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Complexity of financial reporting standards and accounting expertise

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ABSTRACT

This study tests whether firms seek to mitigate the adverse effects of Financial Reporting Complexity (FRC) by investing in accounting expertise. We develop a measure of FRC based on the complexity of accounting standards that govern annual disclosures. We find that FRC is positively related to the accounting expertise on a firm's board of directors and audit committee. We also find that accounting expertise mitigates the relation between FRC and negative reporting outcomes. Collectively, this study increases our understanding of the actions firms take to mitigate the negative consequences of FRC, and the role of accounting expertise in this setting.

1. Introduction

The U.S. Securities and Exchange Commission's (SEC) Advisory Committee on Improvements to Financial Reporting defines financial reporting complexity (FRC) as: "the difficulty for… preparers to properly apply generally accepted accounting principles in the U.S. (U.S. GAAP) and communicate the economic substance of a transaction or event and the overall financial position and results of a company… " (Securities and Exchange Commission, 2008, p. 18).[1]

Prior literature documents a growing trend in FRC (Dyer et al., 2017) and examines its consequences. Generally, firms with high FRC have a less favorable information environment (e.g., Lehavy et al., 2011; Li, 2008; Peterson, 2012; You and Zhang, 2009) and increased financial misstatement risk (e.g., Filzen and Peterson, 2015; Hoitash and Hoitash, 2018) relative to firms with low FRC. Extant literature generally attributes these findings to high FRC levels reflecting the intentional choice of firm managers to obfuscate

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[1] Anecdotal evidence suggests that regulators, preparers, and investors struggle with increasingly complex accounting standards. For instance, former SEC Commissioner, Cynthia A. Glassman highlights the growing volume of pronouncements that make up these standards: *"This has been going on for decades. The result is that today, U.S. GAAP is made up of over 2000 pronouncements. That's a lot of ABCs, even for a CEO or CFO with a CPA"* (Securities and Exchange Commission, 2006). Similarly, Russell G. Golden, the chair of the Financial Accounting Standards Board (FASB), notes the difficulty in understanding and applying each standard: *"One way to think about complexity in accounting is that the literature surrounding a standard is so dense and complicated that its meaning is unclear – and therefore it becomes very difficult for a preparer to decide exactly how to apply the accounting model"* (Financial Accounting Standards Board., 2013).

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financial reports (e.g., Li, 2008; Lo et al., 2017).

Recently, some studies have argued that FRC primarily captures the complexity of firms' business operations and accounting standards rather than the intention to obfuscate (Bushee et al., 2018; Dyer et al., 2017; Guay et al., 2016). If high FRC is not an intentional choice, one could expect firms to seek to diminish the adverse effects of FRC on their information environment and financial reporting risk. However, there is little evidence on whether and how companies mitigate the negative effects of FRC. One exception is a study by Guay et al. (2016) documenting that firms increase voluntary disclosure as financial reporting complexity increases. Their findings are consistent with firms balancing complex mandatory financial reporting and voluntary disclosure to achieve an optimal information environment.

Our study extends this line of research by investigating whether firms invest in accounting expertise to mitigate the adverse effects of FRC. If high FRC is driven by the applicable accounting standards and regulations (Dyer et al., 2017), we expect companies to invest in accounting expertise to reduce the risk of negative reporting outcomes (e.g., restatements). If, on the other hand, high FRC arises from managers' efforts to obfuscate financial reporting (Li, 2008; Lo et al., 2017), we would expect a *negative* or *nonexistent* relation between a firm's level of accounting expertise and FRC. In other words, if FRC is used as a smokescreen, it is unlikely that companies would invest in expertise to counteract the obscuring effects of complexity. In contrast, we expect a *positive* relation between FRC and accounting expertise if high FRC is mainly driven by a combination of a firm's business operations and accounting standards complexity. While Guay et al. (2016) examine voluntary disclosure as a channel to mitigate FRC, we focus on firms' accounting expertise. An important difference is that increasing voluntary disclosure can be used to address transitory changes in annual report text (e.g., changes in sales, business acquisitions, or litigation), while increasing accounting expertise can be a response to permanent changes in firm complexity (e.g., changes in business operations and/or applicable accounting standards).

Since the absence of publicly available data makes it impossible to directly measure the level of accounting expertise in a given firm (e.g., expertise of the accounting department and outside consultants), we use the accounting expertise on its board of directors and audit committee as a proxy for a firm's overall level of accounting expertise. This choice of accounting expertise measure introduces additional factors that may contribute to the difficulty in finding a relation between FRC and accounting expertise. Namely, we expect *no* relation between FRC and board accounting expertise, if FRC is mainly driven by business operations or transitory issues (e.g., industry-related trends or litigation). For firms with high operational complexity, the benefits of having boards with operational and industry expertise (Coles et al., 2008; Klein, 1998) might outweigh the benefits of adding more accounting expertise, considering that board size is limited (Cheng, 2008).[2] In addition, from a research-design standpoint, we expect *no* consistent relation between board accounting expertise and FRC if board accounting expertise does not reflect a firm's overall investment in accounting expertise.

We conduct our analysis in three steps. First, we create a new measure of FRC based on the length of accounting standards and SEC disclosure regulations applicable to a firm's annual report. Second, we use this measure to test whether FRC is related to the levels of accounting expertise on the board of directors and audit committee. Finally, we examine how FRC and accounting expertise jointly affect three negative financial reporting outcomes: internal control weaknesses, accounting restatements, and SEC comment letters. We expect positive relations between FRC and the incidences of these financial reporting problems; however, these relations should be comparatively weaker for firms with high levels of accounting expertise.

Prior studies have generally viewed FRC from the investors' perspective, focusing on the textual complexity of annual 10-K reports. In contrast, we study FRC through the lens of a company that must apply complex accounting rules to prepare financial reports. We use the length of the accounting standards and regulations applicable to a firm's annual report to measure FRC.[3] Our FRC measure is based on the intuitive conjecture that accounting items with longer and more detailed disclosure standards are more complex (e.g., financial instruments, goodwill, pension liability). Consequently, financial reports with more complex accounting items have a comparatively higher FRC. Conceptually, our measure attempts to capture the amount of *knowledge* of accounting standards required to prepare a company's annual report.

Unlike other measures of FRC in the extant literature (e.g., annual report length and readability), our measure captures the complexity of applicable accounting standards set by the FASB and the SEC; it is not derived from the annual report text generated by a firm's management (and related parties). Compared to other measures of FRC based on 10-K text, our measure is less likely to be subject to management discretion, more likely to be exogenous with respect to any single corporate event, and more likely to capture persistent changes in complexity. Finally, it may be more difficult to mitigate complexity emerging from accounting standards than it is to mitigate complexity emerging from overly long and/or difficult-to-read textual disclosures (e.g., 10-K text can be simplified, shortened, and communicated more clearly; for more discussion on this topic, see Bonsall et al., 2017).

Our FRC measure is constructed at the firm-year level. First, we use the FASB's eXtensible Business Reporting Language (XBRL) Financial Reporting Taxonomy to link each Generally Accepted Accounting Principles (GAAP) monetary accounting item (i.e., number) reported in a firm's 10-K (e.g., inventory) to the relevant text in the FASB's Accounting Standards Codification (ASC) and the SEC's Regulation S-X that governs the disclosure of that item.[4] Next, we count the number of words in the relevant ASC and

[2] We find that there is a significant correlation between FRC and operational complexity, for example in terms of the number of business and geographical segments and the occurrence of acquisition and restructuring events. Generally, the cost of adding accounting experts to the board of directors or audit committee may outweigh the negative consequences of FRC, even if firms do want to mitigate these negative consequences.

[3] Madsen (2011) reports that the importance and complexity of professional standards for accounting and auditing practitioners resemble those of nuclear engineers, lawyers, and surgeons.

[4] The FASB's XBRL taxonomy also contains references to other regulations (e.g., Regulation S-K and 12B), but they amount to less than 3% of all the references in the taxonomy.

Regulation S-X text to assign a complexity score to each item. Our firm-level FRC proxy is the sum of the complexity scores across all unique items reported in the firm's 10-K report. Finally, in order to reflect the relative complexity between firms, we standardize the FRC measure by industry and year.

To calculate the extent of accounting expertise on the board and audit committee, we use the definitions of accounting experts from Cohen et al. (2014), Krishnan and Lee (2009), and DeFond et al. (2005). Specifically, we classify an individual as an accounting expert if he/she currently has or has had in the past at least one accounting qualification.[5] We then use both the number and ratio of accounting experts on the board and audit committee as proxies for a firm's accounting expertise.

We document that FRC is positively associated with accounting expertise on the board and audit committee. Turning to the negative consequences of FRC, we find that our FRC measure is positively associated with the incidence of internal control weaknesses disclosures and restatements, consistent with prior literature (e.g., Doyle et al., 2007b; Hoitash and Hoitash, 2018; Peterson, 2012). We also find that the likelihood of receiving an SEC comment letter is comparatively high for firms with high FRC. Finally, we document that accounting expertise *completely mitigates* the negative effects of FRC on the likelihood of internal control problems and SEC comment letters, but not the likelihood of accounting restatements. Taken together, these results point to a strong association between adverse financial reporting outcomes and FRC. Nevertheless, high levels of accounting expertise on the board of directors and audit committee attenuate the adverse effects of FRC.

We acknowledge that a positive relation between FRC and accounting expertise may be attributed to firms acquiring accounting experts to advise management on strategic and operational matters, rather than to firms purposefully acquiring these experts to mitigate the risk of negative reporting outcomes. However, firms with high operational complexity may prioritize board members with specialized expertise (e.g., industry knowledge) over members with accounting expertise. Moreover, the board's accounting expertise by itself (our proxy for the firm's overall accounting expertise) may be insufficient to reduce financial reporting risk. If experts are added to the board for reasons other than FRC management and the firm does not increase internal accounting expertise, then it is unlikely that increases in accounting expertise on the board would be associated with the reduction of negative reporting outcomes that we document.

We confirm our inferences with several additional analyses. First, to mitigate a concern that our findings are driven by our choice of FRC measure, we examine the relation between complexity and accounting expertise using two alternative proxies for complexity, 10-K report length and readability index (e.g., Li, 2008; Miller, 2010). Using these proxies, we find similar, albeit weaker, results. Second, it is also possible that the association between FRC and a firm's accounting expertise is driven by unobserved endogenous firm characteristics or short-term transitory changes in FRC not captured by our regression models. We attempt to isolate these effects by analyzing temporal changes in FRC. We find that persistent changes in FRC are related to changes in accounting expertise on the board of directors and audit committee. Third, our results suggest that FRC is driven by operational and accounting standards complexity (as opposed to managerial obfuscation) and that firms with high FRC enhance their governance by acquiring accounting expertise. If this premise is correct, we expect to see a stronger relation between FRC and boards' accounting expertise for firms where external oversight demands better governance. We test this relation for low and high levels of institutional ownership, as institutional ownership are associated with enhanced monitoring and governance (e.g., Chen et al., 2007; Chung and Zhang, 2011). We find that the relation between FRC and accounting expertise on the board of directors is magnified for firms with high levels of institutional ownership. Overall, our additional analyses provide increased confidence that our main results are not explained by a correlated omitted variable, since that variable would have to vary in time simultaneously with different measures of FRC, firm's accounting expertise, and institutional ownership.

Our study contributes to the literature by demonstrating that firms reduce the adverse effects of FRC by investing in accounting expertise. Collectively, our findings indicate that firms use accounting expertise in addition to voluntary disclosure (Guay et al., 2016) to manage FRC. While increasing voluntary disclosure can be a potential response to transitory increases in the complexity of 10-K text, firm's accounting expertise can be a response to permanent increases in the complexity of accounting rules. Moreover, our findings are consistent with FRC arising primarily from business and accounting standards complexity and not from intentional obfuscation. Further, our results highlight the role of accounting expertise in firms' governance, and complement a growing literature on the determinants and consequences of board and audit committee expertise (e.g., Badolato et al., 2014; Bryan et al., 2004; Erkens and Bonner, 2013; Krishnan and Lee, 2009). Finally, our measure of financial reporting complexity directly captures the complexity of accounting standards and regulations that govern firms' annual report disclosures. As such, it complements existing complexity measures (e.g., 10-K length and the Fog index, among others) in the prior literature.

The rest of the paper is organized as follows. In Section 2, we discuss the predicted associations between FRC, accounting expertise on the board and audit committee, and negative reporting outcomes. In Section 3, we describe the construction of our FRC and accounting expertise measures, as well as the design of our empirical analyses. We describe our data, sample selection, and descriptive statistics in Section 4. In Section 5, we present the results of our main analyses. In Section 6, we report additional analyses and robustness tests. We conclude in Section 7.

2. Background and related literature

2.1. Financial reporting complexity and its adverse effects

The complexity of financial reports has increased dramatically over the last two decades (Dyer et al., 2017; Li, 2008). For

[5] We consider the following accounting qualifications: certified public accountant (CPA or similar certification) and work experience as a controller, treasurer, chief financial officer, auditor, or tax professional.

example, Dyer et al. (2017) report a double increase in the median number of words in a 10-K report from 23,000 in 1996 to 50,000 in 2013. This increase in financial reporting complexity has prompted concerns among standard setters and practitioners (see footnote [1]). For instance, the SEC published *A Plain English Handbook* (Commission and Exchange, 1998) in an attempt to reduce the complexity of language in financial reports. The FASB has taken measures along similar lines through its ongoing project titled the *Disclosure Framework* (Financial Accounting Standards Board, 2009) aimed at making financial statement disclosures "… more effective, coordinated, and less redundant."

Prior literature has documented that FRC worsens firms' information environments. Li (2008) provides evidence that firms with comparatively less readable reports have lower and less persistent earnings. You and Zhang (2009) document that firms with longer 10-K filings have a larger delay in the market reaction to 10-K filings. Miller (2010) finds that firms with less readable financial reports have less pronounced small investor trading around the 10-K filing date. Lawrence (2013) shows that retail investors are less likely to invest in firms with comparatively longer and less readable financial reports.

