

XBRL Adoption and SEC Monitoring

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ABSTRACT: We examine how disclosure processing costs influence SEC monitoring of firm disclosures by leveraging the mandatory adoption of XBRL—a digital reporting language designed to reduce these costs. We find that post-adoption, both the frequency and quality of SEC comment letters for 10-K filings increase. Additional tests suggest that XBRL adoption enhances SEC monitoring through three interconnected channels. First, automated data extraction under XBRL enhances SEC review efficiency, as reflected in more timely comment letters and greater increases in their frequency and quality when the SEC faces tighter resource constraints or has access to XBRL analytical tools. Second, standardized reporting under XBRL strengthens the SEC’s benchmarking ability, as evidenced by greater XBRL benefits for firms using more standardized tags and tags more comparable to those of industry peers. Third, XBRL enables the SEC to better scrutinize complex reporting issues, resulting in greater frequency and quality of comments on accounts related to non-core earnings and for firms with more footnote tags or more complex filings. Overall, our evidence suggests that a reduction in disclosure processing costs following XBRL adoption enhances the SEC’s ability to conduct regulatory monitoring.

XBRL Adoption and SEC Monitoring

I. Introduction

The SEC plays a crucial role in ensuring registrants' compliance with financial reporting and disclosure standards. An important means through which the SEC fulfills its responsibility is the review of regulatory filings. The SEC issues a comment letter when it perceives the filing to be inconsistent with applicable financial reporting regulations or lacking clarity. While the SEC review process generates significant benefits in terms of improved disclosures and reduced information asymmetry (Cunningham and Leidner 2022), the efficacy of SEC reviews varies across several factors including resource constraints (Gunny and Hermis 2020; Ege et al. 2020), reviewer characteristics (Kubic 2021; Do and Zhang 2022; Kubic and Toynbee 2023), and attention distraction (Hills et al. 2021). Given that SEC reviews require processing large volumes of firm disclosures, disclosure processing costs naturally pose a major hurdle for the SEC (Blankespoor et al. 2020). However, little is known about how these costs affect SEC reviews. As disclosure processing costs are not directly observable, we fill this gap by studying whether and how a significant advancement in financial reporting technology designed to reduce disclosure processing costs—eXtensible Business Reporting Language (XBRL)—impacts the frequency and quality of SEC comment letters.

To make financial statements easier for investors to analyze and to automate the regulatory filing process, in 2009, the SEC passed the Interactive Data to Improve Financial Reporting rule, requiring companies to provide financial statements in XBRL format (SEC 2009). The XBRL mandate was phased in based on company size over three years starting from June 2009. By 2011, all public companies had to provide XBRL-tagged financial statements in their Securities Act registration statements, Forms 10-K and 10-Q, transition reports, and certain Forms 8-K. XBRL standardizes financial reporting by encoding financial reporting concepts using pre-defined

machine-readable taxonomies. By mandating XBRL, the SEC sought to transform financial statements filed through its Electronic Data Gathering, Analysis, and Retrieval (EDGAR) System from static text-based format (e.g., HTML, PDF, or ASCII) to standardized, interactive, and machine-readable XBRL-tagged filings, enabling more timely and accurate acquisition, analysis, and comparison of information across firms and over time (Hoitash et al. 2021).

Consistent with XBRL adoption reducing disclosure processing costs and enhancing information efficiency in the market, prior research suggests that XBRL reporting is associated with various capital market benefits.¹ While the XBRL mandate primarily aims to serve the interests of investors, it may also benefit the SEC. However, unlike investors who use XBRL data mainly to support investment decisions, the SEC, as a market regulator, is more likely to use XBRL data to strengthen investor protection through enhanced monitoring.

We expect XBRL to improve SEC monitoring through three channels. First, XBRL enables automated data extraction and analysis, improving the SEC's review efficiency and allowing it to conduct more frequent reviews while generating deeper insights. Second, XBRL's standardized reporting facilitates peer benchmarking, consequently strengthening the SEC's ability to detect unusual patterns and deviations from industry peers. Third, XBRL adoption enhances the SEC's ability to monitor complex reporting issues, which would otherwise require substantially more resources to detect and analyze.

As the volume of XBRL-formatted filings grew, the SEC began leveraging XBRL data more systematically. By 2012, the SEC had launched the Interactive Data Analysis Platform (IDAP), a tool used to parse XBRL data into a relational database to analyze regulatory filings (Starr 2012). Subsequently, the SEC developed several more advanced internal applications to

¹ See Hoitash et al. (2021) for a comprehensive review of prior literature on XBRL. Throughout the paper, we use “disclosure processing cost” and “information processing cost” interchangeably in the context of SEC monitoring.

leverage XBRL data for more efficient and effective scrutiny of firm disclosures (SEC 2023). Nonetheless, XBRL may not immediately improve SEC monitoring during its initial adoption years if XBRL data is prone to nontrivial errors given its unaudited nature (Boritz and No 2008; Debreceeny et al. 2010), or if SEC staff lack the necessary expertise in U.S. GAAP taxonomy and XBRL to fully leverage the unique features of XBRL.

