of interviews with Big 4 partners and managers. We also received extensive feedback from audit partners from each participating firm, and pilot-tested the questionnaire with six senior managers.

¹³ Variables other than indicators are centered at their means. We do not include the relative materiality of the FVM in the models, as it is highly correlated with *UNCERTAINTY* (0.52, $p < 0.01$).

TABLE 1
Variable Definitions and Descriptive Statistics

Panel A: Variables Used in Model (1)

Variable Name	Measurement	Percent or Mean (S.D.) [Median]
<i>INHERENT_RISK</i>	Inherent risk associated with the FVM [scale from 1 = low to 11 = high]	8.47 (2.15) [9]
<i>UNCERTAINTY</i>	Degree of EU: = 1 if less than materiality = 2 if approximately equal to materiality = 3 if 2–3X materiality = 4 if 4–5X materiality = 5 if greater than 5X materiality	2.7 (1.50) [2]
<i>LEVEL3</i>	= 1 if Level 3 in the SFAS 157 fair value hierarchy, and 0 otherwise	82.46
<i>CONTROL_RISK</i>	Control risk associated with the FVM [scale from 1 = low to 11 = high]	6.70 (2.39) [6]
<i>SPEC_CLIENT</i>	= 1 if valuation specialist consulted by the client (client employee = 54.8%, third party = 39.1%; multiple responses allowed)	60.0
<i>SEC_NOTAF</i>	= 1 if a public company, but not an accelerated filer, and 0 otherwise	15.7
<i>ACCELERATED</i>	= 1 if an accelerated filer, and 0 otherwise	51.3
<i>SALES</i>	= 1 if < \$25 million = 2 if \$25 million–\$200 million = 3 if \$200 million–\$1 billion = 4 if \$1 billion–\$5 billion = 5 if > \$5 billion	3.42 (1.32) [3]
<i>TYPE_FININST</i>	= 1 if the FVM is a financial instrument, and 0 otherwise	48.7
<i>TYPE_IMPAIR</i>	= 1 if the FVM is an asset impairment, and 0 otherwise	27.8

Panel B: Additional Variable for Auditor Valuation Specialist (Model (2))

Variable Name	Measurement	Percent or Mean (S.D.) [Median]
<i>SPEC_AUDITOR</i>	= 1 if valuation specialist consulted by the engagement team (employed by the audit firm = 85.2%, third party = 5.2%; multiple responses allowed)	86.1

Panel C: Additional Variable for Procedures Performed

Variable Name	Measurement	Percent or Mean (S.D.) [Median]
<i>PROC_INDEP_EST</i>	= 1 if an independent fair value estimate was developed, and 0 otherwise. See Table 2 for detail on all audit procedures.	53.0

Panel D: Additional Variables for Audit Outcomes (Models (3) and (4))

Variable Name	Measurement	Percent or Mean (S.D.) [Median]
<i>PROB_SUM</i>	The sum of number of categories in which the auditor detected client problems; see Table 3 for details.	1.46 (1.16) [1]

(continued on next page)

TABLE 1 (continued)

Variable Name	Measurement	Percent or Mean (S.D.) [Median]
<i>TOPIC_ADJ</i>	= 1 if an audit adjustment discussed with management, and 0 otherwise	40.0
<i>DEC_AUD_ADJ</i>	= 1 if a decreasing audit adjustment was fully or partially booked, and 0 otherwise (n = 103 with increasing adjustments removed)	10.7

This table defines and describes variables used in the models. Statistics are computed on all available data unless otherwise noted.

In the fourth phase of the audit, we investigate substantive procedures performed when auditing challenging FVMs. We address this issue using descriptive statistics derived from a series of questions shown in Table 2 that outline the possible audit procedures prescribed by auditing standards: (1) test the FVM model, the assumptions used in the model, and the data used in the model, (2) develop an independent estimate (*PROC_INDEP_EST*), and (3) review subsequent events and transactions. The instrument also captures who performed the procedure (engagement team or specialist), whether significant challenges were encountered, and whether the procedure identified client problems. Table 1, Panel C defines *PROC_INDEP_EST*, to be used in Models (3) and (4).¹⁴

The final phase concerns outcomes of the audit process. We describe client problems that were identified in the audit (Table 3) and provide a flowchart from auditors' discussion of a possible adjustment through proposal to the book/waive decision (Figure 2). Models (3a) and (4a) are logistic regressions that test hypotheses on the associations of audit outcomes with account and client characteristics, auditor specialist use, and evidential planning decisions. The dependent variable in Model (3a) is *TOPIC_ADJ*, which equals 1 if an audit adjustment was discussed with management, and 0 otherwise. The dependent variable in Model (4a) is *DEC_AUD_ADJ*, which equals 1 if a decreasing audit adjustment was fully or partially booked, and 0 otherwise. Incremental variables used in these models are defined in Table 1, Panel D:

$$\begin{aligned}
 [AUDITOUTCOME] = & \beta_0 + \beta_1 UNCERTAINTY(\mathbf{H5}) + \beta_2 LEVEL3(\mathbf{H5}) + \beta_3 INHERENT_RISK(\mathbf{H6}) \\
 & + \beta_4 CONTROL_RISK(\mathbf{H6}) + \beta_5 CR*IR(\mathbf{H6}) + \beta_6 SPEC_AUDITOR(\mathbf{H7}) \\
 & + \beta_7 PROC_IND_EST(\mathbf{H8}) + \beta_8 SPEC_CLIENT + \beta_9 SEC_NOTAF + \beta_{10} ACCELERATED \\
 & + \beta_{11} SALES + \beta_{12} TYPE_FININST + \beta_{12} TYPE_IMPAIR + \varepsilon
 \end{aligned}
 \tag{3a/4a}$$

H5a and H6a predict positive associations of measures of uncertainty (*UNCERTAINTY* and *LEVEL3*) and risk variables (*INHERENT_RISK*, *CONTROL_RISK*, and *CR * IR*), respectively, with *TOPIC_ADJ*. H5b and H6b predict no effect of uncertainty and risk variables, respectively, on *DEC_AUD_ADJ*. H7 and H8 predict positive coefficients in both models on test variables related to auditors' evidence-gathering efforts (*SPEC_AUDITOR* and *PROC_INDEP_EST*, respectively), as additional expertise and evidence help bolster the engagement team in discussions with clients (e.g., Koonce et al. 1995; Peecher 1996; Power 1995; Gibbins et al. 2001). Control variables (and expected signs) in Models (3a) and (4a) include: (1) *SPEC_CLIENT* (sign not predicted, as client valuation specialists bring additional knowledge, but also indicate greater complexity; Griffith 2015); (2) *SEC_NOTAF* and *ACCELERATED* (positive, due to increased regulatory complexity and scrutiny); (3) *SALES* (not predicted, as larger clients have both more negotiating power [Nelson et al. 2002] and greater in-house expertise); and (4) *TYPE_FININST* and *TYPE_IMPAIR* (not predicted).

In Models (3b) and (4b), we investigate the incremental effect of the breadth of problems identified during the engagement. Participants indicated whether problems were identified in each of 16 areas shown in Table 3 (developed with the help of the participating firms). We combine these individual problems into five types: (1) assumptions used in the FVM; (2) controls over the FVM; (3) appropriateness of management method/model; (4) reliance on other parties in the valuation process; and (5) management intent in determining the FVM. H9 predicts a positive association of problems identified during the engagement with audit outcomes. We test H9 by adding *PROB_SUM*, an index equal to the number of problem types identified, to the independent variables in Models (3a) and (4a).

¹⁴ We do not use variables indicating the other substantive procedures permitted in auditing standards (testing of the client's model, assumptions, and/or data) as these procedures are used very frequently, and often in combination. Only *PROC_INDEP_EST* is used as a test variable as there is greater variation in its use, and concurrent research emphasizes the evidential quality of developing independent estimates (Griffith et al. 2015a; Glover et al. 2016a; Fitzgerald et al. 2016).

TABLE 2
Audit Procedures Performed on Fair Value Measurements

Panel A: Substantive Testing—Model (86.1 Percent)

<u>Procedure (Variable Name if Applicable)</u>	<u>Percent</u>
[Of those (n = 99)]	
• Who performed?	
• Valuation specialist employed by the audit firm	74.7
• Third-party valuation specialist engaged by audit firm	3.0
• Member(s) of the core engagement team	63.3
• Were significant challenges encountered?	56.6
• Did the results identify any significant problems?	15.2

Panel B: Substantive Testing—Assumptions (84.4 Percent)

<u>Procedure (Variable Name if Applicable)</u>	<u>Percent</u>
[Of those (n = 97)]	
• Who performed?	
• Valuation specialist employed by the audit firm	76.3
• Third-party valuation specialist engaged by audit firm	1.0
• Member(s) of the core engagement team	71.1
• Were significant challenges encountered?	46.4
• Did the results identify any significant problems?	16.5

Panel C: Substantive Testing—Underlying Data (82.6 Percent)

<u>Procedure (Variable Name if Applicable)</u>	<u>Percent</u>
[Of those (n = 95)]	
• Who performed?	
• Valuation specialist employed by the audit firm	34.7
• Third-party valuation specialist engaged by audit firm	2.1
• Member(s) of the core engagement team	86.3
• Were significant challenges encountered?	15.8
• Did the results identify any significant problems?	5.3

Panel D: Independent Fair Value Estimates (*PROC_INDEP_EST*) (53.0 Percent)

<u>Procedure (Variable Name if Applicable)</u>	<u>Percent</u>
[Of those (n = 61)]	
• Who performed?	
• Valuation specialist employed by the audit firm	85.2
• Third-party valuation specialist engaged by audit firm	3.3
• Member(s) of the core engagement team	32.8
• Were significant challenges encountered?	24.6
• Did the results identify any significant problems?	16.4

Panel E: Testing Subsequent Events and Transactions (64.3 Percent)

<u>Procedure (Variable Name if Applicable)</u>	<u>Percent</u>
[Of those (n = 74)]	
• Who performed?	
• Valuation specialist employed by the audit firm	18.9
• Third-party valuation specialist engaged by audit firm	0
• Member(s) of the core engagement team	91.9
• Were significant challenges encountered?	5.4
• Did the results identify any significant problems?	4.1

(continued on next page)

TABLE 2 (continued)

This table describes auditors' evidential planning decisions for the FVM and defines variables used in the models. Statistics are computed on all available data unless otherwise noted.