There is also evidence that FRC leads to negative financial reporting outcomes. For example, Doyle et al. (2007b) examine the determinants of internal control weaknesses and find that business complexity (measured as the number of special purpose entities and segments, foreign operations, and merger and acquisition activities) is positively associated with the incidence of internal control weaknesses. Peterson (2012) finds that the complexity of revenue recognition increases the probability of restatements. Cassell et al. (2013) examine the determinants of receiving an SEC comment letter related to financial reporting. They find that the probability of receiving a comment letter, the number of topics in the comment letter, and the cost of remediation are associated with business complexity (i.e., sales growth, number of segments, merger and acquisition activities, and restructuring charges). Lo et al. (2017) find that restatements are associated with complexity in the management's discussion and analysis (MD&A) sections in 10-K reports. Finally, Hoitash and Hoitash (2018) find a positive association between internal control weaknesses, restatements, and reporting complexity.

2.2. Sources of financial reporting complexity

Broadly speaking, FRC can arise from complexity in a firm's business operations, extensive accounting standards, and managerial discretion regarding the type and extent of language used in financial reports. The prevalent view in the literature is that FRC is primarily a managerial choice and that FRC is used by managers to obfuscate information communicated to their firms' stakeholders. For example, Li (2008) argues that managers increase FRC to strategically hide adverse information by increasing information processing costs. Similarly, Lo et al. (2017) find that firms that are close to meeting or just beating the prior year's earnings have less readable MD&A sections in the 10-K reports. They interpret this finding as an indication that managers use complexity to engage in intentional obfuscation.

Several contemporary papers advance a different view and argue that FRC is mainly driven by business operations and complex accounting standards and regulations. For instance, Bloomfield (2008) provides an alternative explanation for the findings in Li (2008) that firms with lower earnings quality have less readable reports: losses and transitory income are more difficult to communicate. Guay et al. (2016) find that managers of firms with high FRC increase voluntary disclosure to mitigate the negative impact of FRC on their information environment; this finding is consistent with the idea that managers do no use FRC opportunistically. Also, the descriptive evidence in Dyer et al. (2017) suggests that the increasing trend in 10-K length is an outcome of changes in accounting standards in three focal areas: fair value/impairments, risk factors, and internal controls. Bushee et al. (2018) show that complex language in a firm's earnings conference call can provide informative disclosure. Finally, in an experimental setting, Asay et al. (2018) find that while managers write more readable disclosures when news is good to highlight positive performance, they do not intentionally try to obfuscate poor performance when the news is bad by writing less readable disclosures.

2.3. Financial reporting complexity and accounting expertise

Our study further examines whether FRC is mainly an intentional choice of self-interested managers, or an artifact of complex business transactions and related disclosure standards and regulations. *Only* if the latter is the case, firms would attempt to manage FRC. While Guay et al. (2016) examine whether voluntary disclosures improve firms' poor information environments when FRC is high, we study a different channel, firms' accounting expertise. We argue that employees in key financial reporting roles, including board members, need a deep understanding of the relevant standards and regulations in order to effectively manage FRC. For example, firms that engage in hedging activities to reduce exposure to changes in input prices are subject to the FASB's ASC 815, which requires a clear understanding of both the standards and the underlying financial instruments. Also, old firms with defined benefit pension plans face more complex accounting disclosures (ASC 715.30) than new firms with defined contribution plans (ASC 715.70). Finally, firms with international operations must implement standards related to accounting for foreign currency translation (ASC 830.30).

We use the level of accounting expertise on the board of directors and audit committee as a proxy for a firm's overall level of accounting expertise. Hence, our study emphasizes the role of accounting expertise in a firm's governance. Prior research suggests that board expertise is related to financial reporting. For example, Abbott et al. (2004) and Agrawal and Chadha (2005) find that financial expertise on the audit committee is associated with a lower probability of restatements. Similarly, both the legal expertise on the board of directors (Krishnan et al., 2011) and industry and accounting expertise on the audit committee (Cohen et al., 2014) are positively associated with financial reporting quality. Although there is some evidence in the literature that accounting expertise on the audit committee can reduce the risk of negative financial outcomes such as internal control weaknesses and restatements (e.g.,

Abbott et al., 2004; Cohen et al., 2014; Hoitash and Hoitash, 2018), there is little evidence as to whether firms *choose to increase* their level of accounting expertise to manage FRC.

As a possible mechanism for mitigating FRC, enhancing accounting expertise on the board and audit committee is different from issuing voluntary disclosures. Voluntary disclosures, such as management's forecasts, could be a response to transitory events (e.g., an increase in sales, a decrease in operating costs, or a business acquisition). Increasing accounting expertise on the board of directors and audit committee is a long-term decision that is also subject to several constraints (e.g., limited board size, internal and external approval processes, SEC regulations, etc.). If a firm does increase the number of accounting experts on the board to attenuate the effects of FRC, it is likely a response to more permanent changes in FRC (e.g., changes in the business model or applicable accounting standards).

2.4. Measures of financial reporting complexity

The literature uses several proxies to capture FRC. Some examples are: (1) firm characteristics, such as company size, the number of special purpose entities, the number of segments, and the presence of special items (e.g., see Bushman et al., 2004; DeFond et al., 2002; Doyle et al., 2007b); (2) the number of words in a 10-K report (Guay et al., 2016; You and Zhang, 2009); (3) the readability of the 10-K report (Bonsall et al., 2017; Li, 2008); (4) the number of words in the revenue recognition footnote and the number of revenue recognition methods (Peterson, 2012); (5) the number of words in the accounting policies footnote (Filzen and Peterson, 2015); (6) the number of (non-missing) items in Compustat (Chen et al., 2015; Li, 2008); and, (7) the number of items in the XBRL 10-K report (Hoitash and Hoitash, 2018).

We propose a new measure of FRC based on the length of the accounting standards and regulations related to the disclosure of items reported in a 10-K report. Since this measure is based on the required accounting standards, it has a number of advantages for studying the relation between FRC and firms' choices to invest in accounting expertise. First, it is less subject to managerial discretion compared to the length and readability of 10-K reports. Similarly, it directly captures a possible determinant of FRC, the volume of accounting standards and regulations applicable to the firm's business operations. Second, it is less likely to reflect complexity introduced by transitory corporate events and more likely to reflect persistent financial reporting complexity. Third, it reflects the amount of knowledge of accounting standards and regulations needed to prepare financial statements. As such, it is closely related to the definition of an (accounting) expert, as someone "… whose special knowledge or skill causes him to be regarded as an authority; a specialist" (Oxford University Press , 2018). Finally, our FRC measure reflects the difficulty of *preparing* financial reports rather than the difficulty of *reading* and understanding them.

Dyer et al. (2017) use the Latent Dirichlet Allocation (LDA) method to identify topics in 10-K reports. LDA can capture topics related to disclosure regulation, such as fair value/impairments, risk factors, and internal controls. Although their approach can be used to capture a similar construct of regulation-driven complexity, our approach is intrinsically different: we measure firms' disclosure complexity *imposed* by regulators, while the approach of Dyer et al. (2017) measures firms' *disclosure response* to the regulation-driven complexity.

To study the negative consequences of FRC, Hoitash and Hoitash (2018) use 10-K filings reported in XBRL format. They measure FRC as the number of accounting items in each XBRL filing. While our FRC measure also relies on XBRL reporting, we focus on the complexity of accounting standards and regulations governing financial reports' disclosures. Specifically, our FRC measure links each individual accounting item to the length of the relevant standards for that item. Thus our measure assigns greater weight to accounting concepts with more complex standards.[6] Overall, our FRC measure conceptually reflects the complexity of underlying accounting standards rather than the number of disclosed accounting items.

3. Research design

3.1. Measuring financial reporting complexity

Our FRC measure is designed to capture the difficulty in *preparing* annual financial reports based on the quantity of text in accounting standards and SEC regulations that firms must follow. Our measure reflects the complexity of standards that are viewed by accounting professionals as extremely important and complex (Madsen, 2011). It is based on the intuitive assumption that lengthy standards (e.g., accounting for pensions) are more complex, and firms required to apply more lengthy standards have higher FRC. For every GAAP item reported in a 10-K, we identify the text of relevant standards and regulations that govern disclosure of this item and then count the number of words in this text. Our complexity measure is the sum of these counts across all unique GAAP items reported in the 10-K.[7] We provide more detailed description of the measure construction below along with some examples.

We identify standards and regulations that govern the disclosure of accounting items reported in 10-Ks by means of XBRL reporting technology. The SEC mandated public companies to prepare annual and quarterly financial reports using XBRL starting on June 15, 2011. Financial information reported in XBRL filings is standardized in accordance with the FASB's U.S. GAAP Financial

[6] For example, derivative concept gets a higher complexity score than cash and contributes more to the overall firm FRC score.

[7] Note that we count words contained in subtopics that are referenced for a specific GAAP item and not all the words contained in entire standards. For example, as described in A.2, the GAAP item *PensionExpense* references only ASC 715.70-50.1, ASC 230.10-45.28, and ASC 715.20-50.1. Thus, we only count words contained in these subtopics, and exclude all other subtopics contained in ASC 715 and ASC 230.

Reporting Taxonomy (GAAP taxonomy). For the purpose of this study, the GAAP taxonomy can be viewed as a dictionary of GAAP accounting items, referred to as GAAP concepts in the taxonomy. Each GAAP concept has a name (e.g., "NetIncomeLoss" for net income (loss) line item) and a corresponding description. Reporting firms need to (1) identify GAAP concepts from this dictionary that best match accounting items reported in their 10-K reports, (2) assign monetary values to them, and (3) report related concepts and values in their XBRL filings. For example, a company reporting net income of $2 billion in its annual filing, will "report" the NetIncomeLoss concept with a value of 2,000,000,000 in its XBRL 10-K filing. In a sense, XBRL allows firms to use standardized "language" to report their financial information.

For each GAAP concept in the GAAP taxonomy, the FASB provides references to accounting standards and regulations that govern the disclosure of this concept. For every unique GAAP concept reported in a 10-K, we first use these references to collect the relevant text from the FASB Accounting Standards Codification and SEC's Regulation S-X, and then count the number of words in this text. We sum these word counts across all the GAAP concepts reported in a 10-K and use the sum as a measure of FRC. Finally, we de-mean the FRC measure by year and industry to isolate taxonomy year and industry effects.

Following is an example of the methodology we use to compute the firm-level FRC score. The *NetIncomeLoss* concept has six references in the GAAP taxonomy, two to the FASB's Accounting Standards Codification (ASC 230.10-45.28 and ASC 260.10-50.1) and four to Regulation S-X (SX 210.5-03.18, SX 210.5-03.19, SX 210.7-04.19, and SX 210.9-04.20). The total number of words in these references is 550. A company reporting only net income or loss would have an FRC score of 550. Since companies report more than one accounting concept, we aggregate complexity scores (word counts) over all the reported concepts. Appendix A includes examples of how we calculate complexity of accounting concepts. In A.1 we show that the number of words in standards related to cash disclosure (*CashAndCashEquivalentsAtCarryingValue*) is 281. In contrast, in A.2 we show that the number of words in standards related to pension expense reporting (*PensionExpense*) is 2254. Thus, consistent with our expectation, pension expense is a more complex concept than cash. We provide descriptive statistics and more examples of complexity scores of individual accounting items in A.3.

We make several important design choices when constructing our measure. First, we only consider references to the FASB's Accounting Standards Codification and SEC's Regulation S-X since they embody most (around 97%) of the references to accounting standards and disclosure regulations in the FASB's taxonomy. Second, we consider only monetary items (measured in dollar and cents) reported in 10-K reports. The GAAP taxonomy defines concepts for text blocks and tables that we ignore, since those concepts often refer to broad sets of standards. Third, some XBRL reporting concepts are not defined in the GAAP taxonomy because they are not standard. These concepts are usually non-GAAP line items and are called extensions. We do not include them in our main analysis because they have no references to standards and regulations in the taxonomy and standard GAAP concepts represent the majority of all XBRL concepts (more than 80%).[8] Fourth, there are several versions of the GAAP taxonomy. Filings in our sample can use either the 2011, 2012, 2013, or 2014 versions of the taxonomy. We use the latest 2014 version to calculate FRC because it is the most complete and contains descriptions of deprecated GAAP concepts from previous taxonomy versions.[9] Finally, some standards and regulations referred to in the taxonomy may have been updated as part of normal changes in GAAP over time. We use the standards as of the taxonomy date to calculate the complexity scores. Those standards were current at the time the financial statements in our sample were prepared.

3.2. Determinants model for FRC

We first study the association between FRC and relevant firm characteristics using the following regression model:

$$\begin{aligned} Complexity_{i,t} = {} & \alpha_0 + \alpha_1 NumBus_{i,t} + \alpha_2 NumGeo_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 Leverage_{i,t} + \alpha_5 ROA_{i,t} \\ & + \alpha_6 MTB_{i,t} + \alpha_7 Accruals_{i,t} + \alpha_8 EarnVol_{i,t} + \alpha_9 Foreign_{i,t} + \alpha_{10} Loss_{i,t} \\ & + \alpha_{11} Restructure_{i,t} + \alpha_{12} Acquisition_{i,t} + \alpha_{13} Litigious_{i,t} + \alpha_{14} BigAuditor_{i,t} \\ & + \alpha_{15} FirmAge_{i,t} + \psi_1 IndustryFixedEffects + \psi_2 YearFixedEffects + \epsilon_{i,t}, \end{aligned} \tag{1}$$

where *Complexity* is our FRC measure that relates accounting items reported in a 10-K to the relevant text in accounting standards and regulations.