We examine the research question by exploiting the staggered implementation of the XBRL mandate during the initial adoption period of 2007-2011. Utilizing a difference-in-differences (DiD) specification (Bertrand and Mullainathan 2003), we first estimate the relationship between XBRL adoption and the frequency of SEC comment letters on 10-K filings.² We find that compared to the pre-adoption period, the SEC is more likely to issue a comment letter on 10-Ks in the post-adoption period. In economic terms, the likelihood that a firm receives a comment letter increases by 4 percentage points post-adoption (a 12.5% increase relative to the sample mean of 31.9%). This evidence suggests that XBRL reporting enables the SEC to issue more comments on potentially deficient disclosures.

Next, we examine whether XBRL adoption improves the quality of SEC reviews, as measured across four dimensions: the number of review comments, issues referenced, negative-tone words, and total words in the initial comment letter (Ege et al. 2020), as well as a composite measure of review quality across these dimensions. We find that post-adoption, the SEC raises more comments, refers to more issues, uses more negative-tone words, and uses more words in the

² We focus on comment letters on 10-K filings because 10-Ks are the typical starting point when the SEC reviews a firm's periodic filings, have the highest likelihood of receiving an SEC comment among all periodic filings (Cunningham and Leidner 2022), contain the largest concentration of XBRL metadata, are heavily relied upon by investors (Griffin 2003), and are specifically referenced in Section 408 of the Sarbanes-Oxley Act (SOX) regarding SEC reviews. We exclude 20-Fs and 40-Fs filed with the SEC by foreign private issuers because they were not required to comply with the XBRL mandate until fiscal periods ending on or after December 15, 2017 (Hoitash et al. 2021). Further, SEC monitoring of foreign firms is confounded by the strength of their home-country institutions (Naughton et al. 2018).

comment letters, implying more substantive SEC comments. To corroborate these findings, we examine comment letter resolution. We find that firms receiving comment letters following XBRL adoption are more willing to revise current or future filings, to restate the referenced annual reports, and to restate issues specifically referenced in SEC comments. This evidence suggests that SEC comments are more likely to identify substantial disclosure deficiencies and thus are of higher quality after XBRL adoption.

We further assess review quality by examining Type II errors, defined as cases where the SEC reviews a 10-K, issues no comment letter, but the filing is later restated. A Type II error indicates that the SEC fails to detect a deficiency during the review. As we cannot observe which 10-Ks are reviewed, we construct and validate a measure of SEC attention based on Stice-Lawrence (2026) to proxy for the ex-ante probability of SEC review. We find that among 10-Ks without a comment letter, the likelihood of subsequent restatements decreases after XBRL adoption for firms facing higher SEC attention (i.e., firms likely reviewed by the SEC), but not for those with lower SEC attention. This evidence supports the notion that, post-XBRL, the SEC's decision not to issue a comment letter for reviewed-without-comment firms is more justified, indicating a reduction in Type II error rate and an enhancement in review quality.

Next, we explicitly test the three channels through which XBRL improves SEC monitoring. First, consistent with automation enhancing review efficiency, we find that XBRL adoption leads to more timely SEC reviews, particularly for reviews with greater information processing costs. In addition, the increase in comment letter frequency and quality following XBRL adoption is concentrated in cases where the SEC faces tighter resource constraints or has better access to XBRL analytical tools. Second, in line with standardized reporting facilitating benchmarking, the benefits of XBRL are stronger for firms using more standardized tags and tags more similar to

those of industry peers. Further, firms whose financial reports deviate more from those of industry peers face greater SEC scrutiny only when their XBRL tags are more similar to those of peers, consistent with XBRL facilitating deviation detection through standardization. Third, consistent with XBRL strengthening the SEC's ability to analyze complex reporting issues, we find the following: (i) after XBRL adoption, the SEC is more likely to issue comments related to non-core earnings, which are inherently less recurring and more complex than core earnings; (ii) the effect of XBRL on comment letter frequency and quality is concentrated among firms with more footnote tags, where information processing costs are higher than for the face of financial statements (Müller et al. 2015); (iii) the effect of XBRL is more pronounced for firms with more complex 10-K filings; and (iv) the XBRL effect is stronger when SEC review teams include higher-ranked members such as supervisors, who likely possess greater U.S. GAAP expertise and are better equipped to evaluate complex reporting issues.