V. RESULTS

Environmental and Task Characteristics of Challenging FVMs

We obtained information on 115 experiences in auditing challenging FVMs, of which about 80 percent represent the most recent engagement.¹⁵ Almost half are financial instruments (*TYPE_FININST*), with a wide range of instrument types that illustrates the variable and innovative nature of FVMs on which auditors are required to provide assurance. About 28 percent are asset impairments (*TYPE_IMPAIR*), including goodwill, research and development, property/plant/equipment, indefinite-lived trademarks, and business combinations. Table 1, Panel A shows that mean *UNCERTAINTY* is 2.7 (on the scale of 1 to 5). As detailed in the Online Appendix, 71.9 percent have EU equal to or greater than materiality, and 21.1 percent are at the highest level (greater than *five times* materiality). As prior research suggests that EU inherent in some estimates may be “irreducible” with audit procedures (e.g., Bell and Griffin 2012), the prevalence of EU exceeding materiality is concerning. The most frequent FVM types at the highest level are impairments and financial instruments (54.2 and 29.2 percent, respectively; untabled). About 82 percent of FVMs are classified as *LEVEL3* based on the ASC 820 classification.

Participants indicated reasons for choosing the specific FVM example by selecting items from a list (derived from AU 328.24) of factors that could contribute to the complexity and uncertainty of an FVM, or responding to an open-ended “other” category. The most frequent factors (untabled) reflect high EU: “number of significant and/or complex assumptions associated with the process” (65.2 percent) and “high degree of subjectivity associated with these assumptions and factors used in the process” (64.4 percent), followed by “high degree of uncertainty associated with the future occurrence or outcome of events underlying the assumptions” (45.2 percent). Responses to the open-ended question cite the lack of available data to independently value the FVM, including third parties who were unwilling or unable to provide the necessary detail regarding the underlying assets and assumptions used in the valuation (consistent with Glover et al. [2016a, 18]). Examples include fund-of-funds, use of third-party pricing services, and limited partnership interests.¹⁶ These investments and services may use proprietary models not made available even to large institutional investors. In these situations, the investor is simply given the reported fair value, stripping both the client and auditor of the ability to perform due diligence over the calculation. As detailed in the Online Appendix, a proprietary valuation model was used in 24.4 percent of experiences.

Several respondents also cite the overall complexity of the FVMs as a reason for selection. Other reasons given include the range of EU, relative size of the related balances, length of time between the identification of the issue and the SEC reporting deadline, and disagreements with the client's valuation specialist. One particularly insightful response is as follows:

There were several reasons, (1) Lack of management understanding over the valuation of certain investment categories, (2) time crunch between reporting period, deadlines and specialist resources, (3) lack of concise firm guidance and continued comments from the PCAOB and/or [Firm management] reviews that trickled down through partners, and (4) use of third-party resources by both the Firm and the client which makes it difficult to identify, isolate and understand pricing differences.

Estimation Uncertainty and Risk Assessments

Descriptive Statistics

Table 1, Panel A shows that mean *INHERENT_RISK* (*CONTROL_RISK*) for sample FVMs is 8.47 (6.70) on an 11-point scale from 1 = Low to 11 = High. Almost half of participants report relying on at least some controls surrounding the FVM process for

¹⁵ Sample FVMs are highly material, averaging greater than four times materiality. The industry distribution is 53.9 percent financial services, 33.0 percent manufacturing/retail, and 13.0 percent technology/biotech. Table 1 describes client characteristics used in the models, showing that the sample predominately comprises large public companies: 51.3 percent are accelerated filers (*ACCELERATED*); 15.7 percent are public companies, but not accelerated filers (*SEC_NOTAF*). Mean *SALES* is 3.42 on the scale from 1 (less than \$25 million) to 5 (greater than \$5 billion). Appendix A shows correlations of model variables, and Appendix B presents details on FVM types.

¹⁶ A fund-of-funds is an investment strategy of holding a portfolio of other investment funds rather than investing directly in shares, bonds, or other securities.

TABLE 3
Problems Identified During the Course of the Audit, by Outcome

Problem Category	(1) Overall	(2) Adjustment Discussed with Management? (<i>TOPIC_ADJ</i>)		(3) Income-Decreasing Adjustment Booked? (<i>DEC_AUD_ADJ</i>)	
		Yes (n = 46)	No (n = 69)	Yes (n = 11)	No (n = 104)
Assumptions used in the FVM	59.1	78.3***	46.4	81.8**	56.7
Documentation supporting assumptions	45.2	58.7***	36.2	72.7**	42.3
Significant management assumptions	41.7	60.9***	29.0	45.5	41.3
Process to develop and apply assumptions	24.3	32.6**	18.8	45.5**	22.1
Controls over the FVM	37.4	50.0***	29.0	81.8***	32.7
Expertise and experience	21.7	21.7	21.7	45.5**	19.2
Controls over process to determine FVM	16.5	26.1**	10.1	27.3	15.4
Monitoring controls	13.0	17.4	10.1	36.4***	10.6
Controls over model inputs	8.7	15.2**	4.3	18.2	7.7
Control to prevent management override	7.0	13.0**	2.9	9.1	6.7
Overall control environment	7.0	10.9*	4.3	18.2*	5.8
Integrity of change controls for models	0.9	2.2	0.0	0.0	1.0
Appropriateness of Method or Model	25.2	41.3***	14.5	63.6***	21.2
Other Parties in the Valuation Process	19.1	17.4	20.3	18.2	19.2
Extent of reliance on service organization	13.0	13.0	13.0	0.0	14.4
Extent to which entity engages a specialist	6.1	4.3	7.2	18.2**	4.8
Role of IT in valuation process	0.9	0.0	1.4	0.0	1.0
Management Intent	5.2	8.7*	2.9	18.2**	3.8
None of the Above Problems Identified	26.1	8.7	29.0	0.0**	23.1

*, **, *** Indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, with one-tailed probability levels consistent with expecting that identified problems will lead to discussion with management and audit adjustments.

This table describes problems identified during the course of the audit, with statistical comparison of frequencies in both conditions of the outcome model dependent variables (*TOPIC_ADJ* and *DEC_AUD_ADJ*). We do not table income-increasing adjustments, given small numbers and the greater importance of income-decreasing adjustments to audit quality.

purposes of altering the nature, timing, or extent of substantive audit procedures.¹⁷ One rationale for nonreliance is that controls are not sufficiently precise to address specific risks in this inherently uncertain environment, as explained by one respondent:

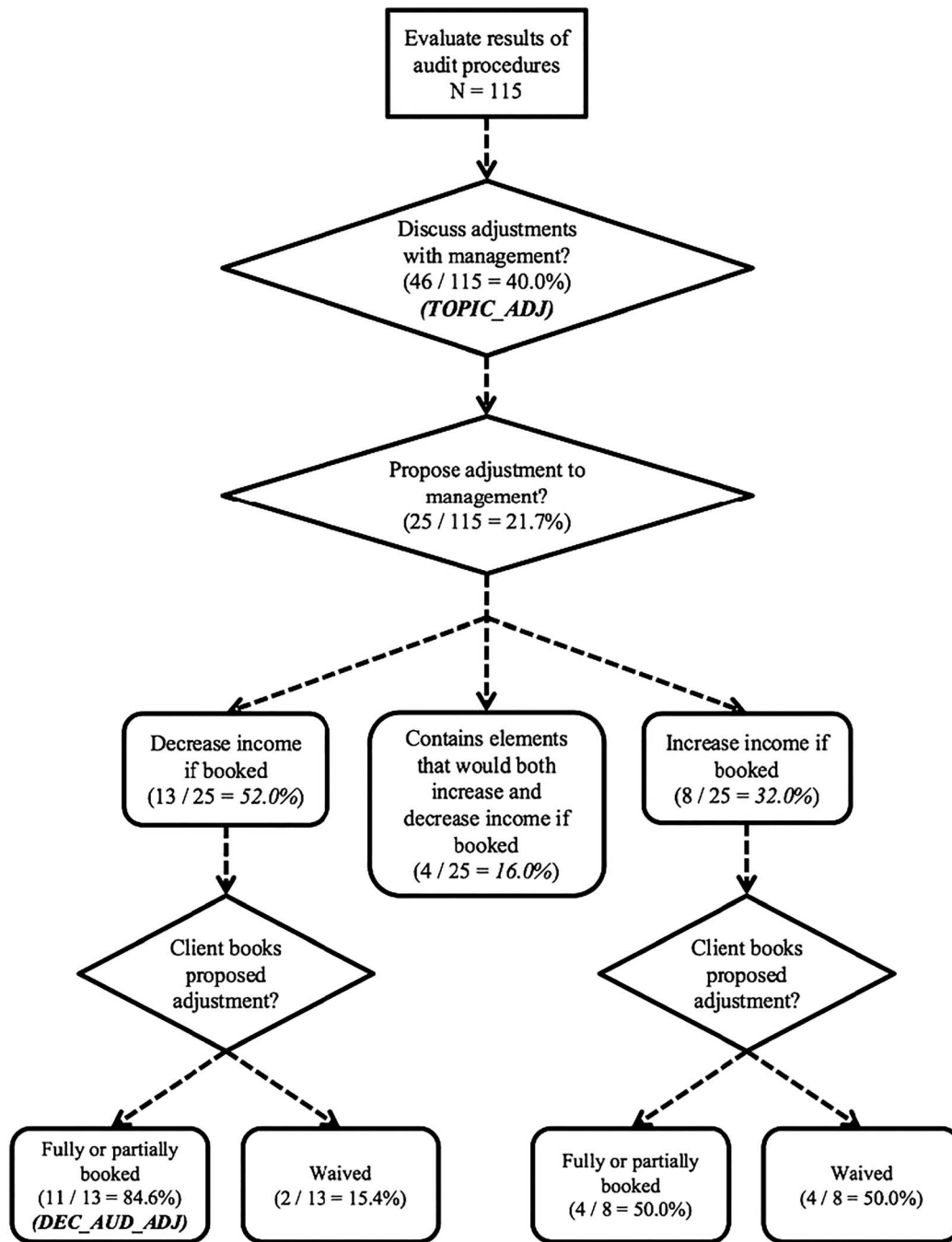
The precision of the control was difficult to validate, as the uncertainty of the inputs was very high. Due to the high EU, it was difficult to place a high level of comfort from the controls because the inputs were very subjective and there was not credible third-party evidence and/or proper audit support available for management's analyses. They were more put together based on management's opinions and thus the control was verifying that top management agreed with each other on the future projections. As it was difficult to corroborate, we took partial reliance.

Other respondents note a lack of necessary observability, such as when the majority of the key controls that needed to be tested for reliance resided at a third-party custodian: "Management did not fully own the process, and a lot of areas were those that they did not have insight/transparency into how the funds were calculated." The remaining challenges relate to lack of in-house expertise, insufficient documentation, the complexity of the controls, and the unique, non-recurring nature of some FVMs.