In terms of control variables, we first include proxies for firm complexity used in the prior literature (e.g., Doyle et al., 2007b; Erkens and Bonner, 2013; Linck et al., 2008): firm size (*Size*), number of operating and geographic segments (*NumBus* and *NumGeo*), indicator for foreign sales (*Foreign*), mergers and acquisition activities (*Acquisition*), firm age (*FirmAge*), indicator for litigious industries (*Litigious*), and restructuring charges (*Restructure*). Next, we include proxies related to the properties of accounting estimates (Dechow and Dichev, 2002): total accruals (*Accruals*), earnings volatility (*EarnVol*), and the incidence of losses (*Loss*). We also include return on assets (*ROA*) as a proxy for firm profitability (in addition to *Loss*), arguably influencing the appointment of directors and managers (Boone et al., 2007). Finally, we include two proxies for outside monitoring (Erkens and Bonner, 2013; Peterson, 2012): an indicator variable for firms with a large brand-name auditor (*BigAuditor*) and leverage (*Leverage*). We also include year and industry fixed effects. All the variables are defined in Appendix B.

[8] We do control for the number of extensions in our robustness analysis, but do not find results qualitatively different from our main ones.

[9] Due to GAAP taxonomy becoming more comprehensive with each subsequent version, our complexity measure might mechanically assign higher values to observations in the later years. To mitigate this issue, we center (de-mean) FRC scores with respect to the taxonomy version (year) and industry in our analysis.

3.3. Measuring firm's accounting expertise

We proxy for a firm's accounting expertise using the absolute and relative number of accounting experts on the board of directors and audit committee. We extend the accounting expertise definitions in Cohen et al. (2014), Krishnan and Lee (2009), and DeFond et al. (2005), and consider an individual an accounting expert if he/she has currently or has had in the past at least one of the following qualifications: certified public accountant (CPA or similar certification), or experience as a controller, treasurer, chief financial officer, auditor, or tax professional. We use data from BoardEx to collect qualifications of board members and then identify those who are accounting experts based on our criteria. We then create two measures of accounting expertise. The first measure is the raw count of accounting experts on the board of directors (*BoardNumAcc*) and audit committee (*ACNumAcc*). The second measure is the fraction of accounting experts on the board of directors (*BoardRatioAcc*) and audit committee (*ACRatioAcc*).

3.4. Models for FRC and firm's accounting expertise

We test our predictions on the relations between, FRC, and accounting expertise on the board and audit committee size using the following regression models:

$$\begin{aligned} DependentVariable_{i,t} \;=\; & \beta_0 + \beta_1 Complexity_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 NumBus_{i,t} \\ & + \beta_4 NumGeo_{i,t} + \beta_5 Size_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 ROA_{i,t} \\ & + \beta_8 MTB_{i,t} + \beta_9 Accruals_{i,t} + \beta_{10} EarnVol_{i,t} + \beta_{11} Foreign_{i,t} \\ & + \beta_{12} Loss_{i,t} + \beta_{13} Restructure_{i,t} + \beta_{14} Acquisition_{i,t} \\ & + \beta_{15} Litigious_{i,t} + \beta_{16} BigAuditor_{i,t} + \beta_{17} FirmAge_{i,t} \\ & + \theta_1 IndustryFixedEffects + \theta_2 YearFixedEffects + \epsilon_{i,t}, \end{aligned} \tag{2}$$

where $DependentVariable_{i,t}$ is one of the following measures: board size (*BoardSize*), board accounting expertise (*BoardNumAcc* and *BoardRatioAcc*), audit committee size (*ACSize*), or audit committee accounting expertise (*ACNumAcc* and *ACRatioAcc*). For audit committee measures, audit committee size (*ACSize*) is used as a control variable instead of board size (*BoardSize*). Neither board size nor audit committee size are included as control variables if they are dependent variables.

All the other control variables in Eq. (2) are the same as in Eq. (1); these include proxies for firm business complexity, complexity related to accounting estimations, firm profitability, and outside monitoring. Also, we include year and industry fixed effects. All the variables are defined in Appendix B. We estimate all the models with robust standard errors and with firm-level clustering.[10]

3.5. Models related to the interactive effects of FRC and accounting expertise on financial reporting outcomes

To test the interactive effects of FRC and accounting expertise on internal control weaknesses and accounting restatements, we use the following model:

$$\begin{aligned} DependentVariable_{i,t} \;=\; & \gamma_0 + \gamma_1 Complexity_{i,t} + \gamma_2 HighBoardRatioAcc_{i,t} \\ & + \gamma_3 Compl \times HighBoardRatioAcc_{i,t} + \gamma_4 MarketCap_{i,t} \\ & + \gamma_5 FirmAge_{i,t} + \gamma_6 Loss_{i,t} + \gamma_7 BankruptcyRisk_{i,t} \\ & + \gamma_8 NumBus_{i,t} + \gamma_9 NumGeo_{i,t} + \gamma_{10} Foreign_{i,t} \\ & + \gamma_{11} Acquisition_{i,t} + \gamma_{12} Growth_{i,t} + \gamma_{13} RestructCharge_{i,t} \\ & + \eta_1 IndustryFixedEffects + \eta_2 YearFixedEffects + \epsilon_{i,t}, \end{aligned} \tag{3}$$

where *DependentVariable* is either an indicator for a material weakness disclosure in the current fiscal year (*ICW*) or indicator for a restatement related to this fiscal year (*Restatement*), *Complexity* is our FRC measure, *HighBoardRatioAcc* is an indicator for high accounting expertise on the board (i.e., equal to one if the ratio of accounting experts on the board is in the third tercile), and *Compl* × *HighBoardRatioAcc* is the interaction dummy between the FRC measure and high accounting expertise on the board. We also estimate Eq. (3) with a high audit committee expertise indicator, *HighACRatioAcc*, instead of *HighBoardRatioAcc*.

The regression specification in Eq. (3) is adapted from the determinants models of control weaknesses and restatements in Doyle et al. (2007a,b). The following controls are included in Eq. (3): market capitalization (*MarketCap*), firm age (*FirmAge*), indicator for a loss (*Loss*), bankruptcy risk rank based on Altman (1968)'s Z-score model (*BankruptcyRisk*), number of business and geographical segments (*NumBus* and *NumGeo*), indicator for foreign sales (*Foreign*), indicator for mergers and acquisition activities (*Acquisition*), sales growth (*Growth*), and the amount of restructuring charges over the last two years (*RestructCharge*). All the variables are defined in Appendix B.

To examine the relation between the likelihood of receiving an SEC comment letter, FRC, and accounting expertise, we estimate the following comment letter determinants model based on Cassell et al. (2013):

[10] We do not cluster standard errors on year values since our sample period is only four years (2011–2014), which would result in a very small number of clusters that is likely to bias downward the standard errors (see Cameron et al., 2008).

$$
\begin{aligned}
SEC\_CL_{i,t} = {} & \delta_0 + \delta_1 Complexity_{i,t} + \delta_2 HighBoardRatioAcc_{i,t} + \delta_3 Compl \times HighBoardRatioAcc_{i,t} \\
& + \delta_4 Restatement_{i,t} + \delta_5 ICW_{i,t} + \delta_6 MarketCap_{i,t} + \delta_7 Growth_{i,t} \\
& + \delta_8 BankruptcyRisk_{i,t} + \delta_9 ExtFinancing_{i,t} + \delta_{10} NumBus_{i,t} \\
& + \delta_{11} BigAuditor_{i,t} + \delta_{12} SndTierAuditor_{i,t} + \delta_{13} FirmAge_{i,t} + \delta_{13} Loss_{i,t} \\
& + \delta_{14} Restructure_{i,t} + \delta_{15} Acquisition_{i,t} + \delta_{16} Litigious_{i,t} + \delta_{17} CEOChairman_{i,t} \\
& + \delta_{18} CEOTenure_{i,t} + \delta_{19} CFOTenure_{i,t} + \delta_{20} BoardRatioIndep_{i,t} \\
& + \psi_1 IndustryFixedEffects + \psi_2 YearFixedEffects + \epsilon_{i,t}, \qquad (4)
\end{aligned}
$$

where *SEC_CL* is an indicator for a firm receiving an SEC comment letter in the current fiscal year. In addition to the control variables described above, this model includes measures of equity and debt financing (*ExtFinancing*), indicator for a "big four" audit firm (*BigAuditor*), indicator for a second-tier audit firm (*SndTierAuditor*), indicator for a restructuring event (*Restructure*), indicator for a litigious industry (*Litigious*), indicator for the CEO being the chairman (*CEOChairman*), tenure of the CEO (*CEOTenure*), tenure of the CFO (*CFOTenure*), and board independence (*BoardRatioIndep*).

4. Data, sample selection, and descriptive statistics

4.1. Data and sample selection

To construct our financial reporting complexity measure we require 10-K filings to be reported in XBRL format. The SEC has mandated all public companies to file annual reports using XBRL starting in year 2011. We download and parse XBRL 10-K reports of U.S. public firms with fiscal years between 2011–2014 that are available on EDGAR. We require a firm-year observation to use the 2011, 2012, 2013, or 2014 XBRL taxonomy, and have at least ten unique monetary accounting concepts reported in its XBRL 10-K. This yields an initial sample of 27,656 firm-year observations. For each company-year observation, we calculate a complexity score variable (*Complexity*) as described in the previous section.

We collect financial data from Compustat to calculate the following variables: *Size, NumBus, NumGeo, Leverage, ROA, MTB, Accruals, EarnVol, Foreign, Loss, Restructure, Acquisition, Litigious, BigAuditor*, and *FirmAge*. We exclude an observation if any of the variables above cannot be calculated or if a firm's industry is finance-related (firms with SIC codes between 6000 and 7000). This reduces our sample to 13,547 observations.

Next, we obtain board and audit committee information from BoardEx. Namely, we calculate *BoardNumAcc, ACNumAcc, BoardRatioAcc, ACRatioAcc, BoardSize, BoardRatioIndep*, and *ACSize*. We require company-year observations to have at least two members on the board of directors and one on the audit committee. Our primary sample, which we use to examine the relation between financial reporting complexity and firm expertise, consists of 9383 observations.

We follow Doyle et al. (2007a,b) and calculate additional variables (from Compustat and Audit Analytics) for our material weakness and restatement analysis: *ICW, Restatement, MarketCap, BankruptcyRisk, Growth*, and *RestructCharge*. The sample with non-missing data values for these analyses consists of 8188 observations. For the restatement analysis, we exclude seven observations that can be reliably classified as irregularities (as opposed to errors) following the methodology in Hennes et al. (2008); this restricts the sample for restatement analysis to 8181 observations. Hence, our analysis examines the relation between FRC and restatements that are most likely due to *unintentional* errors.

Finally, we follow Cassell et al. (2013) and include additional variables (from Compustat, ExecuComp, and Audit Analytics) for our SEC comment letter analysis: *SEC_CL, ExtFinancing, SndTierAuditor, CEOChairman, CEOTenure*, and *CFOTenure*. As in Cassell et al. (2013), we exclude a firm-year observation without a comment letter in the current fiscal year if there was a comment letter in at least one of the previous two years. This limits our comment letter analysis to 3864 observations.

All the continuous variables are winsorized at 1% and 99%. The sample selection procedure is summarized in Table 1, and all the variables used in the study are defined in Appendix B.

4.2. Descriptive statistics

In Table 2, we report descriptive statistics for variables used in our analyses. The mean and median of our FRC measure (*Complexity*) is around zero (because it is de-meaned by industry and year) with a standard deviation of 0.39. A firm on average reports 193 unique monetary accounting items in its 10-K with 8524 words in unique accounting standards describing how to disclose these items. Also, according to the descriptive statistics reported in A.3, an accounting item has on average 185 words and 7 sentences in accounting standards that regulate its disclosure.

An average company in our sample has sales of about \$478 million ($\approx e^{6.17}$), operates in two business ($\approx e^{0.94} - 1$) and two

Table 1
Sample selection.

	Firm-years
Firm-year observations (years 2011–2014) that have XBRL 10-K filings with at least 10 concepts and use either 2011, 2012, 2013, or 2014 XBRL taxonomy version.	27,656
Firm-year observations with required Compustat data.	13,547
Firm-year observations with required BoardEx data. This is the *main sample* used to relate complexity to firm's accounting expertise.	9383
Firm-year observations with required Compustat and Audit Analytics data for *restatement* and *material weaknesses* analyses.	8188
Firm-year observations with required Compustat, ExecuComp, and Audit Analytics data for *SEC comment letter* analysis. Firm-year observations with no SEC comment letters in the current fiscal year are excluded if there was a comment letter received in at least one of the previous two fiscal years.	3864

The sample covers the period of 2011–2014.

Table 2
Descriptive statistics.

Panel A:*Financial reporting complexity and firm characteristic variables.*

	Mean	*Std. Dev.*	*Q1*	*Median*	*Q3*
Complexity	0.02	0.39	−0.21	0.00	0.24
NumBus	0.94	0.52	0.69	0.69	1.39
NumGeo	1.03	0.68	0.69	1.10	1.61
Size	6.17	2.44	4.75	6.44	7.82
Leverage	0.27	0.54	0.01	0.19	0.37
ROA	−0.08	0.94	−0.03	0.04	0.08
MTB	3.02	13.50	1.19	1.68	2.63
Accruals	−0.08	0.43	−0.09	−0.05	−0.02
EarnVol	0.15	0.87	0.02	0.04	0.11
Foreign	0.35	0.48	0.00	0.00	1.00
Loss	0.39	0.49	0.00	0.00	1.00
Restructure	0.33	0.47	0.00	0.00	1.00
Acquisition	0.48	0.50	0.00	0.00	1.00
Litigious	0.29	0.45	0.00	0.00	1.00
BigAuditor	0.74	0.44	0.00	1.00	1.00
SndTierAuditor	0.06	0.24	0.00	0.00	0.00
FirmAge	3.08	0.62	2.71	3.00	3.50
Growth	0.13	0.56	−0.02	0.06	0.16
MarketCap	6.53	2.18	5.08	6.62	8.05
BankruptcyRisk	5.50	2.87	3.00	6.00	8.00
RestructCharge	−0.01	0.02	−0.00	0.00	0.00
ExtFinancing	0.03	0.29	−0.06	−0.01	0.04
CFOTenure	1.87	0.63	1.39	1.95	2.30
CEOTenure	1.97	0.88	1.39	2.08	2.64
CEOChairman	0.89	0.31	1.00	1.00	1.00
Panel B:*Accounting expertise and financial reporting outcome variables.*					
	Mean	*Std. Dev.*	*Q1*	*Median*	*Q3*
BoardSize	8.76	2.48	7.00	9.00	10.00
BoardNumAcc	4.69	2.35	3.00	4.00	6.00
BoardRatioAcc	0.53	0.20	0.40	0.54	0.67
ACSize	4.57	1.86	3.00	4.00	5.00
ACNumAcc	2.98	1.76	2.00	3.00	4.00
ACRatioAcc	0.65	0.26	0.50	0.67	0.83
ICW	0.03	0.17	0.00	0.00	0.00
Restatement	0.06	0.23	0.00	0.00	0.00
SEC_CL	0.43	0.49	0.00	0.00	1.00

This table shows the descriptive statistics (mean, median, standard deviation, and first and third quartiles) for variables used in our study. All variables are defined in Appendix B. Descriptive statistics on complexity scores of individual accounting items is provided in A.3.

geographical ($\approx e^{1.03} - 1$) segments, and is audited by a "big four" auditor. The median board size is nine members with four accounting experts. The average audit committee has four members and three accounting experts. About 6% of firms eventually issue a restatement related to a given fiscal year, 3% of firms disclose material weaknesses, and 43% of firms receive a comment letter.[11]

[11] For our comment letter analysis, we follow Cassell et al. (2013) and exclude firm-year observations without comment letters in a three-year period. For this sample used to estimate comment letter determinants model reported in Table 9, the mean value of the comment letter indicator (*SEC_CL*) is 0.67 (67%), which is consistent with statistics reported in Cassell et al. (2013).