We perform a battery of tests to address alternative explanations of our findings. First, as XBRL adoption was phased in based on firm size, one concern is that our results may simply reflect greater SEC scrutiny over larger firms. Inconsistent with this concern, we fail to reject the parallel trends assumption or find any differences between adopters and non-adopters in SEC comments on transactional filings or 10-K sections not subject to the XBRL mandate. Second, further alleviating the above concern, our main results are robust to using regression discontinuity design (RDD) (Lee and Lemieux 2010). Third, inconsistent with other economic events around XBRL adoption driving our results, we fail to find any evidence of enhanced SEC monitoring over adopting firms when we use pseudo-event years to define the treatment. Fourth, to alleviate the concern over biased estimates due to staggered treatments in a DiD test (Baker et al. 2022), we implement a stacked DiD design and find corroborative results. Lastly, we find that SEC comment

letter frequency and quality are more strongly associated with the SEC’s download of XBRL filings than its download of traditional HTML filings, providing more direct evidence of the link between XBRL adoption and SEC monitoring.³

We make two primary contributions to prior literature. First, we document the role of disclosure processing costs in regulatory monitoring. While prior studies on the issuance and effectiveness of SEC comment letters emphasize firm characteristics (Cassell et al. 2013), reviewer characteristics (Kubic 2021; Do and Zhang 2022; Kubic and Toynbee 2023), and attention distraction (Hills et al. 2021), the role of disclosure processing costs has largely been overlooked. However, since information processing costs significantly impede all users of firm disclosures (Blankespoor et al. 2020), they potentially undermine SEC monitoring, particularly when the SEC faces resource constraints (Kedia and Rajgopal 2011; Gunny and Hermis 2020; Ege et al. 2020; Bonsall et al. 2024). Using XBRL adoption as a shock to disclosure processing costs, we find evidence suggesting that a reduction in disclosure processing costs significantly improves the SEC’s ability to monitor firm disclosures.⁴

Second, we extend the XBRL literature beyond its traditional capital-market focus. Prior research primarily examines how capital market participants, such as investors and analysts, use XBRL data to improve valuation and investment decision-making (Hoitash et al. 2021). In contrast, we examine whether and how XBRL benefits the capital market regulator, the SEC, whose primary

³ In 2018, the SEC further required a phase-in adoption of Inline XBRL (iXBRL) by public companies by 2021 (SEC 2018). iXBRL enhances XBRL by directly embedding XBRL tags into HTML filings, making structured data human-readable via a standard web browser. Instead of iXBRL, we focus on XBRL because it represents a fundamental shift from traditional financial reporting to digital reporting; in contrast, iXBRL is a modest extension of XBRL aimed at improving human readability.

⁴ Even-Tov et al. (2025) examine the impact of reduced information processing costs on U.S. state regulators of mortgage companies. They find that compared to disclosing enforcement actions against mortgage companies only on each state regulator’s individual websites, centralized reporting of such enforcement actions on a single repository improves state regulators’ monitoring of mortgage companies in their own states. We complement their study by examining the impact of a different tool (XBRL) on the information processing costs of a different regulator, the SEC, which has much broader and distinct oversight responsibilities over the capital market.

objective is investor protection rather than return maximization. The three channels we test are grounded in the SEC's monitoring objective rather than in the valuation objective that motivates much of the prior XBRL literature. Our results indicate that, unlike investors who primarily use XBRL to support investment decisions, the SEC leverages XBRL as a monitoring tool to enhance its oversight of firm disclosures, thereby strengthening investor protection. Accordingly, we contribute to the literature on XBRL by demonstrating its benefits for an institutionally distinct user group and for a fundamentally different purpose.

II. Institutional Background and Related Literature

2.1 The SEC Review Process

The SEC Division of Corporation Finance (DCF) reviews and makes comments on regulatory filings to ensure compliance with the disclosure requirements under federal securities laws. Section 408 of SOX mandates that the SEC review all public companies at least once every three years and evaluate the need for more frequent reviews of companies meeting six criteria.⁵ The SEC allocates considerable resources to the filing review process and targets delivering initial comments within 30 days of the start of the review (Ege et al. 2020).

Early research finds that low profitability, high complexity, engagement of a small auditor, and weak governance increase the chance of a comment letter (Cassell et al. 2013), in addition to factors explicitly discussed in Section 408 of SOX. Recent research finds that financial statement comparability between the firm and its industry peers also affects the chance of an SEC comment letter (Brown et al. 2023; Nam and Thompson 2023).

⁵ These six criteria include: history of material restatement, significant share price volatility, large market capitalization, emerging companies with disparities in price-to-earnings ratios, companies with operations that affect a material sector of the economy, and other factors at the SEC's discretion.