Although the reasons for not relying on controls vary, one consistent theme is concern over the imprecision caused by high subjectivity of the FVM. This high degree of subjectivity, coupled with the fact that control testing is optional for all but accelerated filer clients, led some auditors to cite a nonreliance approach as more efficient. According to one respondent: "Due to the subjective nature of the assumptions, we felt our testing could not be reduced by controls." Even for accelerated filers for which control testing is required, little to no reliance might be gained in the process, as noted by one participant:

¹⁷ While untabled results show more control reliance among accelerated filers (74.6 versus 25.5 percent for non-accelerated filers, $p < 0.001$), these data show that auditors do not report relying on controls over the FVM for about a quarter of accelerated filers despite performing SOX 404(b) testing.

FIGURE 2
Audit Outcomes Decision Tree for Challenging Fair Value Measurements



This figure shows the frequency of outcome decisions reported by participants when auditing a challenging FVM. *TOPIC_ADJ* equals 1 if the auditor discussed a possible audit adjustment with management, and 0 otherwise. *DEC_AUD_ADJ* equals 1 if a decreasing audit adjustment was partially or fully booked, and 0 otherwise. The dependent variable *DEC_AUD_ADJ* solely indicates booking of an audit adjustment that decreases income. Also, four respondents indicated that they proposed an adjustment, but did not report discussing it with management.

Controls were in place, but due to the high degree of EU associated with the fair value for this estimate, the nature, timing, and extent of the substantive audit procedures were not altered. Additionally, the valuation of this investment was identified as a key estimate (requiring additional attention during the audit), resulting in an inability to reduce our extent of testing by relying on controls.

TABLE 4
Results of Models (1) and (2): Inherent Risk Assessments and Auditor's Use of a Valuation Specialist

	(1) <i>INHERENT_RISK</i>			(2) <i>SPEC_AUDITOR</i>		
	Hyp. (Exp. Sign)	Without Test Variables	Full Model	Hyp. (Exp. Sign)	Without Test Variables	Full Model
Test Variables						
<i>UNCERTAINTY</i>	H1+		0.34*** (2.55)	H2+		-0.33 (-1.17)
<i>LEVEL3</i>	H1+		1.86*** (3.70)	H2+		-0.73 (-0.75)
<i>INHERENT_RISK</i>				H3+		0.27 (1.73**)
<i>CONTROL_RISK</i>	+		0.16** (2.02)	H3+		0.14 (0.93)
<i>CR * IR</i>				H3+		0.08 (1.46*)
<i>SPEC_CLIENT</i>	+		-0.14 (-0.35)	H4+		3.74 (3.48***)
Control Variables						
<i>SEC_NOTAF</i>	+	0.73 (1.15)	0.74 (1.29)	+	-0.72 (-0.88)	-1.73 (-1.60)
<i>ACCELERATED</i>	+	0.72 (1.35*)	0.75* (1.55)	+	0.65 (0.85)	-0.97 (-0.90)
<i>SALES</i>		-0.34 (-1.88*)	-0.25 (-1.46)		-0.2 (-0.75)	0.46 (1.35)
<i>TYPE_FININST</i>		0.31 (0.59)	0.50 (1.04)		0.99 (1.52)	2.21 (2.25**)
<i>TYPE_IMPAIR</i>		0.83 (1.45)	0.45 (0.83)		1.81 (2.03**)	2.22 (2.02**)
Constant		0.3 (0.44)	-1.45* (-1.72)		1.46 (1.69*)	-1.25 (-0.81)
n		112	112		112	112
(Adjusted R ² or ROC Area/Pseudo-R ²)		(0.02)	(0.22)		(0.70/0.08)	(0.89/0.35)

*, **, *** Indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, with one-tailed probability levels for hypothesized effects and control variables with directional expectations.

Column (1) presents the results of Model (1), an OLS regression model of inherent risk assessments. Column (2) presents results of Model (2), a logistic regression of the auditor's decision to use a valuation specialist. For both models, we first present a preliminary model containing only control variables to illustrate the incremental contribution of the test variables to explaining variation in the dependent variable. *UNCERTAINTY*, *INHERENT_RISK*, and *CONTROL_RISK* are centered at their means. Values in the cells are model coefficients, with t-statistics or z-scores in parentheses.

All variables are defined in Table 1.

Results of Model (1): Inherent Risk Assessments

Table 4, Column (1) presents results of Model (1), investigating factors associated with inherent risk assessments for FVMs. The model adjusted R² is 0.22, with test variables contributing significantly to explanatory power (Chi-squared = 30.14, $p < 0.01$). The coefficients on *UNCERTAINTY* and *LEVEL3* are both positive and significant ($p < 0.01$), supporting H1. Coefficient magnitudes indicate that from its mean of 8.47, *INHERENT_RISK* increases 0.34 units for each unit increase in *UNCERTAINTY*, and 1.86 units for *LEVEL3* FVMs. While these associations are positive, we find that even when the range of EU exceeds five times materiality, over 70 percent of respondents rate inherent risk at less than the maximum. Among FVMs with ranges of EU greater than materiality, over 30 percent rate inherent risk within the low/moderate range (8 or lower on the 11-point scale). This apparent disconnect is troubling, as it could suggest insufficient professional skepticism for this subset of

difficult FVMs.¹⁸ Model results also show that *CONTROL_RISK* and *ACCELERATED* are positively associated with increased inherent risk assessments ($p < 0.05$ and $p < 0.10$, respectively).

Use of Valuation Specialists

Table 1, Panel B shows that about 86 percent of engagement teams consult a valuation specialist (internal, third-party, or both); this percentage exceeds client specialist use of 60 percent (Panel A, $p < 0.001$). Auditors in our sample of Big 4 engagements overwhelmingly consult an internal specialist (85.2 percent versus 5.2 percent for third-party specialists; Table 1). Table 4, Column (2) presents results of Model (2), a logistic regression model explaining auditor use of a valuation specialist. The ROC area of this model is 0.89 and its Pseudo- R^2 is 0.35. Test variables in the model contribute significantly to explanatory power (Chi-squared = 24.77, $p < 0.01$). H2 predicts positive coefficients on *UNCERTAINTY* and *LEVEL3*; Table 4, Column (2) shows that H2 is not supported. H3 predicts positive associations with assessed risk; results show that *INHERENT_RISK* is significant at $p < 0.05$, and $CR * IR$ is significant at $p < 0.10$.¹⁹ Marginal effects show that the predicted probability of auditor specialist use is 0.92 (0.97) when *INHERENT_RISK* and *CONTROL_RISK* are both at the 25th (75th) percentiles of their range.²⁰ The coefficient of *SPEC_CLIENT* is positive and significant at $p < 0.01$, supporting H4.²¹ The predicted probability of auditor specialist use is 0.67 (0.99) when *SPEC_CLIENT* is 0 (1). While this association is expected given the subjective and complex nature of the FVMs in this investigation, it opens up the possibility that client and auditor specialists may disagree as to the appropriate method for performing the valuation. One respondent describes exactly this scenario:

The guidance around [valuing FVMs] is not very specific and leaves a significant amount of judgment for management to decide which valuation methodology to use. In performing their analysis, the Company engaged one of the Big 4 firms to assist them with the valuation. Upon our valuation specialists reviewing the analysis performed, they disagreed with the methodology used by the other firm. This was a fundamental difference that caused a lot of issues and either methodology is acceptable under the guidance; however, our firm would not support the analysis performed by the other firm.

When two competent, qualified specialists disagree as to which of multiple methodologies is most appropriate, conflict will arise. Prior research (e.g., Bratten et al. 2013; Peecher et al. 2013) suggests that discrepancies between valuation experts may be fairly common. Such discrepancies highlight the challenge of providing positive assurance on highly uncertain FVMs, even when experts are involved.

Evidential Planning Decisions

Table 2 describes frequencies of the AU 328 approaches to auditing FVMs, who performed those procedures, whether challenges were encountered, and whether problems were identified through their use. Panels A, B, and C show that auditors report substantive testing of management's model, assumptions, and underlying data for most FVMs (86.1, 84.4, and 82.6 percent, respectively). Responses indicate a high level of collaboration among audit firm specialists and the engagement team for testing the model and assumptions (ranging from 63 to 76 percent for both parties for both tests). In contrast, the core engagement team more commonly performs testing of underlying data (86.3 versus 34.7 percent for specialists). Table 2 shows higher rates of challenges encountered when testing the model and assumptions (56.6 and 46.4 percent, respectively), relative to testing underlying data (15.8 percent, $p < 0.01$). This is not surprising given the more subjective nature of the models and assumptions, while the underlying data are often easier for auditors to verify. More client problems are identified by testing the model (15.2 percent) and assumptions (16.5 percent), relative to testing the data (5.3 percent, $p < 0.05$), suggesting that a holistic approach to auditing the valuation leads to a better understanding of underlying problems.

Table 2, Panel D shows that independent fair value estimates are developed for 53 percent of FVMs, primarily by internal firm specialists (85.2 percent) with relatively low involvement from the core team (32.8 percent). Challenges in developing an

¹⁸ Another potential explanation, as noted earlier, is that per auditing standards (PCAOB 2010, AS No. 14, ¶13), the client's asserted value "ordinarily would not be considered to be a misstatement" as long as it is within the range of reasonable estimates. Thus, a larger range of EU could actually reduce the likelihood of a known or determinable misstatement.

¹⁹ The combined results of Models (1) and (2) suggest that EU affects auditors' decisions to use specialists through its effect on risk assessments. This is corroborated by supplemental path models presented later, which estimate both direct and indirect effects of EU and risk assessments on evidential decisions and audit outcomes.

²⁰ For this and subsequent computations of marginal effects, other variables in the model are held at their means.

²¹ Model results also show that auditor specialists are more often used for financial instruments ($p < 0.05$) and asset impairments ($p < 0.05$) than for other FVMs ($p < 0.05$).

independent estimate were encountered for 24.6 percent of FVMs, and significant client problems identified in 16.4 percent. Panel E shows the opposite pattern for testing subsequent events, with most work done by the core team (91.9 percent versus 18.9 percent for valuation specialists), relatively few challenges experienced (5.4 percent), and few problems identified (4.1 percent). In sum, our results imply very frequent use of all approaches, consistent with [Glover et al. \(2016a\)](#), but inconsistent with [Griffith et al. \(2015a, 856\)](#), who conclude that “auditors overwhelmingly focus on testing management’s process rather than developing independent estimates or relying on subsequent events.” Further, those procedures performed with assistance by specialists tend to have higher yield in terms of ability to identify client problems.