5. Empirical results

5.1. Association between FRC and company characteristics

FRC is likely to be driven by a number of intrinsic firm characteristics, including size, type of business operations, profitability, age, etc. Therefore, we begin our empirical analysis by examining the association between FRC and firm characteristics.

We first employ a correlation analysis to study the univariate relations between FRC and firm characteristics. Table 3, Panel A reports the results. Perhaps unsurprisingly, at 0.57, *Size* has the highest correlation with our FRC measure suggesting that larger firms face greater reporting complexity. FRC is also significantly and positively correlated with proxies for operations complexity (*NumBus, NumGeo, Foreign, Restructure*, and *Acquisition*), as well as with firm age (*FirmAge*). Firm profitability measures, *ROA* and *Loss*, are also significantly correlated with FRC. In addition, FRC is correlated with accounting estimation characteristics (*Accruals* and *EarnVol*), litigious environment (*Litigious*), market-to-book (*MTB*), and "big" auditor indicator (*BigAuditor*).

Next, we estimate an OLS regression for the FRC determinants model as in Eq. (1), and report the results in Panel B of Table 3. Regression allows us to better examine the associations between FRC and firm characteristics conditional on the levels of other characteristics. The results of the regression analysis are generally consistent with the univariate results in Panel A: *Size* is the most significant predictor of FRC (coef. = 0.095, *t*-stat. = 33.54), followed by *FirmAge* (0.078), *Acquisition* (0.07), *Restructure* (0.067), *Foreign* (0.064), and *NumGeo* (0.045). Other variables that are significantly associated with FRC are: *NumBus* (0.019), *Leverage* (0.036), *ROA* (−0.019), *MTB* (−0.001), and *Accruals* (0.032). Unlike in the correlation analysis, *ROA* has a negative effect on FRC, and *Loss* and *Litigious* variables are no longer significantly associated with FRC.

Taken together, the results in Table 3 document that FRC is positively associated with firm size, number of business and geographic segments, foreign operations, restructuring charges, business acquisitions, total accruals, having a "big" auditor, and firm age. Also, FRC is negatively associated with earnings volatility.

5.2. FRC and board accounting expertise

We start our analysis of the relation between FRC and accounting expertise using the accounting expertise of the board members as a proxy for a firm's overall expertise. We first examine the differences in board size (*BoardSize*), the number of accounting experts on the board (*BoardNumAcc*), and the fraction of accounting experts on the board (*BoardRatioAcc*) across three groups of firm-year observations: low, medium, and high complexity groups that correspond to the first, second, and third tercile of our *Complexity* variable, respectively. The results are reported in Panel A of Table 4. For all three variables, we observe monotonic increases from the low to medium and then from the medium to high FRC group. The mean values of *BoardSize* are 7.54, 8.62, and 10.13, respectively. Similarly, the mean values of *BoardNumAcc* change from 3.6 to 4.52 to 5.96, and the mean values of *BoardRatioAcc* change from 48% to 52% to 58%. These changes across the groups are economically meaningful: the average board for high FRC firms is 34% (=2.59/7.54) larger than that of low FRC firms. Similarly, the number and fraction of accounting experts on the board of directors increases by 65% and 23%, respectively, as FRC changes from low to high. The mean differences in *BoardSize, BoardNumAcc*, and *BoardRatioAcc* variables between high and low groups are also statistically significant.

The results of the analysis in Panel A are also supported by the correlation analysis in Panel B of this table. The correlation coefficients between FRC and *BoardSize, BoardNumAcc*, and *BoardRatioAcc* are statistically significant ($p < 0.01$) and equal to 0.44, 0.42, and 0.23, respectively. Overall, our univariate analyses suggest a strong association between FRC and the board of directors' size and accounting expertise.

Table 5, Panel A presents results of estimating conditional regression models as in Eq. (2) with our measures of the board's accounting expertise. Models with *BoardSize* and *BoardNumAcc* as dependent variables (Columns (1) and (2), respectively) are estimated using Poisson regressions since these variables represent counts, and the model with *BoardRatioAcc* (Column (3)) is estimated using a generalized linear model (GLM) and a binomial distribution since this variable is a fraction. Consistent with the univariate analysis above, we find that, conditional on firm characteristics, *Complexity* is positively associated with *BoardSize* (coef.=0.098, *t*-stat = 9.204), *BoardNumAcc* (coef. = 0.059, *t*-stat = 3.336), and *BoardRatioAcc* (coef. = 0.124, *t*-stat = 3.144).

To shed light on the implications of FRC on board accounting expertise, we compare the incremental effect of a one standard deviation increase in *Complexity* to a one standard deviation increase in *Size* (the most significant predictor of board size and expertise). For instance, a one standard deviation increase in *Complexity* (*Size*) is associated with a 1.05 (1.22) relative increase in *BoardRatioAcc*. That is, the effect of *Complexity* on *BoardRatioAcc* is equivalent to approximately 86% (=1.05/1.22) of the effect of *Size* on *BoardRatioAcc*. Similarly, the effects of *Complexity* on *BoardSize* and *BoardNumAcc* are equivalent to 92% and 79% of the effects of *Size* on these variables.[12][13]

We next compare results when using our FRC measure to results when using alternative measures of FRC commonly used in the

[12] Although the dependent variable in most of our regressions is dichotomous, we estimate linear probability models (i.e., OLS) instead of logistic regression to simplify interpretation of the results. Our inferences do not change when we use logistic regression.

[13] We also employ propensity score matching to further isolate the effect of FRC on accounting expertise and financial reporting. Our matching analyses aim to reduce the influence of correlated firm characteristics (such as business complexity, size, profitability, etc.) on the estimated relations between the FRC, accounting expertise variables, and financial reporting outcomes, and our results are consistent with those reported above.

Table 3
Determinants of financial reporting complexity.

Panel A:*financial reporting complexity and firm characteristics. Correlation matrix.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) *Complexity*	1.00							
(2) *NumBus*	0.12***	1.00						
(3) *NumGeo*	0.33***	0.11***	1.00					
(4) *Size*	0.57***	0.17***	0.30***	1.00				
(5) *Leverage*	0.01	−0.02**	−0.09***	0.02**	1.00			
(6) *ROA*	0.15***	0.06***	0.13***	0.29***	−0.22***	1.00		
(7) *MTB*	−0.09***	−0.04***	−0.08***	−0.15***	0.45***	−0.55***	1.00	
(8) *Accruals*	0.10***	0.04***	0.07***	0.15***	−0.38***	0.51***	−0.21***	1.00
(9) *EarnVol*	−0.14***	−0.05***	−0.10***	−0.22***	0.52***	−0.48***	0.53***	−0.61***
(10) *Foreign*	0.23***	0.00	0.40***	0.12***	−0.05***	0.06***	−0.03***	0.04***
(11) *Loss*	−0.26***	−0.15***	−0.18***	−0.50***	0.04***	−0.22***	0.05***	−0.13***
(12) *Restructure*	0.30***	0.07***	0.26***	0.26***	−0.01	0.05***	−0.06***	0.02**
(13) *Acquisition*	0.32***	0.13***	0.20***	0.35***	0.04***	0.10***	−0.05***	0.05***
(14) *Litigious*	−0.04***	−0.12***	−0.08***	−0.20***	−0.07***	−0.11***	0.06***	−0.03***
(15) *BigAuditor*	0.37***	0.05***	0.17***	0.50***	0.00	0.11***	−0.05***	0.09***
(16) *FirmAge*	0.31***	0.19***	0.19***	0.42***	−0.04***	0.19***	−0.12***	0.07***

*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(9) *EarnVol*	1.00						
(10) *Foreign*	−0.05***	1.00					
(11) *Loss*	0.12***	−0.05***	1.00				
(12) *Restructure*	−0.05***	0.18***	0.00	1.00			
(13) *Acquisition*	−0.08***	0.10***	−0.22***	0.21***	1.00		
(14) *Litigious*	0.06***	−0.05***	0.17***	−0.03***	−0.08***	1.00	
(15) *BigAuditor*	−0.10***	0.10***	−0.21***	0.19***	0.20***	−0.02*	1.00
(16) *FirmAge*	−0.12***	0.03***	−0.30***	0.17***	0.09***	−0.17***	0.12***

*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel B:*financial reporting complexity and firm characteristics. Regression model.*

	Complexity
NumBus	0.019**
	(2.235)
NumGeo	0.045***
	(6.382)
Size	0.095***
	(33.541)
Leverage	0.036***
	(3.002)
ROA	−0.019***
	(−3.324)
MTB	−0.001**
	(−2.272)
Accruals	0.032***
	(3.053)
EarnVol	−0.011*
	(−1.842)
Foreign	0.064***
	(7.277)
Loss	0.009
	(1.024)
Restructure	0.067***
	(8.236)
Acquisition	0.070***
	(9.146)
Litigious	−0.020
	(−1.420)
BigAuditor	0.044***
	(4.412)
FirmAge	0.078***
	(10.232)
Industry fixed effects	Yes

(*continued on next page*)

Table 3 (*continued*)

Panel B:*financial reporting complexity and firm characteristics. Regression model.*	*Complexity*
Year fixed effects	Yes
Observations	9383
Adjusted R^2	0.545

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ This table shows the results of financial reporting complexity (*Complexity*) and firm characteristics association analysis. Panel A reports Pearson correlations between financial reporting complexity and firm characteristics. Panel B shows the results of an OLS regression that relates financial reporting complexity to firm characteristics. All variables are defined in Appendix B. Industry and year fixed effects are included in the regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level.

Table 4
Accounting expertise, financial reporting outcomes, and financial reporting complexity. Univariate analyses.

Panel A:*mean values of accounting expertise and financial reporting outcome variables by complexity terciles.*

	Low Complexity	*Medium Complexity*	*High Complexity*	*High vs. Low complexity*	
				Difference	*t-stat.*
BoardSize	7.54	8.62	10.13	2.59***	45.58
BoardNumAcc	3.60	4.52	5.96	2.35***	43.49
BoardRatioAcc	0.48	0.52	0.58	0.11***	22.10
ACSize	4.15	4.43	5.12	0.97***	20.42
ACNumAcc	2.41	2.88	3.66	1.24***	28.51
ACRatioAcc	0.58	0.65	0.72	0.13***	20.63
ICW	0.02	0.04	0.03	0.01***	2.68
Restatement	0.04	0.06	0.08	0.04***	7.05
SEC_CL	0.34	0.42	0.52	0.18***	14.98
Observations	3128	3128	3127	6255	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel B:*accounting expertise, financial reporting outcomes, and financial reporting complexity. Correlation matrix.*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) *Complexity*	1.00								
(2) *BoardSize*	0.44***	1.00							
(3) *BoardNumAcc*	0.42***	0.71***	1.00						
(4) *BoardRatioAcc*	0.23***	0.19***	0.80***	1.00					
(5) *ACSize*	0.23***	0.44***	0.36***	0.13***	1.00				
(6) *ACNumAcc*	0.31***	0.45***	0.66***	0.55***	0.74***	1.00			
(7) *ACRatioAcc*	0.21***	0.21***	0.59***	0.71***	0.04***	0.66***	1.00		
(8) *ICW*	0.01	−0.01	−0.01	0.01	−0.00	0.01	0.01	1.00	
(9) *Restatement*	0.08***	0.04***	0.05***	0.03***	0.06***	0.07***	0.03***	0.08***	1.00
(10) *SEC_CL*	0.16***	0.15***	0.12***	0.06***	0.06***	0.08***	0.06***	0.03**	0.05***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. This table shows the results of univariate analysis of relations between financial reporting complexity, accounting expertise, and financial reporting outcomes variables. Panel A reports the mean values of the variables of interest tabulated by terciles of financial reporting complexity variable (*Complexity*). *Low, Medium*, and *High Complexity* indicate observations in the first, second, and third terciles of *Complexity* variable, respectively. Statistical significance of the differences in variable means between high and low complexity observation groups is estimated using a *t*-test. Panel B reports Pearson correlations between these variables. All variables are defined in Appendix B.

literature: annual report length and the Fog readability index.[14] Although we expect a positive relation between these measures of FRC and firms' accounting expertise, such findings are subject to the following caveat. Namely, these two measures are based on the annual report text and, compared to our measure of FRC, are more subject to transitory events (e.g., change in sales and M&A) and managerial discretion.[15] As such, 10-K length and readability might not be well-suited to examine firms' acquisition of accounting expertise as a response to relatively permanent changes in FRC. The results of this analysis are presented in Table 5, Panels B and C. Consistent with our main results, we find that 10-K length and readability are positively associated with *BoardSize* and *BoardRatioAcc* (Columns (1) and (3)). These findings provide additional evidence that FRC is not entirely subject to managerial discretion, and that

[14] Bonsall et al. (2017) propose an alternative measure of readability that captures the plain English attributes of disclosures, the Bog index. The inferences from our results do not change, if we calculate 10-K readability using the Bog index instead of the Fog index. We tabulate results with the Fog index readability since it is employed in the studies most relevant to ours (namely, Bushee et al., 2018; Guay et al., 2016; Li, 2008; Lo et al., 2017).