Regarding the effectiveness of SEC reviews, prior research finds that the quality of SEC comment letters declines when SEC staff experience attention distraction (Ege et al. 2020; Hills et al. 2021) and increases when the SEC review process becomes more transparent (Guo and Tian 2024). Gunny and Hermis (2020) find that while the SEC issues fewer comment letters during the busy season, it does not overlook more serious issues. Recent studies examine SEC reviewer characteristics. Baugh et al. (2022) and Do and Zhang (2022) find that individual reviewer “styles” significantly affect review outcomes, while Kubic (2021) finds that the SEC’s error detection rate is positively associated with the number of accountants, but not the number of lawyers, on the review team. Kubic and Toynbee (2023) document a detrimental effect of reviewer continuity on comment letter quality. Together, these studies underscore the critical role of reviewers in detecting reporting deficiencies.⁶

We extend this research stream by introducing disclosure processing costs as an important determinant of both the issuance and the effectiveness of SEC comment letters.

2.2 XBRL Adoption and Its Impact on Capital Market Participants

In 2009, the SEC mandated that public companies file the financial statements in their periodic reports (10-Ks, 10-Qs) and registration statements in interactive data format using XBRL (SEC 2009). This mandate was phased in by company size over three years beginning in June 2009, with full adoption required of all public companies by 2011. The SEC posited that “interactive data has the potential to increase the speed, accuracy, and usability of financial disclosures, and eventually reduce costs” (SEC 2009, p. 1). XBRL represents the most important innovation in regulatory filing technology since the implementation of the EDGAR system in 1996 (Hoitash et

⁶ Prior research also examines other topics such as the determinants of comment letter resolution, market reactions to public disclosures of comment letters, changes to firm disclosures and accounting applications in response to comment letters, other changes following the receipt of comment letters, and the spillover effects of SEC comment letters. See Cunningham and Leidner (2022) for a comprehensive review of prior studies on SEC comment letters.

al. 2021). The as-filed XBRL data offers significant advantages over the financial data assembled by commercial data aggregators (Du et al. 2023).

Several early studies report some adverse effects of XBRL reporting, including higher bid-ask spreads (Blankespoor et al. 2014) and a decrease in financial statement comparability (Dhole et al. 2015). However, the preponderance of evidence in this literature suggests that XBRL reporting reduces information processing costs and generates positive impacts, including reduced information asymmetry (Kim et al. 2012; Bhattacharya et al. 2018; Zhang et al. 2019), improved information accessibility (Chen and Zhou 2019), faster acquisition and impounding of information into stock prices (Efendi et al. 2014; Dong et al. 2016; Zhang et al. 2019), greater analyst coverage and forecast accuracy (Liu et al. 2014), and a more diverse shareholder base (Kim, Li, and Liu 2019). Further, XBRL adoption enhances investors' ability to process and monitor firm disclosures, which in turn motivates firms to expand disclosures and reduce earnings management (Blankespoor 2019; Kim, Kim, and Lim 2019).

2.3 The SEC as a Unique User of XBRL Data

Compared with market participants, the SEC is likely to use XBRL data for different purposes and, as a result, may derive different benefits. First, as the capital market regulator, the SEC's primary objective is to protect investors by promoting a fair and efficient market. Consequently, unlike investors who primarily rely on XBRL data as inputs to valuation models to inform their investment decisions (Hoitash et al. 2021), the SEC uses XBRL reporting mainly as a surveillance tool to scrutinize firm disclosures and identify potential noncompliance with regulations. Therefore, the primary impact of XBRL on the SEC most likely manifests in its monitoring activities, particularly in the regulatory filing review process.

Second, the SEC is a highly sophisticated user of financial disclosures. Its accounting and legal expertise, combined with the structured nature of the filing review process, suggests that the SEC is well equipped to identify latent disclosure risks and accounting issues earlier and more reliably than typical market participants, as evidenced by market reactions to the release of comment letters (Dechow et al. 2016; Duro et al. 2019), and by restatements and write-downs following the letters (Cassell et al. 2013; Ryans 2021). Because of its greater sophistication and deeper expertise, the SEC may derive fewer benefits from XBRL adoption than less sophisticated users.

Third, the SEC has privileged access to firms' private information through non-public channels, reducing its information acquisition costs even prior to XBRL adoption. For example, the SEC can access private firm information about potential violations through investigations and enforcement actions (Blackburne et al. 2021), materials redacted under confidential treatment provisions (Bozanic et al. 2017), and its whistleblower program (Berger and Lee 2022). As a result, the SEC is likely to benefit less from XBRL through the acquisition of new information, but more through improved efficiency in processing and analyzing information already in regulatory filings.

Lastly, the SEC faces significant resource constraints when performing its regulatory monitoring responsibilities (Kedia and Rajgopal 2011; Bonsall et al. 2024), including in the comment letter process (Ege et al. 2020; Gunny and Hermis 2020). Consequently, the sheer volume of filings under the SEC's purview each year means that even the modest per-filing reductions in disclosure processing costs can yield substantial aggregate benefits in alleviating the SEC's resource constraints. We extend prior research by analyzing how XBRL reporting impacts the SEC in fulfilling its monitoring responsibilities.