Audit Outcomes

Descriptive Statistics on Audit Outcomes

Problems identified. Table 3 presents the frequencies of identification of specific problem types. Problems were most often identified in management assumptions (59.1 percent), followed by controls over valuation (37.4 percent), appropriateness of the model (25.2 percent), and other parties involved in the client’s valuation (19.1 percent). Less frequent, although very important in terms of audit risk, are concerns regarding management intent in valuing the FVM (5.2 percent).²² Univariate comparisons show that each problem category (with the exception of problems with other parties) is associated with discussion of a possible audit adjustment with management (at least, $p < 0.10$) and with booking a decreasing audit adjustment (at least, $p < 0.05$). These results imply that many types of problems cause concern to auditors, and these concerns may be unresolved through discussion with management. For example, the following illustrates one auditor’s frustration with auditing management’s assumptions:

It was very difficult to substantiate and corroborate management’s assumptions of what future growth would be within each of the regions/businesses. Due to the economic recession and poor results in the last few years and the uncertainty if in future years the business would improve, we were unable to obtain support for management’s assumptions. It was more their opinion. In their defense, no one really knew what was going to happen and they took their best shot based on their level of experience in the industry.

This quote suggests that subjective assumptions may be little more than an educated guess based on the client’s experience—or as another respondent put it, management’s “gut feeling.” This situation creates serious challenges for the auditor, as the subjectivity and ambiguity inherent in these assumptions is a key driver of the wide ranges of EU observed in our sample.

Discussion, proposal, and booking of audit adjustments. Figure 2 presents a flowchart of audit outcomes from discussion with management, to proposal of audit adjustments, to ultimately booking or waiving those adjustments. Auditors discussed a potential audit adjustment with management in 46 engagements (40 percent), and an adjustment was proposed in 25 (21.7 percent). Because prior research generally shows greater auditor focus on income-decreasing than income-increasing adjustments (consistent with an asymmetric loss function), Figure 2 separately tracks proposed adjustments by direction (e.g., [Wright and Ashton 1989](#); [Braun 2001](#); [Nelson et al. 2002](#); [Ruhnke and Schmidt 2014](#)). In our sample, 52 (32) percent²³ of proposed adjustments were income-decreasing (income-increasing) not statistically larger (Fisher’s exact test, $p = 0.192$, untabled).²⁴ Proposed decreasing (increasing) adjustments were fully/partially booked for 84.6 (50.0) percent of FVMs also not statistically larger (Fisher’s exact test, $p = 0.115$, untabled). Thus, auditors in our sample proposed relatively few adjustments, but those that were proposed were more likely than not to be booked ($p < 0.05$, untabled). Our qualitative data suggest that subjective assumptions and high EU can contribute to low adjustment proposal rates. One auditor, describing an FVM with EU exceeding five times materiality, noted:

No audit adjustment was proposed and no impairment was recorded, but it could have very easily resulted in an impairment by adjusting the assumptions slightly. The main reason the adjustment was not recorded was the level of

²² Open-ended responses include lack of granularity of documentation over the valuation and classification process, controls surrounding the mathematical accuracy of the model, and lack of access to necessary information for fund-of-funds investments.

²³ These percentages add to less than 100 as four adjustments contained elements that would both increase and decrease income (as shown in Figure 2). In estimating Model (4), we include only pure decreasing adjustments in the “1” condition of the dependent variable *DEC_AUD_ADJ*, and remove both bi-directional and increasing adjustments.

²⁴ Comparing adjustment rates in our sample of FVMs to prior research is valuable, but difficult, as there are very few recent studies. [Nelson et al. \(2002, 194\)](#) report an adjustment rate of 39 percent for low precision accounts (which should include FVMs and estimates), higher than our rate of 15.7 percent. However, they consider situations in which auditors suspect that clients are trying to manage earnings, which should lead to increased adjustments. Comparison to more generalized samples is limited because most studies date from the 1980s and 1990s and vary significantly in research design and context. The only study of which we are aware that analyzes a general sample of U.S. data in the post-SOX environment is [Joe et al. \(2011\)](#), who find that 75.8 percent of proposed adjustments were booked, similar to our overall rate of 72 percent.

uncertainty of management's assumptions (i.e., inputs into the model). Neither the audit firm nor management had firm evidence that could support one assumption was better than another.

This and other similar responses suggest that the complexity and uncertainty underlying FVMs make it difficult to justify proposing and/or booking an adjustment. It is important to note, however, that management and auditors both face difficulty in appropriately valuing FVMs. Although the FVM may not necessarily be valued incorrectly, the range of reasonably possible values can be alarmingly large. Some respondents describe numerous accepted valuation techniques with different point estimates:

I think often, when you have a scenario like this there are several valuation techniques that are appropriate but will give slightly different answers and it is a challenge to bridge valuation differences between methods. For example, is a difference in valuation then actually an error/audit difference? If so, then why is one method better than the other when both are widely accepted in practice?

AU 328.38 suggests that the method used by the client should be given preference when these reasonable differences arise: "the auditor does not function as an appraiser and is not expected to substitute his or her judgment for that of the entity's management," but rather "reviews the model and evaluates whether the assumptions used are reasonable and the model is appropriate considering the entity's circumstances." The difficulty of applying this standard lies in determining what is "reasonable" and "appropriate." As previously noted, Auditing Standard No. 14 (PCAOB 2010, ¶13) clarifies that misstatements only occur when the recorded amount falls materially *outside* of the range of reasonable estimates, even if that range is many multiples of the auditors' materiality threshold (which, as our data show, is not uncommon in challenging engagements). Without objective evidence to the contrary, auditors have difficulty proving that their estimates are better than the client's. One participant sums up the difficulty of this position as follows:

During 60+ hours of discussions and analyzing the assumptions by the audit team and ensuring the assumptions and information within the models did not contradict themselves, we determined management's assumptions/model held together and was their best estimate at the fair value of the reporting units. The audit firm did not have objective evidence or enough information to be certain that our estimate was any better than management's estimate.

Results of Model (3): Discussion with Management of a Possible Audit Adjustment

Table 5, Column (1) presents results of Model (3a), investigating factors associated with the auditor's decision to discuss a potential audit adjustment with management. Panel A contains results of the test variables, and Panel B contains results of the control variables. The ROC area of this model is 0.81, and its Pseudo-R² is 0.24. Test variables in the model contribute significantly to explanatory power (Chi-squared = 26.07, $p < 0.01$). H5a, predicting a positive association with EU, is partially supported: *UNCERTAINTY* is significant ($p < 0.10$), but *LEVEL3* is not. Marginal effects analysis shows that the predicted probability of discussing an adjustment with management is 0.24 (0.51) as *UNCERTAINTY* increases from less than materiality, to over five times materiality. H6a, predicting a positive association with risk, is supported: *INHERENT_RISK* and *CONTROL_RISK* are both significant ($p < 0.05$ and $p < 0.10$, respectively), as is their interaction ($CR * IR$, $p < 0.01$). The predicted probability of discussing an adjustment with management is 0.21 (0.53) when *INHERENT_RISK* and *CONTROL_RISK* are both at the 25th (75th) percentiles of their range. Neither *SPEC_AUDITOR* nor *PROC_INDEP_EST* are significant, as predicted in H7a and H8a, respectively. Table 5, Column (2) presents results of Model (3b), investigating the incremental effect of problems identified during the audit. *PROB_SUM*, which measures the number of different categories in which at least one problem was identified, is significant at $p < 0.05$, supporting H9a. The predicted probability of discussing an adjustment with management rises monotonically with the number of problem areas identified, ranging from 0.18 to 0.67 as *PROB_SUM* increases from 0 to 4. In sum, results show that discussions of an FVM adjustment with management are more likely when EU and risk are high, and when a greater number of problem areas are identified during the audit.

Results of Model (4): Booking an Income-Decreasing Audit Adjustment

Table 5, Column (4) presents results of Model (4a), investigating factors associated with income-decreasing audit adjustments. The ROC area of this model is 0.82 and its Pseudo-R² is 0.20. Test variables in the model contribute marginally to explanatory power (Chi-square 9.43, $p < 0.10$). We proposed H5b and H6b as null hypotheses, due to contradictory indications of the possible effects of EU and risk on booking decreasing adjustments, and model results do not reject the null for both constructs. However, *LEVEL3* could not be included as a test variable, as *all* booked decreasing audit adjustments are Level 3 assets. The null H6b is also not rejected, as the level of inherent/control risk does not directly affect audit adjustments.

TABLE 5

Results of Models (3) and (4)

Discussing an Adjustment with Management and Booking an Audit Adjustment that Decreases Net Income

Panel A: Test Variables

	Model (3): <i>TOPIC_ADJ</i>				Model (4): <i>DEC_AUD_ADJ</i>			
	Hyp. (Exp. Sign)	(1) Model (3a)	(2) Model (3b)	(3) Model (3c)	Hyp. (Exp. Sign)	(4) Model (4a)	(5) Model (4b)	(6) Model (4c)
<i>UNCERTAINTY</i>	H5a (+)	0.30 (1.64*)	0.29 (1.56*)	0.12 (0.60)	H5b (null)	0.21 (0.79)	0.12 (0.38)	0.11 (0.36)
<i>LEVEL3</i>	H5a (+)	-0.50 (-0.67)	-0.71 (-0.88)	-0.84 (-1.02)	H5b (null)	See notes	See notes	See notes
<i>INHERENT_RISK</i>	H6a (+)	0.34 (2.09**)	0.30 (1.78**)	0.24 (1.34*)	H6b (null)	0.23 (0.86)	0.16 (0.45)	0.05 (0.13)
<i>CONTROL_RISK</i>	H6a (+)	0.20 (1.62*)	0.14 (1.13)	0.16 (1.15)	H6b (null)	0.18 (0.91)	0.07 (0.26)	0.04 (0.17)
<i>CR * IR</i>	H6a (+)	0.12 (2.41***)	0.12 (2.33***)	0.10 (1.91**)	H6b (null)	0.09 (1.21)	0.13 (1.49)	0.12 (1.36)
<i>SPEC_AUDITOR</i>	H7a (+)	0.89 (1.03)	0.78 (0.90)	0.93 (1.00)	H7b (+)	See notes	See notes	See notes
<i>PROC_INDEP_EST</i>	H8a (+)	0.02 (0.05)	-0.10 (-0.19)	-0.20 (-0.36)	H8b (+)	1.11 (1.35)	1.10 (1.11)	1.29 (1.20)
<i>PROB_SUM</i>	H9a (+)		0.56 (2.16**)	0.63 (2.19**)	H9b (+)		2.04 (2.67***)	2.18 (2.61***)
<i>RESIDUAL_UNCERT</i>	+			3.06 (3.13***)				1.53 (1.39)