[15] The levels of correlation between our FRC measure and 10-K length and readability are less than 30%.

Table 5
Financial reporting complexity and board accounting expertise.

Panel A:*accounting standards-based measure of financial reporting complexity.*

	(1) *BoardSize*	(2) *BoardNumAcc*	(3) *BoardRatioAcc*
Complexity	0.098***	0.059***	0.124***
	(9.204)	(3.336)	(3.144)
BoardSize		0.103***	0.002
		(34.520)	(0.306)
NumBus	−0.006	−0.002	0.006
	(−0.797)	(−0.224)	(0.246)
NumGeo	−0.019***	−0.038***	−0.083***
	(−2.908)	(−3.412)	(−3.261)
Size	0.051***	0.039***	0.081***
	(17.515)	(7.822)	(7.362)
Leverage	0.001	0.000	0.008
	(0.147)	(0.007)	(0.339)
ROA	−0.027***	−0.021***	−0.031**
	(−5.582)	(−3.480)	(−2.391)
MTB	−0.001***	−0.001	0.000
	(−5.554)	(−1.196)	(0.239)
Accruals	0.022**	0.069***	0.112***
	(2.137)	(3.610)	(3.164)
EarnVol	0.002	0.022**	0.047**
	(0.428)	(2.350)	(2.504)
Foreign	−0.013	0.008	0.024
	(−1.622)	(0.579)	(0.792)
Loss	0.034***	0.043***	0.094***
	(4.480)	(3.341)	(3.321)
Restructure	0.041***	0.059***	0.144***
	(5.975)	(5.109)	(5.557)
Acquisition	−0.013*	0.024**	0.029
		(−1.957)	(2.244) (1.197)
Litigious	−0.001	0.004	0.037
	(−0.079)	(0.189)	(0.750)
BigAuditor	0.091***	0.163***	0.249***
	(8.343)	(8.395)	(6.701)
FirmAge	0.044***	−0.026**	−0.049**
	(6.213)	(−2.302)	(−1.965)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	9383	9383	9383
R^2	0.063	0.145	0.026

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

This panel shows the estimated coefficients from regressions of board of directors size (*BoardSize*), number of accounting experts on the board (*BoardNumAcc*), and ratio of accounting experts on the board (*BoardRatioAcc*) on financial reporting complexity (*Complexity*). All variables are defined in Appendix B. Regressions in Columns (1) and (2) are estimated using Poisson regression, and the regression in Columns (3) is estimated using generalized linear model (GLM) with binomial distribution and logit link function. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using McFadden pseudo R^2 statistics.

Panel B*: 10-K length as a measure of financial reporting complexity.*

	(1) *BoardSize*	(2) *BoardSize*	(3) *BoardRatioAcc*	(4) *BoardRatioAcc*
10KLength	0.040***	0.028**	0.083**	0.070*
	(3.295)	(2.380)	(2.136)	(1.794)
Complexity		0.092***		0.111***
		(8.565)		(2.804)
BoardSize			0.004	0.002
			(0.491)	(0.235)
Controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 5 (*continued*)

Panel A:*accounting standards-based measure of financial reporting complexity.*

	(1) *BoardSize*	(2) *BoardNumAcc*	(3) *BoardRatioAcc*	
Year fixed effects	Yes	Yes	Yes	Yes
Observations	9383	9383	9383	9383
R^2	0.062	0.063	0.025	0.026
t statistics in parentheses				
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$				

Panel C:*10-K readability as a measure of financial reporting complexity.*

	(1) *BoardSize*	(2) *BoardSize*	(3) *BoardRatioAcc*	(4) *BoardRatioAcc*
Fog	0.004***	0.003**	0.014***	0.013***
	(2.584)	(2.101)	(2.759)	(2.596)
Complexity		0.096***		0.117***
		(9.079)		(2.976)
BoardSize			0.004	0.002
			(0.524)	(0.236)
Controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	9383	9383	9383	9,381
R^2	0.062	0.063	0.026	0.026

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These panels show the estimated coefficients from regressions of board of directors size (*BoardSize*) and ratio of accounting experts on the board (*BoardRatioAcc*) on 10-K word length (*10KLength*, Panel B) and 10-K readability measured using Gunning Fog index (*Fog*, Panel C). Columns (2) and (4) include accounting standards-based financial reporting complexity measure introduced in this paper (*Complexity*). All variables are defined in Appendix B. Regressions in Columns (1) and (2) are estimated using Poisson regression, and regressions in Columns (3) and (4) are estimated using generalized linear model (GLM) with binomial distribution and logit link function. Industry and year fixed effects are included in each regression but not reported. Regressions in Panels B and C include the same control variables as in Panel A, but their estimated coefficients are not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using McFadden pseudo R^2 statistics.

firms seek to manage FRC.[16] We also include our measure of FRC together with 10-K length/readability measures (Columns (2) and (4)), and find that our measure explains variation in boards' accounting expertise over and above the traditional measures of annual report length and readability.

Although we continue to find a positive relation between FRC and accounting expertise when 10-K length and readability measures are used instead of our FRC measure, we do not employ these measures to study the relations between FRC, accounting expertise, and reporting outcomes. The reason is that the complexity of text in financial reports is likely to be simultaneously determined with the reporting outcomes. For example, a disclosure of material weakness may result in a more lengthy and less readable 10-K report. Hence, we cannot rule out the possibility of a reverse causality in such analysis when 10-K text complexity measures are used. On the other hand, our FRC measure reflects the complexity of applicable accounting standards, and, as such, is not subject to the reverse causality issue.

Finally, Li (2008) and Lo et al. (2017) argue that a manager may leverage complexity and use it as a smokescreen for earnings management and misreporting. In this case, the manager prefers a board that is less capable of seeing through complex financial reporting. If a board is captured, there is a greater possibility of management having some control over board composition. We repeat similar regression analysis (untabulated) on a subsample of observations where CEOs are also chairs of the boards of directors to test whether the above documented positive association between FRC and board accounting expertise holds. The results do not change. Overall, we document statistically and economically significant associations between a firm's level of FRC and its board size and accounting expertise, suggesting that firms attempt to FRC by enhancing their accounting expertise.

5.3. FRC and audit committee accounting expertise

In addition to examining how FRC is related to the accounting expertise on the board of directors, we also study how it is associated with the accounting expertise on the audit committee, whose members arguably are more directly involved with reporting. We first examine the univariate associations between our *Complexity* variable and the audit committee size (*ACSize*), the number of accounting experts (*ACNumAcc*), and the fraction of accounting experts (*ACRatioAcc*) on the audit committee.

Panel A of Table 4 reports the mean values of *ACSize, ACNumAcc*, and *ACRatioAcc* for observations in the low, medium, and high FRC groups. As with the board of directors characteristics, we observe a monotonic increase in all three audit committee variables as the level of FRC change from low to high. Specifically, the mean values of *ACSize* increase from 4.15 to 4.43 to 5.12. Similarly, the

[16] In untabulated analysis, we also find positive associations between 10-K length, readability, and *BoardNumAcc*.

Table 6
Financial reporting complexity and audit committee accounting expertise.

Panel A:*accounting standards-based measure of financial reporting complexity.*

	(1) *ACSize*	(2) *ACNumAcc*	(3) *ACRatioAcc*
Complexity	0.116***	0.055***	0.185***
	(6.348)	(2.816)	(3.141)
ACSize		0.158***	−0.013
		(46.033)	(−1.314)
NumBus	−0.006	−0.002	0.023
	(−0.465)	(−0.172)	(0.571)
NumGeo	−0.002	−0.031**	−0.111***
	(−0.157)	(−2.481)	(−3.051)
Size	0.022***	0.043***	0.129***
	(5.049)	(8.563)	(8.698)
Leverage	−0.009	−0.002	−0.000
	(−0.571)	(−0.126)	(−0.002)
ROA	−0.022***	−0.027***	−0.076***
	(−3.170)	(−4.885)	(−3.362)
MTB	−0.001**	−0.001	−0.000
	(−2.117)	(−1.280)	(−0.192)
Accruals	0.010	0.068***	0.153***
	(0.677)	(3.822)	(3.138)
EarnVol	0.006	0.021***	0.052**
	(0.722)	(2.623)	(2.069)
Foreign	−0.031**	0.030**	0.080*
	(−2.265)	(2.000)	(1.782)
Loss	0.073***	0.043***	0.193***
	(5.331)	(2.994)	(4.481)
Restructure	0.052***	0.054***	0.176***
	(4.342)	(4.428)	(4.538)
Acquisition	−0.023**	0.003	−0.002
	(−2.073)	(0.270)	(−0.052)
Litigious	−0.055**	0.020	0.119
	(−2.551)	(0.853)	(1.586)
BigAuditor	0.046***	0.162***	0.378***
	(2.923)	(7.570)	(6.992)
FirmAge	0.106***	−0.049***	−0.183***
	(9.372)	(−3.944)	(−4.879)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	9383	9383	9383
R^2	0.033	0.138	0.044

t statistics in parentheses
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
This panel shows the estimated coefficients from regressions of audit committee size (*ACSize*), number of accounting experts on the committee (*ACNumAcc*), and ratio of accounting experts on the committee (*ACRatioAcc*) on financial reporting complexity (*Complexity*). All variables are defined in Appendix B. Regressions in Columns (1) and (2) are estimated using Poisson regression, and the regression in Columns (3) is estimated using generalized linear model (GLM) with binomial distribution and logit link function. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using McFadden pseudo R^2 statistics.

Panel B*: 10-K length as a measure of financial reporting complexity.*

	(1) *ACSize*	(2) *ACSize*	(3) *ACRatioAcc*	(4) *ACRatioAcc*
10KLength	0.005	−0.009	0.207***	0.188***
	(0.295)	(−0.532)	(3.767)	(3.419)
Complexity		0.118***		0.147**
		(6.433)		(2.500)
ACSize			−0.010	−0.013
			(−1.071)	(−1.299)
Controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

(*continued on next page*)

Table 6 (*continued*)

Panel A:*accounting standards-based measure of financial reporting complexity.*

	(1) *ACSize*	(2) *ACNumAcc*	(3) *ACRatioAcc*	
Observations	9383	9383	9383	9383
R^2	0.032	0.033	0.045	0.045
t statistics in parentheses				
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.				

Panel C:*10-K Readability as a Measure of Financial Reporting Complexity.*

	(1) *ACSize*	(2) *ACSize*	(3) *ACRatioAcc*	(4) *ACRatioAcc*
Fog	0.000	−0.001	0.020***	0.019**
	(0.175)	(−0.280)	(2.677)	(2.504)
Complexity		0.116***		0.174***
		(6.389)		(2.960)
ACSize			−0.010	−0.013
			(−1.024)	(−1.300)
Controls	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	9381	9381	9381	9381
R^2	0.032	0.033	0.044	0.045

t statistics in parentheses *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These panels show the estimated coefficients from regressions of audit committee size (*ACSize*) and ratio of accounting experts on the committee (*ACRatioAcc*) on 10-K word length (*10KLength*, Panel B) and 10-K readability measured using Gunning Fog index (*Fog*, Panel C). Columns (2) and (4) include accounting standards-based financial reporting complexity measure introduced in this paper (*Complexity*). All variables are defined in Appendix B. Regressions in Columns (1) and (2) are estimated using Poisson regression, and regressions in Columns (3) and (4) are estimated using generalized linear model (GLM) with binomial distribution and logit link function. Industry and year fixed effects are included in each regression but not reported. Regressions in Panels B and C include the same control variables as in Panel A, but their estimated coefficients are note reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using McFadden pseudo R^2 statistics.

mean values of *ACNumAcc* and *ACRatioAcc* increase from 2.41 to 2.88 to 3.66 and from 0.58 to 0.65 to 0.72, respectively. The mean differences in these audit committee characteristics between high and low FRC groups are significant both statistically and economically: *ACSize, ACNumAcc*, and *ACRatioAcc* increase on average by 23% (=0.97/4.15), 52% (=1.24/2.41), and 22% (=0.13/0.58), respectively. Panel B of Table 4 reports correlation statistics between FRC and audit committee size and accounting expertise. The correlation estimates indicate significant and positive associations between *Complexity* and *ACSize, ACNumAcc*, and *ACRatioAcc*.

We estimate conditional regression models, as in Eq. (2), with *ACSize, ACNumAcc*, and *ACRatioAcc* as dependent variables and *Complexity* as an independent variable. The results are presented in Panel A of Table 6. We find positive and statistically significant associations between FRC and all three audit committee variables with the following coefficients: 0.116 for *ACSize* (*t*-stat = 6.348), 0.055 for *ACNumAcc* (*t*-stat = 2.816), and 0.185 for *ACRatioAcc* (*t*-stat = 3.141). To interpret the economic meanings of these relations, we compare the effects of one standard deviation increase in *Complexity* on *ACSize, ACNumAcc*, and *ACRatioAcc* to the corresponding effects of one standard deviation increase in firm size variable (the most significant predictor of audit committee expertise) on these variables (similarly as in the board analysis above). We find that the effects of *Complexity* on *ACSize, ACNumAcc*, and *ACRatioAcc* are roughly equivalent to 99%, 92%, and 79% of the effects that *Size* has on these variables.

We repeat our analysis with 10-K length and readability as alternative FRC measures with results reported in Panels B and C of Table 6. We find that both 10-K length and readability are positively related to the number of accounting experts on the audit committee (*ACRatioAcc*, see Column (3)), but not related to audit committee size (*ACSize*, see Column (1)).[17] We also document that our measure of FRC complements both the 10-K length and readability measures when explaining variation in audit committee accounting expertise (Columns (2) and (4)). In summary, we find that FRC is positively associated with audit committee accounting expertise, consistent with firms seeking to manage high FRC by increasing their levels of accounting expertise.