III. Hypotheses Development

We expect that XBRL enhances the SEC's ability to monitor firm disclosures primarily through three channels. First, XBRL improves SEC review efficiency through automation of data extraction and analysis. Before XBRL adoption, financial reports were filed under the EDGAR system in HTML, PDF, or text format and were not machine-readable. SEC reviewers had to manually extract and compile information from firm filings for analysis.⁷ This manual process is inherently inefficient and prone to errors (Cox 2006).⁸

In contrast, under XBRL, each data tag is encoded in machine-readable XML, reducing the need for manual data collection and processing. This allows the SEC to redirect significant resources from data management toward analytical tasks and improve review efficiency per filing.⁹ As a result, the SEC can conduct a higher volume of reviews. Consistent with this conjecture, the percentage of public companies reviewed by the DCF rose steadily from 36% in 2007, prior to XBRL adoption, to 48% in 2011, following XBRL adoption (SEC 2011a, p. 77). The ability to conduct more frequent reviews is likely to lead to a higher incidence of comment letters.

Second, by standardizing financial reporting, XBRL enables more in-depth SEC reviews through enhanced peer benchmarking. Before XBRL adoption, firms often used different terms to

⁷ We confirmed with one member at the Office of Structured Data of the SEC that before XBRL adoption, SEC staff accessed firm filings submitted in PDF, HTML, or ASCII through the EDGAR system.

⁸ During the sample period of 2007-2011, the total numbers of 10-K and 10-KSB filings were 11,689, 11,077, 9,574, 8,890, and 8,561, in respective years (see https://www.sec.gov/dera/data/dera_edgarfilingcounts). The total numbers of DCF employees were 510, 515, 489, 520, and 501 in respective years (see Professor Matthew Kubic's website at <https://www.mattkubic.com/data>). Assuming that one-third of firms are reviewed each year, and each 10-K review involves three DCF employees (Kubic 2021, Table 4), this statistic implies that each DCF employee must review at least 20 10-K or 10-KSB filings each year. This workload is on top of their responsibilities to monitor other periodic and transactional filings, which could further strain the SEC's capacity to review 10-Ks (Ege et al. 2020).

⁹ For example, "[e]xtracting data from an HTML document takes at least 20 minutes, from a good quality PDF, takes around 30 minutes, from an image around 50 minutes. Data pulled from an XBRL file though, can be extracted in 1 to 2 seconds... lets us focus on better analytics rather than scraping data from documents" (Morningstar 2020). In commenting on the benefits of XBRL for the SEC, the FASB states "[t]he SEC can more timely review the information and immediately incorporate it into their tools and it dramatically increases their access to and reuse of corporate disclosures by a factor of 5 to 10 times depending on the company." See <https://www.fasb.org/page/PageContent?pageId=/staticpages/what-is-xbrl.html&isstaticpage=true>.

describe the same accounting concept, making it difficult to draw meaningful comparisons. Under XBRL, each financial reporting concept is mapped to a standardized U.S. GAAP taxonomy, enhancing the comparability of financial reports across firms and over time. Since the SEC applies similar scrutiny across firms in the same industry (Brown et al. 2018), peer benchmarking is an important strategy it uses to detect disclosure deficiencies (Nam and Thompson 2023; Brown et al. 2023). By improving comparability, XBRL strengthens the SEC’s ability to identify unusual patterns, discover unexpected deviations, and assess reporting risk through benchmarking. This, in turn, allows the SEC to better target high-risk firms or accounts, increasing the likelihood of identifying disclosure deficiencies and issuing comment letters. Reflecting on its use of XBRL data, the SEC states that “[w]ithout the use or analysis of machine-readable data, the alleged deficiencies would have been significantly more difficult to detect and pursue in a cost-effective or timely manner” (SEC 2023, p. 6).

Third, XBRL adoption enhances the SEC’s ability to monitor more complex reporting issues. Enforcement costs are a major consideration when the SEC targets potential financial misreporting cases (Kedia and Rajgopal 2011; Ege et al. 2020). Under resource constraints, the SEC is more likely to focus on relatively straightforward disclosure violations—the “low-hanging fruit” (Gunny and Hermis 2020; Holzman et al. 2024). Because complex accounting issues involve higher information processing costs, the SEC may have been more likely to detect violations involving more obvious or less complex issues prior to XBRL adoption. For instance, the SEC is more likely to issue comment letters on rules-based than on principles-based accounting standards, because the latter require more sophisticated judgment and entail higher resolution costs (Boone et al. 2013). By automating and standardizing financial disclosures, XBRL reduces information

processing frictions and enables the SEC to more effectively analyze complex reporting issues and generate deeper insights, increasing the likelihood of comment letters on such issues.