Panel B: Control Variables

	Model (3): <i>TOPIC_ADJ</i>				Model (4): <i>DEC_AUD_ADJ</i>					
	Hyp. (Exp. sign)	Without Test Variables	(1) Model (3a)	(2) Model (3b)	(3) Model (3c)	Hyp. (Exp. sign)	Without Test Variables	(4) Model (4a)	(5) Model (4b)	(6) Model (4c)
<i>SPEC_CLIENT</i>		0.46 (1.04)	0.64 (1.05)	0.75 (1.19)	0.60 (0.91)		0.62 (0.83)	0.83 (0.97)	2.02 (1.65**)	2.29 (1.64*)
<i>SEC_NOTAF</i>	+	0.7 (1.13)	1.03 (1.36*)	0.74 (0.93)	0.19 (0.22)	+	0.85 (0.96)	0.76 (0.73)	-0.20 (-0.16)	-0.52 (-0.39)
<i>ACCELERATED</i>	+	-0.06 (-0.11)	-0.09 (-0.14)	0.20 (0.29)	-0.54 (-0.72)	+	-0.38 (-0.44)	-0.39 (-0.39)	-0.05 (-0.04)	-0.37 (-0.31)
<i>SALES</i>		-0.32 (-1.7*)	-0.24 (-1.02)	-0.24 (-1.02)	-0.14 (-0.57)		-0.22 (-0.76)	-0.15 (-0.41)	-0.04 (-0.11)	0.02 (0.05)
<i>TYPE_FININST</i>		-0.81 (-1.55)	-1.00 (-1.61)	-1.35 (-2.06**)	-1.65 (-2.33**)		-0.55 (-0.64)	-0.67 (-0.73)	-2.97 (-2.04**)	-3.24 (-2.05**)
<i>TYPE_IMPAIR</i>		-0.43 (-0.77)	-1.42 (-1.92*)	-1.41 (-1.89*)	-1.65 (-2.06**)		-0.11 (-0.12)	-1.07 (-1.01)	-1.56 (-1.17)	-1.31 (-1.00)
<i>Constant</i>		0.74 (0.98)	0.01 (0.01)	-0.50 (-0.37)	-0.53 (-0.37)		-1.52 (-1.29)	-2.60 (-1.83*)	-7.11 (-2.73***)	-27.71 (-2.43**)
n		112	112	112	112		102	102	102	102
(ROC area/Pseudo-R ²)		(0.68/0.07)	(0.81/0.24)	(0.84/0.28)	(0.89/0.37)		(0.68/0.07)	(0.82/0.20)	(0.92/0.39)	(0.92/0.42)

*, **, *** Indicate significance at $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively, with one-tailed probability levels for variables with directional expectations.

This table presents results of estimating Models (3) and (4), logistic regressions explaining the auditor's discussion of a potential audit adjustment with management, and the booking of an audit adjustment that resulted in a decrease to client income, respectively. We do not table models for income-increasing adjustments, given small numbers and the greater importance of income-decreasing adjustments to audit quality. For all models, we first present a preliminary model containing only control variables to illustrate the incremental contribution of the test variables to explaining variation in the dependent variable. Values in the cells are model coefficients, with z-scores in parentheses. *LEVEL3* and *SPEC_AUDITOR* are not included in Model (4) as all decreasing audit adjustments are Level 3, and for all, an auditor valuation specialist was used.

Evidential planning decisions of specialist use and developing an independent estimate do not directly affect booking income-decreasing adjustments, so directional H7b and H8b are not supported. Table 5, Column (5) presents the results of Model (4b), investigating the incremental effect of problems identified during the audit. *PROB_SUM* is positively associated with income-decreasing audit adjustments, supporting H9b ($p < 0.01$). The predicted probability of booking an income-decreasing audit adjustment increases monotonically with the number of problem areas identified, ranging from 0 to 0.71 as *PROB_SUM* increases from 0 to 4.²⁵ In sum, these results suggest that the key factor in supporting an audit adjustment in our sample of challenging FVMs is the evidence that the auditor has accumulated, regardless of the level of EU and/or risk.

Supplemental Qualitative Analysis of Sources of Uncertainty and Coping Tactics

In this section, we present results of coding qualitative responses using Lipshitz and Strauss's (1997; hereafter, LS) theory of sources of uncertainty and coping tactics. Table 6 defines and describes our coded variables based on the LS framework. Among sources of uncertainty, the first is lack of information, ranging from complete lack of information to lack of reliable information (*UNCERT_LACK_INFO*). As auditing is a process of gathering evidence to reduce the risk of material misstatement, expressions of lack of evidence should be common in this context. The second is inadequate understanding due to equivocal information, novelty, or instability (*UNCERT_CONFLICTING*). This source is likely prevalent in valuing FVMs, as there can be various equivocal alternatives for choice of valuation model, technique, and/or inputs. Third, uncertainty can result from undifferentiated outcomes; i.e., after gathering and considering all available evidence, the decision maker may still be ambivalent (*UNCERT_UNDIFFERENTIATED*).

LS also identify tactics that individuals use to cope with uncertainty, which we adapt to the auditing context. First, auditors will attempt to reduce uncertainty by collecting additional information, in accordance with auditing standards (*TACTIC_COLLECT_INFO*). Second, auditors may seek advice to reduce uncertainty (*TACTIC_ADVICE*), which may be especially prevalent in our context as valuation specialists are often used to supplement the knowledge of the engagement team. The third tactic is assumption-based reasoning (*TACTIC_ASSUMPTION*), likely to be found in the FVM context because most valuations depend on assumptions. Even after these tactics, auditors may be left with uncertainty about FVMs that cannot be reduced (e.g., Bell and Griffin 2012; Christensen et al. 2012). We add to the LS framework by coding such expressions as "residual" uncertainty (*RESIDUAL_UNCERT*).²⁶

We coded all qualitative responses for instances of these expressions. After achieving an inter-rater agreement of 85.5 percent (Cohen's Kappa of 95.8, $p < 0.001$) on an initial sample of observations independently coded by both authors, one author then coded the remaining observations. Table 6 compares frequencies across values of the outcome variables. All auditors mention at least once that some desired information is not available (*UNCERT_LACK_INFO*). About half identify conflicting information with regard to inputs or models (*UNCERT_CONFLICTING*), with a higher proportion of these expressions for observations in which an adjustment was discussed with client management, and for which a decreasing audit adjustment was booked (both at $p < 0.05$). *UNCERT_UNDIFFERENTIATED* is expressed in only 3.5 percent of engagements overall, and is positively associated with EU ($p < 0.10$, untabled). A possible adjustment was discussed with management for all of these FVMs, but no adjustments were booked. Regarding uncertainty-reducing tactics, all auditors note that information was gathered to reduce uncertainty (*TACTIC_COLLECT_INFO*), as expected. Consistent with the FVM context, all auditors also mentioned the tactic of reasoning by assumption (*TACTIC_ASSUMPTION*), and 80 percent note reducing uncertainty through seeking input from others (*TACTIC_ADVICE*). Finally, for 13.9 percent of observations, participants specifically mention inability to reduce uncertainty to the level needed for comfort with the valuation. *RESIDUAL_UNCERT* is positively associated with EU ($p < 0.05$, untabled) and the proportion is higher for FVMs for which an adjustment was discussed and a decreasing adjustment was booked (both at $p < 0.01$).

²⁵ In Model (4b), we also find that the likelihood of an income-decreasing adjustment is lower when a financial institution is involved ($p < 0.05$). While not a focus of this study, the significance of this finding in relation to the recent financial crisis or other factors may prove a profitable avenue for future research.

²⁶ LS consider uncertainty in everyday decisions, and some tactics they define do not map well to auditing. For instance, auditors cannot reduce uncertainty by delaying action, as a choice must be made in a certain time to either accept the client's balance or propose an adjustment. Tactics of "acknowledging" uncertainty also do not apply well for several reasons: they are not available to auditors (avoiding irreversible action), are likely to be universal (weighing pros and cons), or are taken at the firm level ("preempting" negative outcomes through such protective actions as purchasing insurance or "improving readiness" through developing training and guidance). Tactics of "suppression," including relying on intuition or tossing a coin, are also not available to auditors. The remaining suppression tactic ("acting as if under certainty") might be used by auditors, but we were unable to detect any overt expressions of suppression in qualitative responses. The reduction tactic of "following professional norms" is intrinsic to auditing and so is unlikely to differentiate responses in this context.

TABLE 6
Sources of Uncertainty and Uncertainty-Reducing Tactics
by Outcome

	Overall	Adjustment Discussed with Management (<i>TOPIC_ADJ</i>)		Income-Decreasing Adjustment Booked (<i>DEC_AUD_ADJ</i>)	
		Yes (n = 46)	No (n = 69)	Yes (n = 11)	No (n = 104)
Sources of Uncertainty					
<i>UNCERT_LACK_INFO</i>	100%	100%	100%	100%	100%
<i>UNCERT_CONFLICTING</i>	49.6	67.4**	37.8	72.7**	47.1
<i>UNCERT_UNDIFFERENTIATED</i>	3.5	8.7***	0	0	3.8
Coping Tactics					
<i>TACTIC_COLLECT_INFO</i>	100	100	100	100	100
<i>TACTIC_ADVICE</i>	80.0	84.8	76.8	72.7	80.8
<i>TACTIC_ASSUMPTION</i>	100	100	100	100	100
Remaining Uncertainty					
<i>RESIDUAL_UNCERT</i>	13.9	30.4***	2.9	36.4**	11.5

** , *** Indicate significance at $p < 0.05$ and $p < 0.01$, respectively, with one-tailed probability levels consistent with expecting that sources of uncertainty (uncertainty-reducing tactics) will lead to more (less) discussion and more (fewer) audit adjustments.
 This table defines and describes measures of sources of uncertainty and coping tactics developed from the theory of Lipshitz and Strauss (1997), with results of tests of proportions across both audit outcome dependent variables (*DISCUSS_ADJ_MGT* and *DEC_AUD_ADJ*).

To formally incorporate this analysis, we estimate Models (3c) and (4c), which differ from Models (3b) and (4b) by adding *RESIDUAL_UNCERT*.²⁷ We expect a positive coefficient in Model (3c), but make no prediction for Model (4c) as residual uncertainty suggests greater audit risk, but may also reduce the auditor's ability to successfully negotiate an adjustment. Results in Table 5, Column (3) show that the coefficient on *RESIDUAL_UNCERT* is positive in Model (3c) ($p < 0.01$), implying that when auditors feel residual discomfort with the level of uncertainty after available reduction tactics have been used, they more frequently discuss booking an adjusting entry with management. The predicted probability of discussing an income-decreasing adjustment is 0.24 (0.87) when *RESIDUAL_UNCERT* equals 0 (1). However, Table 5, Column (6) shows no association of *RESIDUAL_UNCERT* with booking a decreasing audit adjustment. The loss of significance on *RESIDUAL_UNCERT* from the discussion to the booking stage suggests reduction in the ability of auditors to press for an adjusting entry in those situations.