5.4. FRC, accounting expertise, and internal control weaknesses

We next examine whether FRC and accounting expertise have interactive effects on the incidence of negative financial reporting outcomes, starting with internal control weaknesses (ICW). As discussed previously, we expect that FRC is positively associated with ICW, and high levels of accounting expertise mitigate this negative effect. The univariate analyses in Panels A and B of Table 4 do not show consistent evidence on this matter. Although there is a statistically and economically significant difference of 0.01 in the

[17] In untabulated analysis, we also find positive associations between 10-K length, readability, and *ACNumAcc*.

Table 7
Finacial reporting complexity, accounting expertise, and control weaknesses.

	(1) *ICW*	(2) *ICW*	(3) *ICW*
Complexity	0.015**	0.032***	0.029***
	(2.043)	(3.495)	(3.241)
HighBoardRatioAcc		0.005	
		(1.021)	
Compl × HighBoardRatioAcc		−0.033***	
		(−3.092)	
HighACRatioAcc			−0.004
			(−0.785)
Compl × HighACRatioAcc			−0.028***
			(-2.646)
MarketCap	0.016***	0.014***	0.015***
	(4.313)	(3.700)	(3.836)
FirmAge	−0.005	−0.005	−0.006
	(−1.346)	(−1.409)	(−1.483)
Loss	0.015**	0.016**	0.017***
	(2.531)	(2.539)	(2.649)
BankruptcyRisk	0.015***	0.014***	0.014***
	(4.751)	(4.543)	(4.539)
NumBus	0.001	−0.000	−0.000
	(0.198)	(−0.002)	(−0.016)
NumGeo	0.001	0.002	0.002
	(0.275)	(0.522)	(0.517)
Foreign	0.002	0.003	0.003
	(0.337)	(0.525)	(0.582)
Acquisition	0.014***	0.012**	0.012**
	(2.770)	(2.286)	(2.324)
Growth	−0.007***	−0.007***	−0.007***
	(−2.983)	(−2.798)	(−2.865)
RestructCharge	−0.157	−0.103	−0.119
	(−1.264)	(−0.795)	(−0.920)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	8188	8188	8188
R^2	0.009	0.017	0.016

t statistics in parentheses $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. This table shows the estimated coefficients from OLS regressions of internal control weakness disclosure (*ICW*) on financial reporting complexity (*Complexity*), board of directors and audit committee accounting expertise (*HighBoardRatioAcc* and *HighACRatioAcc*, respectively), and their interactions (*Compl × HighBoardRatioAcc* and *Compl × HighACRatioAcc*). *HighBoardRatioAcc* and *HighACRatioAcc* are dummy variables indicating third tercile of ratio of accounting experts on board of directors (*BoardRatioAcc*) and audit committee (*ACRatioAcc*). Control variables are adapted from Doyle et al. (2007b) and Doyle et al. (2007a). All variables are defined in Appendix B. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using adjusted R^2 statistics.

likelihood of ICW between observations in high and low complexity groups (Panel A), we find no statistically significant correlation between *ICW* and *Complexity* variables (Panel B).

Table 7shows the results of conditional regression analysis as specified in Eq. (3). In Column (1), *ICW* is regressed on *Complexity* and firm characteristics. In Column (2), we add an indicator variable for high accounting expertise on the board (*HighBoardRatioAcc*, that indicates the third tercile of *BoardRatioAcc* variable), and an interaction term between *Complexity* and *HighBoardRatioAcc* (*Compl × HighBoardRatioAcc*). The model in Column (3) is similar to the one in Column (2), except that *HighBoardRatioAcc* is replaced with an indicator variable for high accounting expertise on the audit committee, *HighACRatioAcc*.[18]

In all Columns (1)–(3), we find statistically significant and positive associations between *ICW* and *Complexity*. These associations are also economically significant. The results in Column (1) imply that a one standard deviation increase in *Complexity* increases the overall likelihood of having an ICW disclosure by 0.006 (= 0.015 × 0.39), a change of about 20% in the ICW variable mean (0.03). An alternative economic interpretation, derived from a similar logit model is that, conditional on other firm characteristics, one standard deviation increase in *Complexity* increases the odds of ICW disclosure by 30.88%.

The results in Columns (2) and (3) indicate significant interaction effects between the level of FRC and the presence of high accounting expertise on the board of directors and audit committee. Specifically, the regression coefficients for *Compl × HighBoardRatioAcc* and *Compl × HighACRatioAcc* are negative and statistically significant. This means that the presence of high

[18] We estimate all models as OLS regression models (as opposed to logistic/probit models) in order to better interpret interaction effects. The results are qualitatively similar if logistic regression models are used instead.

Table 8
Finacial reporting complexity, accounting expertise, and restatements.

	(1) *Restatement*	(2) *Restatement*	(3) *Restatement*
Complexity	0.051***	0.050***	0.047***
	(4.531)	(4.302)	(4.103)
HighBoardRatioAcc		−0.001	
		(−0.082)	
Compl × HighBoardRatioAcc		0.002	
		(0.105)	
HighACRatioAcc			0.006
			(0.829)
Compl × HighACRatioAcc			0.010
			(0.543)
MarketCap	0.008	0.008	0.008
	(1.497)	(1.507)	(1.448)
FirmAge	−0.008	−0.008	−0.008
	(−1.454)	(−1.452)	(−1.404)
Loss	0.021***	0.021***	0.021***
	(2.701)	(2.724)	(2.657)
BankruptcyRisk	0.005	0.005	0.005
	(1.048)	(1.048)	(1.053)
NumBus	−0.001	−0.001	−0.001
	(−0.161)	(−0.163)	(−0.173)
NumGeo	−0.005	−0.005	−0.005
	(−0.842)	(−0.843)	(−0.850)
Foreign	−0.008	−0.008	−0.008
	(−1.040)	(−1.038)	(−1.068)
Acquisition	0.018**	0.018**	0.018**
	(2.502)	(2.503)	(2.505)
Growth	0.002	0.002	0.002
	(0.486)	(0.484)	(0.510)
RestructCharge	−0.155	−0.156	−0.145
	(−1.121)	(−1.118)	(−1.039)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	8181	8181	8181
R^2	0.043	0.042	0.042

t statistics in parentheses *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. This table shows the estimated coefficients from OLS regressions of restatement events (*Restatement*) on financial reporting complexity (*Complexity*), board of directors and audit committee accounting expertise (*HighBoardRatioAcc* and *HighACRatioAcc*, respectively), and their interactions (*Compl × HighBoardRatioAcc* and *Compl × HighACRatioAcc*). *HighBoardRatioAcc* and *HighACRatioAcc* are dummy variables indicating third tercile of ratio of accounting experts on board of directors (*BoardRatioAcc*) and audit committee (*ACRatioAcc*). Control variables are adapted from Doyle et al. (2007b) and Doyle et al. (2007a). All variables are defined in Appendix B. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using adjusted R^2 statistics.

expertise on the board and audit committee mitigates the positive association between FRC and the likelihood of ICW.[19] Moreover, we document that high accounting expertise in a firm *completely negates* this effect of FRC: in Columns (2) and (3), the absolute values of estimated coefficients for *Compl × HighBoardRatioAcc* and *Compl × HighACRatioAcc* are similar in size to the respective coefficients for *Complexity*. Overall, our findings suggest that firm's investment in accounting expertise helps to mitigate the effect of FRC on ICW (i.e., expertise decreases the incidence of ICWs for complex firms).

5.5. FRC, accounting expertise, and restatements

To further explore the relation between FRC, firms' accounting expertise, and financial reporting outcomes, we conduct an analysis similar to the one above, this time focusing on financial restatements. The univariate results in Panels A and B of Table 4 indicate a positive association between *Restatement* and *Complexity* variables. The incidence of restatements doubles from 4% for the observations in the low complexity group to 8% for the observations in the high complexity group (Panel A), and this difference is statistically significant. The correlation between these two variables is also positive at 0.08 and statistically significant. Interestingly, the correlations between *Restatement* and *BoardRatioAcc* and *ACRatioAcc* are also positive and statisticaly significant. The *Complexity* variable is positively correlated with all these three variables. These pairwise correlations demonstrate the limitation of unconditional univariate tests.

[19] This finding is consistent with Hoitash and Hoitash (2018) that show that accounting expertise on the audit committee mitigates the relation between reporting complexity and material weaknesses.

Table 9
Finacial reporting complexity, accounting expertise, and SEC comment letters.

	(1) *SEC_CL*	(2) *SEC_CL*	(3) *SEC_CL*
Complexity	0.071**	0.106***	0.105***
	(2.402)	(3.275)	(3.352)
HighBoardRatioAcc		−0.044**	
		(−2.119)	
Compl × HighBoardRatioAcc		−0.104**	
		(−2.371)	
HighACRatioAcc			−0.047**
			(−2.460)
Compl × HighACRatioAcc			−0.112**
			(−2.468)
Restatement	0.057**	0.058**	0.059**
	(2.087)	(2.161)	(2.196)
ICW	0.121***	0.120***	0.120***
	(3.732)	(3.711)	(3.673)
MarketCap	0.076***	0.081***	0.081***
	(4.491)	(4.785)	(4.821)
Growth	0.024*	0.024*	0.022*
	(1.866)	(1.812)	(1.690)
BankruptcyRisk	−0.002	−0.000	0.000
	(−0.138)	(−0.010)	(0.007)
ExtFinancing	0.158***	0.157***	0.158***
	(3.836)	(3.812)	(3.808)
NumBus	0.010	0.011	0.011
	(0.574)	(0.633)	(0.649)
BigAuditor	−0.053*	−0.057*	−0.055*
	(−1.818)	(−1.947)	(−1.903)
SndTierAuditor	−0.092**	−0.093**	−0.095**
	(−2.138)	(−2.166)	(−2.203)
FirmAge	−0.044**	−0.045***	−0.046***
	(−2.565)	(−2.663)	(−2.714)
Loss	0.089***	0.093***	0.093***
	(4.209)	(4.399)	(4.408)
Restructure	0.012	0.019	0.018
	(0.671)	(1.047)	(0.992)
Acquisition	0.011	0.012	0.011
	(0.608)	(0.632)	(0.595)
Litigious	0.073**	0.072**	0.070**
	(2.268)	(2.242)	(2.182)
CEOChairman	0.005	0.005	0.007
	(0.165)	(0.160)	(0.249)
CEOTenure	−0.009	−0.010	−0.010
	(−0.952)	(−0.996)	(−1.079)
CFOTenure	−0.033**	−0.034**	−0.034**
	(−2.416)	(−2.471)	(−2.471)
BoardRatioIndep	−0.061	−0.039	−0.045
	(−0.822)	(−0.527)	(−0.606)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	3863	3863	3863
R^2	0.164	0.168	0.167

t statistics in parentheses *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. This table shows the estimated coefficients from OLS regressions of firm receiving an SEC comment letter (*SEC_CL*) on financial reporting complexity (*Complexity*), board of directors and audit committee accounting expertise (*HighBoardRatioAcc* and *HighACRatioAcc*, respectively), and their interactions (*Compl × HighBoardRatioAcc* and *Compl × HighACRatioAcc*). *HighBoardRatioAcc* and *HighACRatioAcc* are dummy variables indicating third tercile of ratio of accounting experts on board of directors (*BoardRatioAcc*) and audit committee (*ACRatioAcc*). Control variables and sample selection methodology are adapted from Cassell et al. (2013). All variables are defined in Appendix B. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using adjusted R^2 statistics.

Table 8reports the results of regression analysis as specified in Eq. (3). We find a positive relationship between FRC and restatements in Column (1). Unlike for ICW disclosures, we do not find evidence supporting the mitigating effect of high accounting expertise on this relationship. The estimated coefficients for *Compl* × *HighBoardRatioAcc* (0.002, *t*-stat = 0.105) and *Compl* × *HighACRatioAcc* (0.010, *t*-stat = 0.543) have positive signs and are not statistically significant at conventional levels.

It is possible that our results may be driven by data limitations. Since a restatement is often not issued immediately after a fiscal year and our sample period comprises of four fiscal years, our data may not reflect "true" restatement rates. To mitigate this concern, we repeat the analysis with a restatement indicator, *Restatement*, defined as one if the firm issued a restatement related to either the current year or one of the two previous years (i.e, we include two previous years in our restatement period window). Since FRC is "sticky", this variable definition may better reflect the propensity of a firm to restate. Nevertheless, similar to our main analysis, we find no evidence suggesting that high accounting expertise on the board of directors and audit committee mitigates the positive relation between FRC and restatements.

5.6. FRC, accounting expertise, and SEC comment letters

Finally, we examine the relation between FRC, firms' accounting expertise, and the probability of receiving an SEC comment letter. Our univariate analyses in Panels A and B of Table 4 indicate a positive association between the probability of receiving a comment letter (*SEC_CL*) and FRC (*Complexity*). Firms with high FRC scores have, on average, a 52% chance to receive a comment letter as opposed to a 34% chance for firms with low FRC scores (Panel A). We also find a positive and significant correlation between *SEC_CL* and *Complexity*. The effect of firm's accounting expertise on the likelihood of receiving a comment letter is not evident from the univariate analysis, since the both expertise variables, *BoardRatioAcc* and *ACRatioAcc*, and *SEC_CL* variable are positively associated with *Complexity* and, consequently, with each other.

Table 9 reports the estimation results of regression models as specified in Eq. (4). We find positive and statistically significant associations between *SEC_CL* and *Complexity* in Columns (1) to (3). The association in Column (1) can be interpreted as follows. A one standard deviation increase in FRC increases the probability of receiving an SEC comment letter by 0.028 (= 0.071 × 0.39) that is around 6.4% of the *SEC_CL* mean.[20] We also find negative and statistically significant associations between *SEC_CL* and interactions between FRC and firm's accounting expertise. The values of these coefficients are comparable to the values of coefficients for *Complexity* in the corresponding regression models. Overall, we document that FRC is positively associated with the likelihood of receiving an SEC comment letter, and that a high level of accounting expertise in a firm *completely eliminates* this association.