While large-scale evidence on the SEC’s use of XBRL data for monitoring during the early XBRL adoption period is limited, anecdotal evidence suggests that the SEC had developed the capability to analyze regulatory filings using XBRL data shortly after the mandate. For example, in his speech at the IFRS annual convention in 2012, Mike Starr, the former deputy chief accountant, indicated that “at the SEC, we utilize IDAP, a customized program to shred the XBRL formatted data and put it in a relational database and we use this database to analyze filings” (Starr 2012).¹⁰ Consistent with the SEC’s intention to use XBRL data for regulatory monitoring, in his speech about XBRL adoption, the former SEC Chairman Christopher Cox stated “[i]t should go without saying that if interactive data improves accuracy and gives users of financial information greater speed and flexibility, it will help the SEC in its market watchdog function” (Cox 2006). Therefore, by increasing both review breadth and depth, XBRL enables the SEC to conduct more frequent and more substantive reviews, thereby enhancing its ability to detect disclosure deficiencies. We state the first hypothesis in the alternative form:

H1: Compared to the pre-XBRL adoption period, the SEC is more likely to issue comment letters on 10-K filings during the post-XBRL adoption period.

¹⁰ As detailed in Section 5.2, most SEC comment letters related to XBRL-adopting 10-Ks in our sample were issued during 2011–2013—a period when the SEC had begun using IDAP to analyze XBRL data. To increase the transparency of regulatory agencies, including the transparency about how the SEC uses machine-readable data for oversight, the U.S. Congress passed the Financial Data Transparency Act of 2022, requiring the SEC to report to Congress semi-annually on its use of machine-readable data from corporate disclosures, beginning June 2023 (U.S. House of Representatives 2022). Among other items, the SEC discloses in such a report “a summary of enforcement actions that result from the use or analysis of machine-readable data” and “how the Commission uses the machine-readable data it collects.” (SEC 2023, p. 1)

A higher frequency of comment letters may not, by itself, imply more effective SEC oversight if SEC staff primarily focus on trivial issues while overlooking more serious ones. In this context, we expect that the three channels discussed above will also enhance the quality of SEC comment letters. First, greater efficiency gains from automation allow the SEC to devote less time to data preparation and more to analysis, enabling more thorough review, deeper investigation, and more sophisticated evaluation of regulatory filings. Second, improved benchmarking and greater capacity to analyze complex issues provide the SEC with richer insights, facilitating the identification of more significant deficiencies and the issuance of higher-quality comment letters. Moreover, more frequent reviews expose SEC staff to similar disclosure structures repeatedly, helping to build expertise and sharpen their ability to identify anomalies. We therefore present our second hypothesis in the alternative form:

H2: Compared to the pre-XBRL adoption period, SEC comment letters on 10-K filings are of higher quality during the post-XBRL adoption period.

However, several factors may limit the SEC's ability to benefit from XBRL. First, XBRL filings are not audited by an external auditor and thus are subject to errors (SEC 2009). Indeed, prior research documents nontrivial issues with XBRL data quality during our sample period.¹¹ Second, inappropriate use of tags may reduce the usefulness of XBRL filings for SEC reviews. The SEC requires the use of standard U.S. GAAP taxonomies but allows extended tags for unique transactions (SEC 2009). Firms may misuse extended tags due to misunderstanding or intentional obfuscation (Debreceeny et al. 2011; Kim, Kim, and Lim 2019). By default, extended tags make financial reports more complex and less comparable (Hoitash and Hoitash 2018). Moreover, even

¹¹ These data quality issues include mathematical errors, debit/credit reversal, the unnecessary use of extended tags, and input errors (e.g., incorrectly using negative values) (Boritz and No 2008; Debreceeny et al. 2010, 2011; Harris and Morsfield 2012). For example, Du et al. (2013) find 4,260 errors in 4,532 XBRL filings submitted from June 2009 to December 2010, corresponding to an average of 0.94 errors per filing.

standard tags can be misapplied. With roughly 15,000 elements in the 2009 U.S. GAAP taxonomy, a number that continues to grow, firms may choose incorrect or overly broad tags instead of more precise ones (SEC 2011b).

Third, SEC staff may lack the necessary expertise in U.S. GAAP taxonomies and XBRL filing rules to fully leverage the unique features of XBRL data, especially during the early years of XBRL adoption. Although the SEC developed several advanced in-house applications of XBRL data, most were launched after the initial years of XBRL adoption, with the exception of IDAP.¹² Fourth, while XBRL may allow the SEC to review more filings, if the increase in review frequency outpaces staffing growth, it could create workload compression for SEC staff and result in more superficial reviews that undermine review quality. Lastly, given the convenience offered by XBRL, the SEC may over-rely on the quantitative disclosures provided through tagged data but overlook qualitative disclosures, making the overall impact of XBRL on SEC reviews unclear.