Supplemental Path Analysis

In addition to the OLS regression and logit models discussed above, we also estimate path models to enable simultaneous testing of our hypotheses.²⁸ We estimate two path models because there are two outcome variables, and the sample size differs.²⁹ The path model paralleling Model (3) (*TOPIC_ADJ*) is estimated using all available data. Results presented in Figure 3, Panel A generally support the main analyses. The positive and significant path between *UNCERTAINTY* and *INHERENT_RISK* ($p < 0.01$) supports H1. EU acts through risk to influence discussion of a possible adjustment with management (H6a, $p < 0.10$). *INHERENT_RISK* also is associated with the breadth of problems identified ($p < 0.01$), and the breadth of problems increases discussion with management (H9a, $p < 0.01$). Auditor specialist use increases with client specialist use (H4, $p < 0.01$) and with higher risk (H3, $p < 0.10$), but EU does not influence specialist use directly (H2), as also found in Model (2). Auditor specialists drive development of independent estimates ($p < 0.01$), consistent with the descriptive statistics in Table 2. Specialist use is associated with discussion of an adjustment ($p < 0.10$), supporting H7a, but an independent estimate (H8a) is not.

Results for individual paths in Figure 3, Panel B for decreasing audit adjustments are also largely consistent with findings of Models (1)–(4). There are two differences from the pattern found in Panel A. First, the path from *INHERENT_RISK* to *DEC_AUD_ADJ* is not significant (as predicted in H6b). This suggests that while inherent risk affects management discussion, identified problems matter more than risk assessments when auditors advocate for booking a decreasing adjustment. Second, the path from *PROC_INDEP_EST* to *DEC_AUD_ADJ* is marginally significant ($p < 0.10$). Thus, when all variables are considered simultaneously, developing an independent estimate appears to provide some support for the auditor at the adjustment phase. As with Model (4), *SPEC_AUD* cannot be included in Panel B as auditor specialists were used in all engagements with income-decreasing FVM adjustments.

VI. LIMITATIONS AND CONCLUSIONS

We study auditors' reports of engagements in which FVMs were among the most challenging aspects of the audit. Prior to discussing our main conclusions, we note several limitations inherent to the experiential questionnaire method or specific to our design. Regarding the method in general, Gibbins (2002, 207) notes that the "retrospective, case-based method of gathering experiential data has naturalistic advantages and is useful in putting experiences into context." However, it relies on recollections that might be subject to forgetting and/or retrospective bias (e.g., see Peecher 2002). For example, respondents may exhibit memorability bias by subconsciously providing "reasoned" responses rather than actual recollections (Moeckel and Plumlee 1989; Moeckel 1990; Rothman and Schwarz 1998), or may exhibit social desirability bias by providing responses that reflect favorably on them. To mitigate these concerns (e.g., Nelson et al. 2002; Gibbins and Qu 2005), we asked for recent,

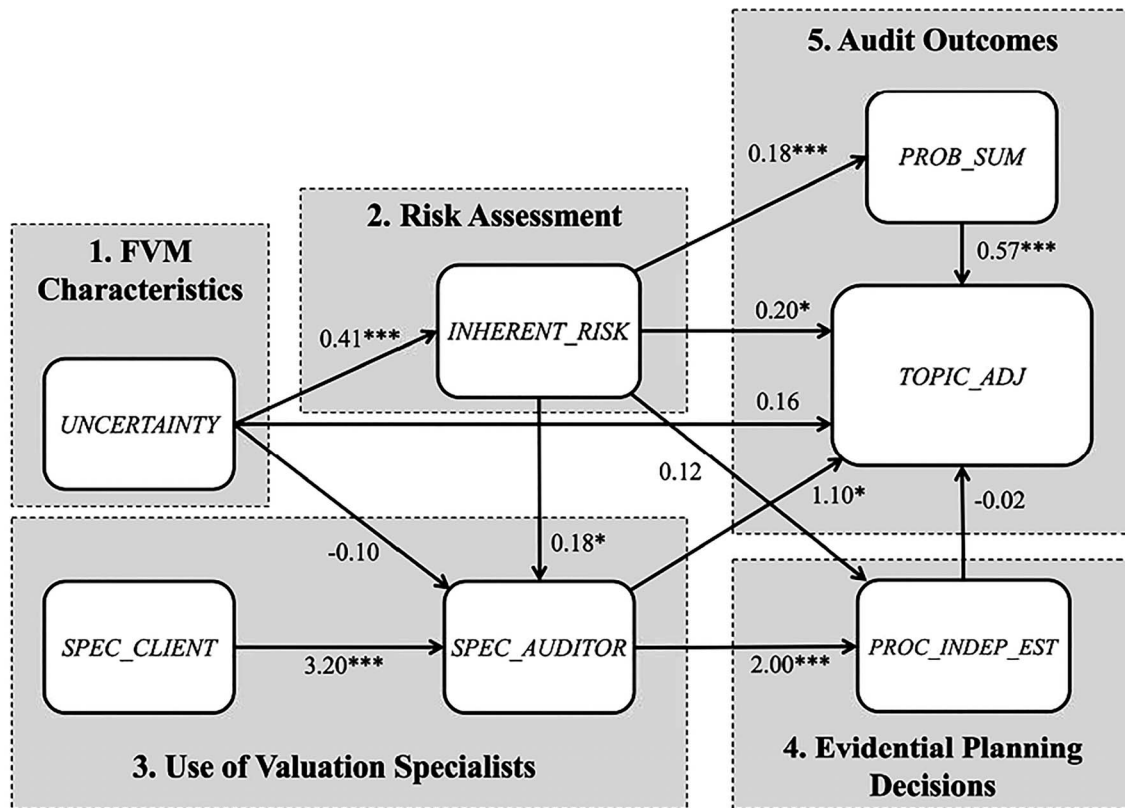
²⁷ The other coded variables are not used in the models for various reasons. First, some types of expressions are used by all participants (*UNCERT_LACK_INFO*, *TACTIC_COLLECT_INFO*, and *TACTIC_ASSUMPTION*). Second, *TACTIC_ADVICE* overlaps with the quantitative variable *SPEC_AUDITOR* by 95.7 percent (untabled). Third, there is complete overlap of expressions of conflicting information with regard to inputs or models (*UNCERT_CONFLICTING*) with *RESIDUAL_UNCERT* (i.e., all participants who expressed *RESIDUAL_UNCERT* also expressed *UNCERT_CONFLICTING*). Fourth, all auditors expressing *UNCERT_UNDIFFERENTIATED* discussed an adjustment with management, but an adjusting entry was not booked.

²⁸ We use the generalized form of the structural equation model in Stata (i.e., GSEM) because several variables are dichotomous, including audit outcomes (Skrondal and Rabe-Hesketh 2004; Rabe-Hesketh, Skrondal, and Pickles 2005). While GSEM allows dichotomous endogenous variables (not available in standard structural equation modeling), the approach is subject to limitations, including a lack of goodness of fit statistics (StataCorp 2013) and an inability to perform tests of indirect effects, including the bias-corrected bootstrapping method (Preacher and Hayes 2008) commonly used for testing indirect effects in small-sample models (e.g., Hayes and Scharkow 2013).

²⁹ All income-decreasing adjustments are Level 3, so *LEVEL3* is not included in Panel B. *LEVEL3* is also omitted from Panel A for parsimony, as it is not significant in Model (3). The path models are also simplified from Models (1)–(4) in measuring risk only as *INHERENT_RISK*, not *CONTROL_RISK*. We tested sensitivity of results to: (1) using the interaction term $CR * IR$, finding results to be weaker; and (2) developing a factor score incorporating *INHERENT_RISK* and *CONTROL_RISK*, but the Eigenvalue of the factor is low (0.338).

FIGURE 3
Supplemental Path Models

Panel A: Path Model Results for Discussion of an Income-Decreasing Adjustment with Client Management



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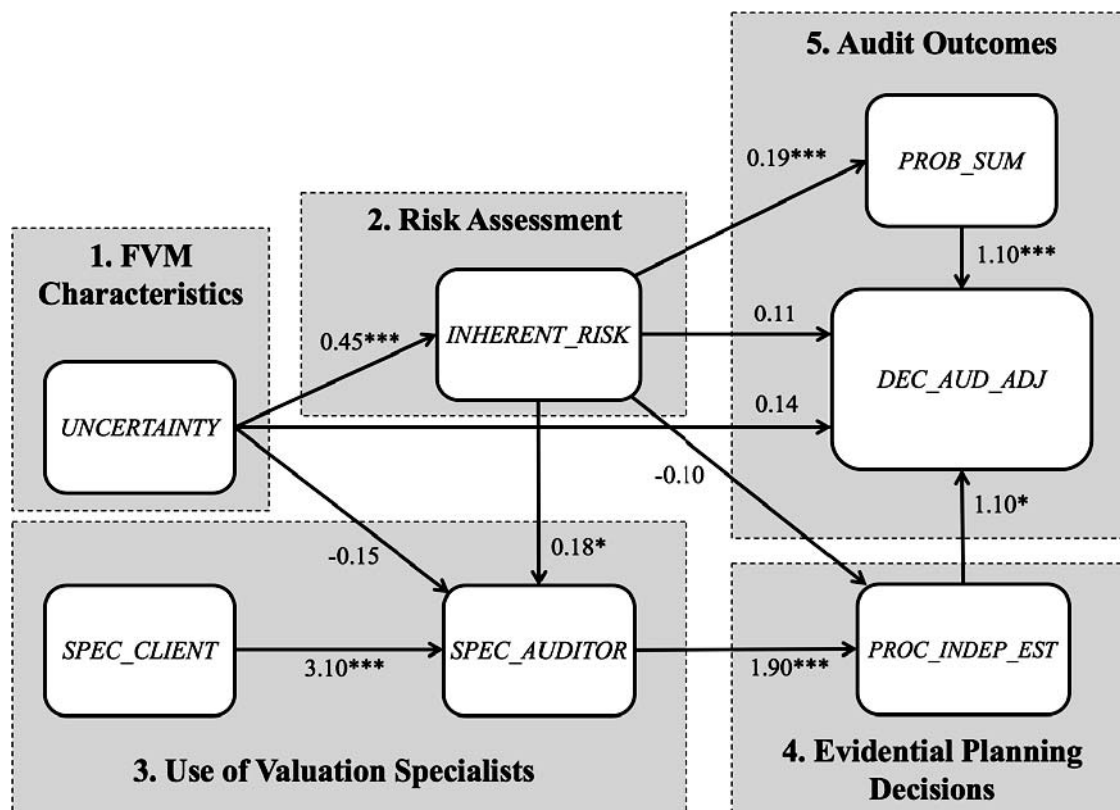
highly salient experiences (i.e., “among the most challenging and important issues in the audit”), and focused primarily on direct, factual responses that could be derived from audit workpapers. While we could not directly observe whether participants consulted workpapers, they had access to them while completing the instrument, and were not time restricted. We also assured confidentiality and anonymity, but there remains the possibility that the auditors’ reports do not reflect engagement circumstances to some degree.³⁰ Further, the self-selected, rather than random, nature of respondents in our study does not permit causal inference, so theory is critical for assessing the generalizability of our study’s findings. Further experimental research might investigate alternative explanations for our findings in controlled environments. Regarding limitations of our specific design, we constrained our sample to three industries and intentionally focused our data-collection efforts on only the most challenging FVMs. Thus, our results are not necessarily generalizable to all audit engagements, or even those with some elements of FVM, but rather to those that “keep the auditors up at night.”