6. Additional analyses and robustness tests

6.1. Analysis of temporal changes in firms' FRC

The positive association between FRC and accounting expertise that we document above might be driven by (a) unobservable endogenous firm characteristics not captured by our regression models, or (b) reverse causality (although this second possibility is less plausible: it implies that an increase in firm's accounting expertise causes an increase in FRC). In order to mitigate these concerns, we regress temporal changes in firms' accounting expertise on temporal changes in FRC. To conduct this changes analysis, for each firm in our sample that has required data, we calculate the difference in FRC, accounting expertise, and related variables between the years of 2014 and 2011.[21] Table 10 shows results with changes in the board size (*ΔBoardSize*), audit committee size (*ΔACSize*), and ratio of accounting experts on the board of directors (*ΔBoardRatioAcc*) and audit committee (*ΔACRatioAcc*) regressed on changes in FRC (*Complexity*) and control variables.[22] We find positive and statistically significant associations between these dependent variables and our FRC measure. Taken together with our main findings, these results reinforce the conjecture that, after controlling for general company characteristics, there is a strong association between FRC and firm's investment in accounting expertise.

6.2. The effects of institutional ownership on the relation between FRC and accounting expertise.

The evidence from our main analysis is consistent with FRC being driven by accounting and business operations' complexity (as opposed to managerial obfuscation) and firms seeking to mitigate this complexity. Specifically, we find that when FRC is high, firms attempt to enhance the monitoring and advising roles of their boards of directors by acquiring more accounting experts. Prior literature finds evidence consistent with higher institutional ownership enforcing better monitoring and governance (e.g., Chen et al., 2007; Chung and Zhang, 2011). If increasing accounting expertise is a mechanism to attenuate the negative effects of FRC and institutional owners strengthen a firm's governance, we should expect a stronger relation between accounting expertise and FRC when institutional ownership is high.

[20] As in internal control weaknesses and restatement analyses, we estimate regression models reported in Table 9 as OLS (as opposed to logit/probit) for better interpretation of interaction coefficients.

[21] We do not estimate firm fixed effect models, or short-term lag models, since changes in FRC are infrequent and changes in the board compositions are slow (Kole and Lehn, 1999). It may take several years for the permanent changes in FRC to be reflected in changes in the board composition.

[22] In untabulated analysis we include changes in the (absolute) number of accounting experts on the board of directors and audit committee (i.e., *ΔBoardNumAcc* and *ΔACNumAcc*) as dependent variables in change regression models, and find similar results.

Table 10
Change in financial reporting complexity and board accounting expertise.

	(1) *ΔBoardSize*	(2) *ΔACSize*	(3) *ΔBoardRatioAcc*	(4) *ΔACRatioAcc*
ΔComplexity	0.624***	0.438***	0.023**	0.031**
	(5.103)	(4.312)	(2.237)	(2.138)
ΔBoardSize			−0.000	0.006*
			(−0.157)	(1.847)
ΔNumBus	−0.070	0.080	0.009	−0.002
	(−0.521)	(0.703)	(0.732)	(−0.129)
ΔNumGeo	−0.355***	−0.177**	0.000	0.004
	(−3.146)	(−2.103)	(0.004)	(0.288)
ΔSize	0.390***	0.109***	0.018***	0.023***
	(9.315)	(4.601)	(4.627)	(4.624)
ΔLeverage	0.024	−0.095	0.012	0.005
	(0.278)	(−1.450)	(1.289)	(0.398)
ΔROA	−0.127***	−0.070***	−0.013**	−0.017**
	(−2.959)	(−3.584)	(−1.989)	(−2.514)
ΔMTB	−0.011***	−0.004***	−0.001	−0.001**
	(−4.686)	(−3.177)	(−1.474)	(−2.007)
ΔAccruals	0.045	−0.064	0.003	−0.012
	(0.442)	(−0.939)	(0.311)	(−0.963)
ΔEarnVol	0.034	0.001	0.003	0.011**
	(0.748)	(0.040)	(0.797)	(2.014)
Foreign	0.008	0.036	−0.005	−0.005
	(0.094)	(0.427)	(−0.728)	(−0.460)
Loss	0.030	−0.147	0.016*	0.011
	(0.286)	(−1.599)	(1.846)	(0.867)
Restructure	0.104	−0.161*	0.010	0.016
	(1.094)	(−1.731)	(1.298)	(1.470)
Acquisition	−0.113	−0.134	0.011	0.005
	(−1.240)	(−1.603)	(1.433)	(0.468)
Litigious	−0.128	−0.080	0.019	0.044**
	(−0.856)	(−0.579)	(1.403)	(2.422)
BigAuditor	0.464***	0.098	0.028***	0.038***
	(4.534)	(1.134)	(2.948)	(2.901)
FirmAge	−0.094	−0.368***	0.019***	0.024***
	(−1.183)	(−5.760)	(2.846)	(2.628)
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	2335	2335	2335	2,335
R^2	0.122	0.034	0.047	0.049

t statistics in parentheses *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. These panels show the estimated coefficients from regressions of audit committee size (*ACSize*) and ratio of accounting experts on the committee (*ACRatioAcc*) on 10-K word length (*10KLength*, Panel B) and 10-K readability measured using Gunning Fog index (*Fog*, Panel C). Columns (2) and (4) include accounting standards-based financial reporting complexity measure introduced in this paper (*Complexity*). All variables are defined in Appendix B. Regressions in Columns (1) and (2) are estimated using Poisson regression, and regressions in Columns (3) and (4) are estimated using generalized linear model (GLM) with binomial distribution and logit link function. Industry and year fixed effects are included in each regression but not reported. Regressions in Panels B and C include the same control variables as in Panel A, but their estimated coefficients are note reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using McFadden pseudo R^2 statistics.

In Table 11, we regress board and audit committee sizes (*BoardSize* and *ACSize*) and accounting expertise (*BoardNumAcc, BoardRatioAcc, ACNumAcc*, and *ACRatioAcc*) on FRC (*Compelxity*), an indicator variable for high levels of institutional ownership (*HighInst*), and their interaction (*HighInst* × *Complexity*). *HighInst* is one if a firm's institutional ownership is above the median (and zero otherwise). As reported in Panel A, we find that institutional ownership amplifies the relation between FRC and board accounting expertise (but not between FRC and board size). Turning to Panel B, we find that institutional ownership amplifies the relation between FRC and audit committee size, but not the relation between FRC and audit committee expertise. Overall, these results indicate that institutional ownership, at least partially, increases the relation between FRC and firm's accounting expertise, once again, suggesting that firms attempt to mitigate the adverse effects of high FRC. In addition, taken collectively with other findings, these results provide additional evidence that our main results are not driven by omitted variable(s) that independently affect both the FRC and board accounting expertise.

6.3. The effects of accounting standards complexity vs. number of reported items on firm's accounting expertise

Our FRC measure is calculated as a sum of complexity scores of all unique GAAP monetary items reported in a 10-K report. A complexity score for a given item is calculated as the length of accounting standards related to the disclosure of this item. Therefore, by construction, our measure is correlated with the number of items reported in a 10-K report. In untabulated analysis, we examine

Table 11
Accounting expertise, financial reporting complexity, and institutional ownership.

Panel A:*board accounting expertise, financial reporting complexity, and institutional ownership.*

	(1) *BoardSize*	(2) *BoardNumAcc*	(3) *BoardRatioAcc*
Complexity	1.984***	0.040	0.004
	(12.258)	(0.315)	(0.273)
HighInst	0.022	0.198***	0.027***
	(0.299)	(3.497)	(4.039)
HighInst × *Complexity*	−0.093	0.253**	0.031**
	(−0.552)	(2.005)	(2.147)
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	9383	9383	9383
R^2	0.359	0.567	0.154

t statistics in parentheses
*$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel B:*audit committee accounting expertise, financial reporting complexity, and institutional ownership.*

	(1) *ACSize*	(2) *ACNumAcc*	(3) *ACRatioAcc*
Complexity	0.656***	0.200***	0.049***
	(6.953)	(2.834)	(3.158)
HighInst	0.051	0.089**	0.017*
	(0.772)	(2.132)	(1.876)
HighInst × *Complexity*	0.404***	−0.018	−0.026
	(2.695)	(−0.201)	(−1.420)
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	9383	9383	9383
R^2	0.165	0.603	0.137

t statistics in parentheses *$p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel A shows the estimated coefficients from OLS regressions of board of directors size (*BoardSize*), number of accounting experts on the board (*BoardNumAcc*), and ratio of accounting experts on the board (*BoardRatioAcc*) on financial reporting complexity (*Complexity*), indicator for high institutional ownership (*HighInst*), and their interaction (*HighInst* × *Complexity*). Panel B shows the estimated coefficients from OLS regressions of audit committee size (*ACSize*), number of accounting experts on the committee (*ACNumAcc*), and ratio of accounting experts on the committee (*ACRatioAcc*) on financial reporting complexity (*Complexity*), indicator for high institutional ownership (*HighInst*), and their interaction (*HighInst* × *Complexity*). *HighInst* is a dummy variables indicating firm-year observations with above median institutional ownership. Regression models in Panel A (Panel B) include the same control variables as in Table 5 (6), but their estimated coefficients are not reported. All variables are defined in Appendix B. Industry and year fixed effects are included in each regression but not reported. Reported statistics are based on robust standard errors and clustering at the firm level. All R^2 values are calculated using adjusted R^2 statistics.

the relative importance of the complexity originating from accounting standards versus the complexity originating from the number of items reported. Specifically, in our main regressions that examine the relationship between FRC and accounting expertise (see Eq. (2)), we replace the *Complexity* variable with the natural logarithms of the number of GAAP accounting items reported in a 10-K (*GAAPConcepts*) and the number of words in unique accounting standards that relate to the disclosure of these items (*AccStandardsWords*).[23] We find that our results are primarily attributable to the relative complexity of standards, *AccStandardsWords*, and not to the number of GAAP concepts used in financial reports, *GAAPConcepts*.

7. Conclusions

A number of recent studies find significant variation in financial reporting complexity (FRC) across firms and industries, and this variation is associated with costly financial reporting outcomes (e.g., restatements and internal control deficiencies). Also, prior research demonstrates that firms' accounting expertise is related to financial reporting. This evidence leads to the question of whether firms attempt to manage the adverse effects of FRC by increasing their levels of accounting expertise. We examine this question by constructing a measure of firm-specific FRC based on the complexity of accounting standards applicable to a firm's financial reports, and testing its association with several proxies for a firm's investment in accounting expertise.

We find that FRC is positively related to accounting expertise on the board of directors and audit committee. FRC is also positively associated to the incidence of internal control weaknesses, restatements, and SEC comment letters. However, high levels of

[23] To calculate *AccStandardsWords*, we count words for each unique reference to accounting standard only once, i.e., if two accounting concepts refer to the same standard, we include this standard only once in our word count.

accounting expertise mitigate the effects of FRC for internal control weaknesses and SEC comment letters, but not for restatements. Our results are robust to a number of additional analyses.

We note that our findings should be evaluated considering two broad caveats. First, we do our best to mitigate the effect of correlated measurement error in our proxies for FRC and accounting expertise by including a comprehensive set of controls in our regression models and conducting temporal and cross-sectional analyses. However, we cannot completely rule out this possibility. Second, firms make unobservable investments in accounting expertise. To the extent that there is a positive correlation between the presence of experts in key financial reporting roles and also on the board, our findings may understate the effect of firm's investment in accounting expertise.

Our combined findings suggest that firms acquire accounting expertise to curtail the negative effects of FRC. More broadly, our study extends our understanding of the consequences of complex reporting standards and the role of accounting expertise in firms' governance.

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Appendix A. Estimating financial reporting complexity of individual accounting items

In this Appendix, we provide two examples of how we calculate reporting complexity of individual accounting items in 10-K reports (Sections A.1 and A.2), as well as descriptive statistics on complexity scores of individual accounting items (Section A.3).

A1. Cash reporting complexity example

The most common XBRL GAAP concept used to report cash in financial statments is "CashAndCashEquivalentsAtCarryingValue".[24] Below is a partial description of this concept as provided in FASB's XBRL Financial Reporting Taxonomy.

Property	Value
Name	CashAndCashEquivalentsAtCarryingValue
Documentation	Amount of currency on hand as well as demand deposits with banks or financial institutions. Includes other kinds of accounts that have the general characteristics of demand deposits. Also includes short-term, highly liquid investments that are both readily convertible to known amounts of cash and so near their maturity that they present insignificant risk of changes in value because of changes in interest rates. Excludes cash and cash equivalents within disposal group and discontinued operation.
Data Type	monetaryItemType
Period Type	instant
Balance	debit
References	ASC 210.10-45.1(a), ASC 230.10-45.4, SX 210.5-02.1

Although the taxonomy provides textual documentation for each concept, it is usually a brief description of the concept and does not capture its complexity well. Note from the table above, that CashAndCashEquivalentsAtCarryingValue is a monetary item (measured in dollars and cents), has a normal balance of debit, and is measured on a certain date (as opposed to a range of dates). CashAndCashEquivalentsAtCarryingValue has three references to standards and regulations in the taxonomy, two to the FASB's Accounting Standards Codification, and one to the Regulation S-X. The total number of words in those references is 281, and this is the number we use to proxy for financial reporting complexity of this item. Below we provide text of these references and their word counts.

ASC 210.10-45.1 (19 words)

Current assets generally include all of the following:

(a) Cash available for current operations and items that are cash equivalents

ASC 230.10-45.4 (84 words)

A statement of cash flows shall explain the change during the period in cash and cash equivalents. The statement shall use descriptive terms such as cash or cash and cash equivalents rather than ambiguous terms such as funds. The total amounts of cash and cash equivalents at the beginning and end of the period shown in the statement of cash flows shall be the same amounts as similarly titled line items or subtotals shown in the statements of financial position as of those dates.

SX 210.5-02.1 (178 words)

Cash and cash items. Separate disclosure shall be made of the cash and cash items which are restricted as to withdrawal or usage.