IV. Research Design and Data

4.1 Research Design

The SEC rolled out the XBRL mandate in three phases over 2009–2011. In the first phase (hereafter Phase 1), large accelerated filers with a public float of \$5 billion or more had to file their periodic financial statements included in their 10-K and 10-Q filings in XBRL format for fiscal periods ending on or after June 15, 2009. In the second phase (hereafter Phase 2), this mandate extended to accelerated filers with a public float between \$700 million and \$5 billion for fiscal periods ending on or after June 15, 2010. In the third phase (hereafter Phase 3), the mandate was

¹² These internal tools include Filer Profile, Financial Statement Query Viewer (FSQV), and iView (SEC 2023). For example, by 2016, staff throughout the SEC used FSQV to search financial statement data and footnotes across different periods and companies (Fleming 2016). We inquired of a member of the SEC’s Office of Structured Data but were unable to obtain, due to confidentiality considerations, information regarding when these tools were launched, when they became fully functional, or how SEC staff utilize these tools to fulfill their monitoring responsibilities.

further extended to all remaining public filers for fiscal periods ending on or after June 15, 2011. As a result, all firms are expected to have adopted XBRL in fiscal year 2011. Relying on the staggered adoption of XBRL, we implement a difference-in-differences design using 10-K filings from 2007 to 2011 (fiscal periods ending from June 15, 2007 to June 14, 2012). We identify whether the 10-K report is filed using XBRL format based on data provided by XBRL US.¹³ We use the following model to estimate the impact of XBRL adoption on the issuance and quality of SEC comment letters.

$$CL_Var_{it} = \alpha_0 + \alpha_1 XBRL_{it} + Control\ Variables_{it} + Year\ FE + Firm\ FE + \varepsilon \quad (1)$$

XBRL is an indicator that equals 1 if firm *i* in year *t* files its 10-K using XBRL format, and 0 otherwise. Since our model includes year and firm fixed effects, the coefficient on *XBRL* reflects the incremental change in the dependent variable for XBRL adopters, relative to not-yet-adopters, from the pre- to the post-adoption period (Bertrand and Mullainathan 2003; Armstrong et al. 2012).¹⁴ *CL_Var_{it}* equals *COMMENT_{it}* or *CLQUALITY_{it}*. *COMMENT_{it}* is set to 1 if firm *i* receives a comment letter on its 10-K filing for fiscal year *t*, and 0 otherwise. *CLQUALITY_{it}* is a measure of comment letter quality for firm *i* for year *t*, capturing the output of the SEC review process. Following Ege et al. (2020), it is calculated as the first factor from factor analysis on four dimensions of the comment letter: the number of comments (*#COMMENTS*), the number of issues referenced (*#TOPICS*), the number of negative-tone words (*#NEGTONE*), and the total number of words (*#WORDS*) in the initial comment letter. As *CLQUALITY* captures the output of the SEC review process, it addresses our research question of how XBRL affects SEC review activities.

¹³ See <https://xbrl.us/>. We code *XBRL* as 1 for both mandatory and voluntary adopters. In our sample, there are 120 (4+21+49+9+37) firm-year observations that voluntarily adopted XBRL (Table 1 Panel B), which represent 3.1% of the 3,829 firm-year observations that adopted XBRL in our sample period. In unreported analyses, we find that our main results are driven by mandatory adopters.

¹⁴ While we include year fixed effects to control for time trends of comment letter outcomes, we acknowledge that our sample period encompasses the 2008 financial crisis. In an untabulated test, we find robust results when replacing year fixed effects with an indicator for the financial crisis period (2008-2009).

However, *CLQUALITY* could reflect review inefficiency rather than quality if the comments are on trivial issues. To address this concern, we triangulate it with comment letter resolution outcomes in Section 5.1 and with alternative comment-letter-quality measures from Kubic and Toynbee (2023) in robustness tests.

Comment letter issuance is jointly determined by the SEC’s decision to review a 10-K filing and the probability that the SEC issues a comment letter conditional on the review (Gunny and Hermis 2020). We first control for the determinants of an SEC review, including whether the company reports a material weakness in the current or last year (*MWEAK* and *L_MWEAK*), the announcement of a restatement in the current or last year (*RESTATE* and *L_RESTATE*), high stock return volatility (*HVOLATILITY*), the market value of equity (*MCAP*), and the number of regulatory filings in the current year (*FILINGS*) (Cassell et al. 2013; Heese et al. 2017; Baugh and Schmardebeck 2023). We also control for other determinants of the issuance of a comment letter (Cassell et al. 2013; Gunny and Hermis 2020).¹⁵

In the comment letter quality regression, we additionally control for the number of filings addressed in the initial letter (*FILINGSCL*) (Cassell et al. 2019). As the SEC reviews registrants at least once every three years, we control for the receipt of comment letters in years *t-1* and *t-2* to account for lower comment likelihood following recent reviews (Cunningham et al. 2020).¹⁶