Keeping in mind these limitations, this study yields a number of insights important to research and practice. Table 7 summarizes these key findings and this study’s contributions relative to prior research. First, our results provide evidence new to the literature (Panel A) regarding specific environmental and task factors that make FVMs challenging to audit. One key finding is that EU inherent in challenging FVMs equals or exceeds the materiality threshold in over 70 percent of our observations. Our quantitative and qualitative results both imply that the main contributors to high uncertainty are lack of sufficient, reliable information and difficulty in clearly distinguishing alternatives. Engagement team personnel report multiple models providing differing valuations, often with no basis to choose between them. Key assumptions are difficult to verify,

³⁰ Even if the perceptions of the engagement team leaders in this study differ to some degree from actual occurrence, perceptions are still likely to be important in driving future decisions and training the next generation of auditors.

FIGURE 3 (continued)

Panel B: Path Model Results for Booking an Income-Decreasing Audit Adjustment



*, *** Indicate significance at $p < 0.10$ and $p < 0.01$, respectively, with one-tailed probability levels used for directional hypotheses. These figures present coefficients of path models culminating in outcomes of auditor discussion of a possible audit adjustment with client management (*TOPIC_ADJ*; Panel A) and booking an income-decreasing audit adjustment (*DEC_AUD_ADJ*; Panel B). We do not model income-increasing adjustments as only seven were booked, and these are of less practical interest given the auditor's asymmetrical loss function. The model in Panel A is estimated on all available data ($n = 113$), while the model in Panel B is estimated on the subsample that excludes observations for which income-increasing adjustments were proposed ($n = 102$). The path from *SPEC_AUD* to *DEC_AUD_ADJ* in Panel B is omitted as this variable is always observed for income-decreasing adjustments. We also omit *LEVEL3* from the path models for parsimony, as it is not significant in Model (3) and is always observed for income-decreasing adjustments in Model (4). The path models also differ from Models (1)–(4) in measuring risk as *INHERENT_RISK* instead of *INHERENT_RISK*, *CONTROL_RISK*, and their interaction.

resulting in broad ranges of possible values. Model inputs are subjective, often requiring forecasting future values. These challenges are further compounded when the FVM is obtained from or determined by a third party (e.g., a pricing service, an investment fund, or a valuation specialist hired by the client). In these situations, some respondents indicate inability to perform required audit procedures over the FVM calculation, as third parties used by clients were sometimes unwilling to provide necessary detail regarding the valuation's underlying model, data, and assumptions.

Second, we focus on the auditor's assessment of inherent and control risk for challenging FVMs (Table 7, Panel B). Auditing standards imply that EU should increase inherent risk, but, to our knowledge, only Rowe (2015) provides evidence. Our results are consistent with Rowe (2015) in finding a positive association of inherent risk assessments with EU. However, these concepts are dissociated in one-third of our observations, in which inherent risk is rated as low to moderate when EU exceeds materiality. Is this due to lack of skepticism (consistent with PCAOB concern) or to auditing standards that define a material misstatement as only those differences that fall materially *outside* the range of EU, regardless of how large the range

TABLE 7
Summary of Hypotheses and Results

Panel A: Environmental and Task Characteristics of Challenging FVMs

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
General Findings	Univariate statistics (Table 1)	<ul style="list-style-type: none"> • Most common challenging FVMs: financial instruments (48.7%), asset impairment (27.8%) • EU is \geq materiality for 71.9% (\geq 5X materiality for 21.1%) • Contributing to high uncertainty: significant, complex assumptions; subjectivity; lack of available data; use of proprietary models 	<ul style="list-style-type: none"> • New finding • New finding • Methodological triangulation: consistent with interview studies by Griffith et al. (2015a) and Glover et al. (2016a)

Panel B: Estimation Uncertainty and Risk Assessment

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
H1: EU (+) inherent risk assessments	OLS Regression (Table 4); Path analysis (Figure 3)	<ul style="list-style-type: none"> • Both <i>UNCERTAINTY</i> and <i>LEVEL3</i> are associated with higher inherent risk • Concern that when EU > materiality, over 30% still rate inherent risk as low to moderate 	<ul style="list-style-type: none"> • Methodological triangulation: consistent with experiment by Rowe (2015).

Panel C: Use of Valuation Specialists

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
General Findings	Univariate statistics (Table 1)	<ul style="list-style-type: none"> • Valuation specialist used by 86% of engagement teams (over 85% internal), and 60% of clients • High EU can lead to disagreements between specialists 	<ul style="list-style-type: none"> • Methodological triangulation: inconsistent with interview study by Griffith (2015) (we find greater auditor specialist use)
H2: EU (+) auditor use of a valuation specialist	Logistic regression (Table 4); Path analysis (Figure 3)	<ul style="list-style-type: none"> • Neither <i>UNCERTAINTY</i> nor <i>LEVEL3</i> is associated with auditor specialist use; results imply that EU influences specialist usage through risk assessments 	<ul style="list-style-type: none"> • New finding
H3: Risk assessments (+) auditor use of a valuation specialist	Logistic regression (Table 4); Path analysis (Figure 3)	<ul style="list-style-type: none"> • Both inherent and control risk are positively associated with specialist use 	<ul style="list-style-type: none"> • Methodological triangulation: consistent with interview study by Boritz et al. (2016)
H4: Client valuation specialist (+) auditor valuation specialist	Logistic regression (Table 4); Path analysis (Figure 3)	<ul style="list-style-type: none"> • Auditor and client specialist use are positively associated 	<ul style="list-style-type: none"> • Methodological triangulation: consistent with interview study by Griffith (2015)

(continued on next page)

TABLE 7 (continued)

Panel D: Evidential Planning Decisions for Challenging FVMs

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
General Findings	Univariate statistics (see the Online Appendix)	<ul style="list-style-type: none"> All substantive procedures listed in auditing standards are employed in a high proportion of engagements. Specialists are most highly involved in substantive testing of the client's model and assumptions, as well as developing an independent estimate. 	<ul style="list-style-type: none"> Methodological triangulation, generally consistent with interview study by Glover et al. (2016a), but only partially consistent with Griffith et al. (2015a) and Griffith (2015)

Panel E: Audit Outcomes (Problems Identified, Discussion with Management, Booking Audit Adjustments)

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
General Findings	Univariate statistics (Tables 3 and 6; Figure 2)	<ul style="list-style-type: none"> Most frequent problems identified: management's assumptions, controls, and model/method appropriateness Potential adjustments discussed in 40% of engagements, proposed in 21.7%; 84.6% (50.0%) of income-decreasing (increasing) adjustments are fully or partially booked 	<ul style="list-style-type: none"> New findings on problem identification and adjustment proposal rates Overall rate of booking proposed adjustments similar to Joe et al. (2011)
Sources of uncertainty and tactics to reduce uncertainty	Coding of textual responses based on Lipshitz and Strauss (1997) (Tables 5 and 6)	<ul style="list-style-type: none"> Expressions of residual uncertainty at the end of the audit are associated with discussion of possible adjustments with client management, but not with booking of audit adjustments 	<ul style="list-style-type: none"> New finding
H5a: EU (+) adjustment discussion H5b: EU (no effect) adjustment booked	Logistic regressions (Table 5); Path analysis (Figure 3)	<ul style="list-style-type: none"> EU is marginally associated with discussion of an adjustment, but not with booking a decreasing adjustment (logit) The association of EU with discussion/booking of an audit adjustment is mediated by inherent risk and client problems identified (path analysis) 	<ul style="list-style-type: none"> New finding
H6a: Auditor risk assessments (+) adjustment discussion H6b: Auditor risk assessments (no effect) adjustment booked	Same as above	<ul style="list-style-type: none"> Inherent/control risk is positively associated with discussion of an adjustment, but not booking (logit) Path analysis shows a marginal association of inherent risk on discussion, but stronger paths show that the association of inherent risk with both audit outcomes is mediated by client problems identified 	<ul style="list-style-type: none"> New finding

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TABLE 7 (continued)

Hypothesis	Nature of Test	Key Results	Contribution Relative to Prior Research
H7: Auditor valuation specialist (+) audit outcomes	Same as above	<ul style="list-style-type: none"> Auditor use of a specialist is marginally associated with discussion (path analysis); an auditor specialist is used in all engagements with booked decreasing adjustments 	<ul style="list-style-type: none"> New finding
H8: Auditor independent estimate (+) audit outcomes	Same as above	<ul style="list-style-type: none"> An independent estimate is marginally associated with booking a decreasing adjustment (path analysis) 	<ul style="list-style-type: none"> New finding
H9: Client problems identified (+) audit outcomes	Same as above	<ul style="list-style-type: none"> Breadth of client problems identified is strongly associated with both audit outcomes 	<ul style="list-style-type: none"> New finding

This table summarizes our main findings, referring to earlier tables and figures where full results are presented. (+) indicates a proposed positive association.

(consistent with [Glover, Taylor, and Wu \[2016b\]](#))? Future research is needed to study why some auditors might assess risk at less than high in an engagement with challenging FVMs and high EU.