[24] Approximately, 95% of public companies use CashAndCashEquivalentsAtCarryingValue to report cash. Other popular concepts to represent cash are "Cash" and "CashAndDueFromBanks".

The provisions of any restrictions shall be described in a note to the financial statements. Restrictions may include legally restricted deposits held as compensating balances against short-term borrowing arrangements, contracts entered into with others, or company statements of intention with regard to particular deposits; however, time deposits and short-term certificates of deposit are not generally included in legally restricted deposits. In cases where compensating balance arrangements exist but are not agreements which legally restrict the use of cash amounts shown on the balance sheet, describe in the notes to the financial statements these arrangements and the amount involved, if determinable, for the most recent audited balance sheet required and for any subsequent unaudited balance sheet required in the notes to the financial statements. Compensating balances that are maintained under an agreement to assure future credit availability shall be disclosed in the notes to the financial statements along with the amount and terms of such agreement.

A2. Pension expense reporting complexity example

Pension expense line item is usually represented in FASB's U.S. GAAP Financial Reporting Taxonomy through "PensionExpense" concept. This concept is described in the taxonomy as follows:

Property	Value
Name	Pension expense
Documentation	The amount of pension benefit costs recognized during the period for (1) defined benefit plans and (2) defined contribution plans. For defined benefit plans, pension expense includes the following components: service cost, interest cost, expected return on plan assets, gain (loss) on plan assets, prior service cost or credit, transition asset or obligation, and gain (loss) due to settlements or curtailments. For defined contribution plans, the pension expense generally equals the firm's contribution to employees' accounts (if the firm contributes) during the period.
Data type	monetaryItemType
Period type	duration
Balance	debit
References	ASC 715.70-50.1, ASC 230.10-45.28, ASC 715.20-50.1

According to the description above, PensionExpense is a monetary concept with normal debit balance and refers to a certain range of dates (e.g., a fiscal year). The taxonomy provides three references to the FASB's Accounting Standards Codification that amount to 2254 words of standards text. Note that this is eight times the number of words in cash item references, suggesting that the disclosure of pension expense is much more complex than the disclosure of cash. Below we provide only partial texts of PensionsExpense references due to text length limitations.

ASC 715.70-50.1 (73 words)

An employer shall disclose the amount of cost recognized for defined contribution pension plans and for other defined contribution postretirement benefit plans for all periods presented separately from the amount of cost recognized for defined benefit plans. The disclosures shall include a description of the nature and effect of any significant changes during the period affecting comparability, such as a change in the rate of employer contributions, a business combination, or a divestiture.

ASC 230.10-45.28 (335 words)

Entities that choose not to provide information about major classes of operating cash receipts and payments by the direct method as encouraged in paragraph 230-10-45-25 shall determine and report the same amount for net cash flow from operating activities indirectly by adjusting net income of a business entity or change in net assets of a not-for-profit entity (NFP) to reconcile it to net cash flow from operating activities (the indirect or reconciliation method). That requires adjusting net income of a business entity or change in net assets of an NFP to remove both of the following:

(a) The effects of all deferrals of past operating cash receipts and payments, such as changes during the period in inventory, deferred income, and the like, and all accruals of expected future operating cash receipts and payments, such as changes during the period in receivables and payables. Adjustments to net income of a business entity or change in net assets of an NFP to determine net cash flow from operating activities shall reflect accruals for interest earned but not received and interest incurred but not paid. Those accruals may be reflected in the statement of financial position in changes in assets and liabilities that relate to investing or financing activities, such as loans or deposits. However, interest credited directly to a deposit account that has the general characteristics of cash is a cash outflow of the payor and a cash inflow of the payee when the entry is made

(b) All items that are included in net income that do not affect net cash provided from, or used for, operating activities such as depreciation of property, plant, and equipment and amortization of finite-life intangible assets. This includes all items whose cash effects are related to investing or financing cash flows, such as gains or losses on sales of property, plant, and equipment and discontinued operations (which relate to investing activities), and gains or losses on extinguishment of debt (which relate to financing activities).

ASC 715.20-50.1 (1846 words)

An employer that sponsors one or more defined benefit pension plans or one or more defined benefit other postretirement plans shall provide the following information, separately for pension plans and other postretirement benefit plans. Amounts related to the employer's results of operations shall be disclosed for each period for which a statement of income is presented. Amounts related to the employer's statement of financial position shall be disclosed as of the date of each statement of financial position presented. All of the following shall be disclosed... [*full text is not provided due to text length constraints*]

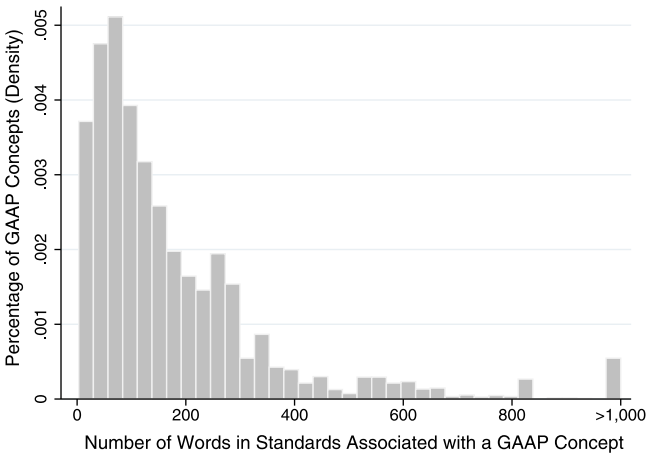
A3. Descriptive statistics and examples of GAAP concepts

Our financial reporting complexity measure is an aggregate score (the logarithm of the sum) of complexity scores of individual accounting items reported in a 10-K. We estimate complexity of each GAAP accounting item reported in a 10-K as the number of words in FASB's Accounting Standards Codification (ASC) and SEC's Regulation S-X that govern the disclosure of this item. In this section, we provide descriptive statistics and examples related to reporting complexity of individual accounting items (as opposed to aggregate, 10-K level).

Below we provide descriptive statistics on complexity scores (number of words, sentences, and references to accounting standards) using a sample of 5576 unique monetary GAAP items defined in this taxonomy:

Variable	*Mean*	*Std Dev.*	*Min*	*1%*	*25%*	*Median*	*75%*	*99%*	*Max*
Words	185	264	3	4	61	117	239	1072	6134
Sentences	7	11	1	1	3	5	9	34	250
References	5	6	1	1	2	3	5	23	141

The following graph illustrates the distribution of the number of words in accounting standards related to the disclosure of accounting items.



Finally, the table below shows ten examples of accounting items (monetary concepts in FASB's XBRL Financial Reporting Taxonomy) with high, medium, and low complexity scores:

GAAP Monetary concept	*Words*	*Sentences*	*References*
Oil and Gas Property ated Depreciation, Depletion, Amortization, and Impairment	6134	250	141
Defined Benefit Plan Plans with Accumulated Obligations in Excess of Plan Assets, Aggregate Accumulated Benefit Obligation	4836	119	3
Defined Benefit Plan Plans with Accumulated Obligations in Excess of Plan Assets, Aggregate Fair Value of Plan Assets	4836	119	3
Defined Benefit Plan Plans with Accumulated Obligations in Excess of Plan Assets, Aggregate Projected Benefit Obligation	4836	119	3
Held-to-Maturity Securities, Restricted	3302	123	83
Increase/ Decrease in Marketable Securities, Restricted	3250	113	73
Income/Loss from Continuing Operations before Income Taxes, Extraordinary Items, and Non-controlling Interest	3249	109	70
Resell Agreements, Period-end Amounts Excluding Effects of Agreements Reported Net by Counterparty	3157	106	68
Land and Land Improvements	3106	168	104
Unbilled Change Orders, Amount Expected to Be Collected Within One Year	2933	162	100
Deferred Costs Leasing, Gross	117	11	11
Operating Leases, Income Statement Initial Direct Costs	117	11	11
Retained Earnings, Appropriated	117	11	9
Marketable Securities, Realized Gain/Loss	117	7	6
Fair Value Concentration of Risk Premiums Receivable	117	9	5
Fair Value Estimate Not Practicable Premiums, Receivable	117	9	5
Premiums Receivable at Carrying Value	117	9	5
Premiums Receivable Fair Value Disclosure	117	9	5
Interest Paid	117	5	3
Interest Paid, Capitalized	117	5	3
Salaries and Wages	5	1	1
Sales Commissions and Fees	5	1	1
Selling Expense	5	1	1

Travel and Entertainment Expense	5	1	1
Effects of Unrealized Holding Gain/Loss on Present Value of Future Insurance Profits	4	1	1
Income/Loss Including Portion Attributable to Non-controlling Interest	4	1	1
Insurance Commissions	4	1	1
Interest Expense, Capital Securities	4	1	1
Interest Expense, Commercial Paper	4	1	1
Interest Expense, Junior Subordinated Debentures	4	1	1

Appendix B. Variable definitions

Variable	Definition	Source
Complexity	Financial reporting complexity measure defined as the natural logarithm of the number of words in text in the FASB's ASC and SEC's Regulation S-X that regulate disclosure of items reported in a firm's 10-K, winsorized at 1% and 99%. FASB's XBRL financial reporting taxonomy is used to associated specific items with the relevant accounting standards and regulations. The variable is mean-adjusted by industry and year (XBRL taxonomy year).	EDGAR, FASB, SEC
BoardSize	Number of members on the board of directors.	BoardEx
BoardNumAcc	Number of accounting experts on the board of directors, where accounting expert is a board member with at least one of the following qualifications: has a CPA (or similar certification), or has been employed either as an auditor, tax professional, financial controller, treasurer, or CFO.	BoardEx
BoardRatioAcc	Relative number (fraction) of accounting experts on the board of directors. Defined as *BoardNumAcc* divided by *BoardSize*.	BoardEx
BoardRatioIndep	Relative number (fraction) of independent members on the board of directors.	BoardEx
ACSize	Number of audit committee members.	BoardEx
ACNumAcc	Number of accounting experts on the audit committee, where accounting expert is an individual with one of the following qualifications: has a CPA (or similar certification), or has been employed either as an auditor, tax expert, financial controller, treasurer, or CFO.	BoardEx
ACRatioAcc	Relative number (fraction) of accounting experts on the audit committee. Defined as *ACNumAcc* divided by *ACSize*.	BoardEx
ICW	Indicator that equals one if there is a material weakness disclosure in the current fiscal year.	Audit Analytics
Restatement	Indicator that equals one if firm issued an accounting restatement related to the current fiscal year.	Audit Analytics
SEC_CL	Indicator variable that equals one if a company received an SEC comment letter in the current fiscal year.	Audit Analytics
NumBus	Natural logarithm of one plus the number of business segments a company operates in.	COMPUSTAT
NumGeo	Natural logarithm of one plus the number of geographical segments a company operates in.	COMPUSTAT
Size	Natural logarithm of one plus the amount of sales, winsorized at 1% and 99%.	COMPUSTAT
Leverage	Current and long-term debt scaled by the beginning-of-year total assets, winsorized at 1% and 99%.	COMPUSTAT
ROA	Earnings before extraordinary items scaled by the beginning-of-year total assets, winsorized at 1% and 99%.	COMPUSTAT
MTB	Market value of equity plus book value of liabilities divided by the beginning-of-year total assets, winsorized at 1% and 99%.	COMPUSTAT
Accruals	Accruals calculated using cash flows from operations. Defined as income before extraordinary items less income from operating activities scaled total assets, winsorized at 1% and 99%.	COMPUSTAT
EarnVol	Standard deviation of earnings scaled by total assets calculated for the last five years. Minimum of three years of earnings information is required, winsorized at 1% and 99%.	COMPUSTAT
Foreign	Indicator that equals one if a company has foreign operations.	COMPUSTAT
Loss	Indicator that equals one if a company experienced a loss in either the current or previous year.	COMPUSTAT
Restructure	Indicator that equals one if there is a restructure event.	COMPUSTAT
Litigious	Indicator variable that equals one if a firm operates in a litigious industry (a firm with an SIC code either 1) between 2833 and 2836, 2) between 3570 and 3577, 3) between 3600 and 3674, or 4) between 5200 and 5961, or 5) equal to 7370).	COMPUSTAT
BigAuditor	Indicator that equals one if company's auditor is a "big four" firm.	Audit Analytics
SndTierAuditor	Indicator that equals one if company's auditor is a "second-tier" firm (e.g., BDO, Crowe Horwath, Grant Thornton, McGladrey & Pullen).	Audit Analytics
FirmAge	Natural logarithm of one plus the number of years a company has been covered by COMPUSTAT.	COMPUSTAT
Growth	Relative change in total sales compared to the previous year. Defined as this year's total sales divided by the previous year's total sales minus one, winsorized at 1% and 99%.	COMPUSTAT
MarketCap	Natural logarithm of market capitalization, calculated as number of shares outstanding multiplied by share price at the end of the fiscal year, winsorized at 1% and 99%.	COMPUSTAT
BankruptcyRisk	Decile rank of bankruptcy risk calculated using Altman's Z score as in (Altman, 1968). Higher values (close to 10) indicate firm observations that are likely to be financially distressed.	COMPUSTAT
RestructCharge	The sum of the current and previous years' restructuring charges scaled by firm's market capitalization (*MarketCap*), winsorized at 1% and 99%.	COMPUSTAT
ExtFinancing	The sum of equity and debt financing scaled by the total assets measured at the end of the next fiscal year (following Cassell et al. (2013) and Ettredge et al. (2011)). Equity financing is calculated as the sales minus the purchase of common and preferred stock and minus dividends. Debt financing is calculated as the long-term debt issued minus short-term debt reduced and minus the change in current debt. The variable is winsorized at 1% and 99%.	COMPUSTAT
CFOTenure	The natural logarithm of CFO tenure (in years), where CFO tenure is the yearly difference between the current year and CFO appointment year.	ExecuComp
CEOTenure	The natural logarithm of CEO tenure (in years), where CEO tenure is the yearly difference between the current year and CEO appointment year.	ExecuComp
CEOChairman	Indicator that equals one, if CEO is the chairman of the board of directors.	ExecuComp

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