Third, following recognition of EU and consideration of effects of this and other environmental and task characteristics on engagement risk, auditors decide whether to seek the assistance of a valuation specialist (Table 7, Panel C). Key drivers of auditor specialist use are the level of inherent risk and client use of a specialist; in fact, both parties use a specialist in a high proportion of sample engagements. Is this due to underlying factors of the FVM that both recognize as concerning ([Griffith et al. 2015a](#)), or do auditors employ specialists in reaction to the presence of the client's specialist, anticipating the need for support in future client negotiations ([McCracken et al. 2008](#))? Whatever the reason, the high correspondence of specialist use by both parties increases the possibility of "dueling specialists." Our qualitative results support the concern that the highly qualified experts in the FVM context can disagree without an objective means to resolve the dispute (see, also, [Peecher et al. 2013](#)). While valuation specialist use by both parties is frequent, auditors quite often engage one when the client does not. Further research is needed to investigate whether less frequent use of specialists by clients is due to lower awareness of FVM uncertainty/complexity relative to auditors, or perhaps to overconfidence regarding the appropriateness of their valuations. Further study of these potential explanations could provide insights important for audit quality in this area.

The fourth phase of the audit concerns evidential planning decisions (Table 7, Panel D). Auditors in our sample apply a substantial battery of tests to support the audit opinion for challenging FVMs, employing all of the AU 328 substantive procedures in a high proportion of engagements. Independent estimates are developed for over half of our sample FVMs, a lower overall rate than for the other procedures, but still substantial. Specialists are most highly involved in substantive testing of the client's model and assumptions, as well as developing an independent estimate. Interestingly, the "yield" is highest for these three procedures in terms of client problems identified, underscoring the importance of specialist involvement in audit effectiveness for these challenging situations. Our findings regarding extent of testing are similar to those reported by [Glover et al. \(2016a\)](#), but differ from [Griffith et al. \(2015a\)](#). Due to variation in findings across studies and the important implications of this issue for audit practice, further research should investigate how auditors plan and conduct audit tests related to FVMs.

The final phase concerns audit outcomes for challenging FVMs and factors affecting those outcomes (Table 7, Panel E). The most frequent types of problems identified relate to management's assumptions, controls, and model/method appropriateness. Results of logit and path models show that EU plays a strong role in determining inherent risk, and inherent risk assessments directly affect discussion of a possible audit adjustment. Higher inherent risk is strongly predictive of client problems identified, the largest proportion of which relate to assumptions. In turn, the breadth of identified problems and the auditor's use of a specialist drive discussion with client management. Examining factors affecting booking of income-decreasing audit adjustments (which are more consequential to auditor business risk), we find no direct association with risk assessments. Rather, model results imply that the likelihood of booking an adjustment increases with evidence quality (i.e., an independent estimate) and the breadth of specific problems identified by the auditor. Interestingly, auditors use a specialist for all booked FVM audit adjustments, implying that expert support is helpful at that stage. It is important to note that while the literature generally supports a link between decreasing audit adjustments and financial reporting quality, we do not have direct

evidence that booked versus waived adjustments imply differential levels of financial reporting quality in our sample. Further research specifically addressing this issue in the context of high-uncertainty FVMs could provide valuable insight.

Qualitative responses add richness to this picture. Auditors expressing residual uncertainty at the end of the audit are more likely to discuss potential adjustments with client management, but few of the discussed adjustments are ultimately booked. Respondents also described FVM situations with numerous commonly accepted valuation techniques providing widely different point estimates, with some expressing that competing audit outcomes could not be differentiated. Such expressions are made in all cases where an adjustment is discussed with management, but not booked. This suggests that in these situations, adjustments are waived not because the auditor thinks the valuation is reasonable, but because the evidence is insufficient to support an amount materially different from management's assertion. However, our analysis is limited in that we did not solicit judgments of residual uncertainty from participants, but rather coded expressions from textual responses. Future research should explicitly assess determinants and consequences of auditors' perceptions of residual uncertainty in high-EU valuations.

Overall, our findings suggest that the greatest problem facing the profession with regard to auditing FVMs may not be a lack of professional skepticism, although recent PCAOB findings do highlight a need for improvement there. Rather, in the engagements that our participants identify as among the most challenging and important issues in the audit, inherent risk assessments for FVMs generally increase with EU, specialists are often used, and a multiplicity of procedures are performed. Despite those efforts, auditors still find it difficult to provide positive assurance. Although this point has been suggested in prior research (e.g., Christensen et al. 2012; Bell and Griffin 2012; Peecher et al. 2013), our study is the first to provide empirical support by statistically examining audit outcome decisions among high-uncertainty FVMs. Our findings are consistent with Peecher et al. (2013) in implying that auditors might be better equipped to audit the reasonableness of management's valuation method than to provide positive assurance on the accuracy of the FVM balance.

A number of scholars have recently proposed changes that might help to alleviate these concerns (e.g., Montague 2010; Bell and Griffin 2012; Christensen et al. 2012; Clor-Proell, Proell, and Warfield 2013; Peecher et al. 2013; Christensen, Glover, and Wolfe 2014; Griffith et al. 2015a; Griffith et al. 2015b; Maksymov et al. 2014; Cannon 2016). These include changes to the financial statements (e.g., presenting ranges of values instead of point estimates, or showing the effect of changes in fair value on net income), additional disclosures (e.g., historical estimation accuracy, current levels of EU), changes in the auditors' communications to users (e.g., allowing negative assurance for certain elements of the audit, such as FVMs, "critical audit matter" disclosures), implementing a "reasonableness" criterion for auditors, and changes from positively to negatively framed FVM auditing standards. Additionally, the PCAOB has recently proposed changes to the auditor's report that would require the auditors to describe critical audit matters in their report, including difficulties auditing high-uncertainty FVMs (PCAOB 2013b, 2016). Given the difficulties in providing assurance on FVMs that our study and others illustrate, future research should further investigate the costs, benefits, and feasibility of such approaches.

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APPENDIX A
Correlation Matrix

Panel A: Correlation Variables *UNCERTAINTY* to *SEC_NOTAF*

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
1. <i>UNCERTAINTY</i>		0.17*	0.31***	0.06	-0.14	0.31***	0.18*	-0.06
2. <i>LEVEL3</i>	0.15		0.37***	0.15	-0.14	0.05	0.21**	0.02
3. <i>INHERENT_RISK</i>	0.29***	0.39***		0.29***	-0.08	0.19**	0.04	0.09
4. <i>CONTROL_RISK</i>	0.06	0.18*	0.27***		-0.08	0.09	-0.06	0.07
5. <i>TYPE_FININST</i>	-0.16*	-0.12	-0.01	-0.08		-0.60***	-0.14	0.12
6. <i>TYPE_IMPAIR</i>	0.32***	0.04	0.13	0.10	-0.60***		0.16*	0.05
7. <i>SPEC_CLIENT</i>	0.20**	0.21**	0.11	-0.04	-0.13	0.15		-0.03
8. <i>SEC_NOTAF</i>	-0.08	0.02	0.08	0.09	0.11	0.05	-0.04	
9. <i>ACCELERATED</i>	0.06	-0.01	0.02	-0.19**	0.01	0.06	0.06	-0.39***
10. <i>SALES</i>	0.09	-0.11	-0.12	-0.21**	-0.03	0.05	-0.19	-0.05
11. <i>SPEC_AUDITOR</i>	0.05	0.01	0.17*	0.04	0.04	0.14	0.39***	-0.10
12. <i>PROC_INDEP_EST</i>	-0.08	-0.22**	-0.06	-0.01	0.15	-0.08	0.05	-0.07
13. <i>PROB_SUM</i>	0.05	0.21**	0.33***	0.31***	0.24***	-0.11	0.02	0.26***
14. <i>TOPIC_ADJ</i>	0.16*	0.06	0.28***	0.32***	-0.09	0.01	0.16*	0.09*
15. <i>DEC_AUD_ADJ</i>	0.07	0.15	0.14	0.20**	-0.08	0.06	0.08	0.10

Panel B: Correlation Variables *ACCELERATED* to *DEC_AUD_ADJ*

	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>
1. <i>UNCERTAINTY</i>	0.07	0.09	0.05	-0.12	0.07	0.15	0.10
2. <i>LEVEL3</i>	-0.01	-0.10	0.01	-0.23**	0.21**	0.05	0.16*
3. <i>INHERENT_RISK</i>	-0.02	-0.11	0.12	-0.07	0.30***	0.31***	0.14
4. <i>CONTROL_RISK</i>	-0.15	-0.19**	0.04	0.01	0.32***	0.31***	0.19**
5. <i>TYPE_FININST</i>	0.01	-0.03	0.03	0.14	0.22**	-0.11	-0.08
6. <i>TYPE_IMPAIR</i>	0.06	0.05	0.14	-0.07	-0.11	0.02	0.06
7. <i>SPEC_CLIENT</i>	0.06	-0.19**	0.39***	0.04	0.01	0.14	0.09
8. <i>SEC_NOTAF</i>	-0.40***	-0.06	-0.10	-0.07	0.27***	0.10	0.10
9. <i>ACCELERATED</i>		0.51***	0.11	0.10	-0.30***	-0.17*	-0.10
10. <i>SALES</i>	0.50***		-0.03	0.10	-0.25***	-0.23**	-0.11
11. <i>SPEC_AUDITOR</i>	0.11	-0.02		0.27***	0.06	0.17*	0.13
12. <i>PROC_INDEP_EST</i>	0.09	0.12	0.28***		0.10	0.04	0.13
13. <i>PROB_SUM</i>	-0.27***	-0.24	0.07	0.09		0.35***	0.32***
14. <i>TOPIC_ADJ</i>	-0.16**	-0.23*	0.17	0.06	0.35***		0.29***
15. <i>DEC_AUD_ADJ</i>	-0.10	-0.11	0.13	0.13	0.33***	0.28***	

*, **, *** Indicate significance at $p < 0.10$, 0.05 , and 0.01 , respectively (two-tailed).

This appendix shows correlations of variables used in the models, computed on 113 observations with complete data. Spearman (Pearson) correlation coefficients are presented above (below) the diagonal.

APPENDIX B
Examples of Specific FVM Experiences

FVM Type	Examples
Financial Instrument	Auction rate securities/credit default swaps/collateralized debt obligations (including single name, tranche, and asset-backed securities)/collateralized mortgage obligations, derivative contracts (e.g., embedded gold derivative, interest rate Bermudan swaption)/available for sale securities/contingent considerations/municipal bonds/fund of funds/portfolio of reverse mortgages/interest rate swaps/structured securities/mortgage servicing rights/U.S. agencies and treasuries/private placement securities
Asset Impairment	Goodwill/long-lived assets/R&D assets/PP&E impairment/indefinite-lived trademarks assets/customer relationships acquired in a business combination
Pension Plan Assets	Hedge fund investments/private equity funds/defined benefit pension plan/OPEB (other post-employment benefits) plans/limited partnership interests
Other FVM Types	Equity investments (investment in a controlled portfolio company/portfolio of start-up and early-stage companies/equity investment in an overseas private entity), various investments in real estate, and one type description that was left blank

APPENDIX C

Online Appendix: <http://dx.doi.org/10.2308/accr-51569.s01>