¹⁵ We control for loss occurrence (*LOSS*), financial distress (*ALTMAN*), business segments (*SEGMENTS*), mergers and acquisitions activities (*M&A*), restructuring activities (*RESTRUCTURING*), external financing demand (*EXTFINANCING*), and December fiscal year-end (*DECEMBER_FYE*). In addition, we control for auditor and governance characteristics that could affect disclosure quality and therefore SEC scrutiny (Cassell et al. 2013; Heese et al. 2017; Gunny and Hermis 2020): Big 4 auditor status (*BIG4*), auditor tenure (*AUDTENURE*), auditor switches (*AUDCHANGE*), institutional ownership (*%INST*), CEO-chair duality (*CEOCHAIR*), CEO tenure (*CEOTENURE*), and board independence (*INDPBOARD*). We also include the number of words in 10-K filing (*FILINGLENGTH*) to account for reporting complexity (Ahn et al. 2022).

¹⁶ One potential concern with controlling for *COMMENT_{t-1}* and *COMMENT_{t-2}* is that these variables may absorb substantial variation in the outcome variable and thereby bias the results. We therefore assess the robustness of our results by re-estimating Model (1) without these controls. Our inferences remain unchanged.

Appendix A provides detailed variable definitions. We estimate Model (1) using ordinary least squares (OLS) with robust standard errors clustered at the firm level.¹⁷

4.2 Sample Selection and Data Sources

Table 1 Panel A summarizes the sample selection process, where we start with 26,159 10-K filings from Compustat for fiscal years 2007-2011 following Bhattacharya et al. (2018). We then obtain data on firm characteristics from Compustat, stock returns from CRSP, comment letters and auditor characteristics from Audit Analytics, governance variables from ExecuComp and BoardEx, and institutional ownership information from Thomson Reuters. After removing observations with missing data for control variables in Model (1), we are left with 15,802 and 5,047 firm-years for the analyses of comment letter issuance and quality, respectively. Table 1 Panel B presents the annual distribution of treatment and control observations in our sample.

Table 2 presents summary statistics for variables used in our sample. About 31.9% of 10-Ks receive comment letters, comparable to the 33.2% reported in Heese et al. (2017) for 2005-2012. About 24.2% of firm-years file 10-Ks using XBRL, comparable to the 21.8% in Dong et al. (2016) for 2005-2012. Regarding the comment letter subsample, we find that the mean values for the number of comments, issues, negative-tone words, and total words contained in the initial letter are 8, 11, 14, and 1,211, respectively, compared to 6, 10, 11, and 1,085 for each corresponding measure in Ege et al. (2020). The average value for the number of days from the 10-K filing date to the first SEC comment letter date (*TIMELINESS*) is 149.88, comparable to the 152.10 in Gunny and Hermis (2020). Overall, the distribution of these key variables is similar to that in prior studies (Cassell et al. 2013; Gunny and Hermis 2020; Ege et al. 2020; Baugh and Schmardebeck 2023).

¹⁷ We report the OLS regression results because logistic regressions may lead to inconsistent coefficient estimates due to the inclusion of a large number of firm fixed effects (Lancaster 2000). Additionally, it is easier to interpret the coefficients of OLS regressions than those of logistic regressions. In untabulated tests, we use the logistic regression to estimate Model (1) when *COMMENT* is a dependent variable and find qualitatively similar results.

V. Main and Subsidiary Results

5.1 Effect of XBRL Adoption on the Issuance and Quality of SEC Comment Letters

XBRL Adoption and the Issuance of Comment Letters

Column (1) of Table 3 shows the results of Model (1) estimated with the full sample when the dependent variable is *COMMENT*. The coefficient on *XBRL* is positive and significant at the 5% level, consistent with H1 that XBRL adoption increases the likelihood that the SEC issues comment letters on 10-K filings. Economically, XBRL adoption is associated with an increase of 4.0 percentage points in the likelihood of a comment letter. This corresponds to a 12.5% increase relative to the sample mean probability of 31.9% that a 10-K filing receives a comment letter.

The coefficients on the controls are largely consistent with prior studies. For example, the coefficients on *MWEAK*, *MCAP*, *RESTRUCTURING*, and *FILINGLENGTH* are consistent with the positive effects of internal control weakness, firm size, and operational and reporting complexity on comment letter issuance (Cassell et al. 2013; Baugh et al. 2022). Consistent with a reduced likelihood of SEC reviews for firms that have been reviewed recently, *COMMENT_{t-1}* and *COMMENT_{t-2}* load negatively.

XBRL Adoption and the Quality of Comment Letters

Columns (2)-(6) of Table 3 report the results of Model (1) when the dependent variable is *CLQUALITY*, *#COMMENTS*, *#TOPICS*, *#NEGTONE*, and *#WORDS*, respectively, using the subsample of 5,047 firm-year observations that received comment letters. The coefficient on *XBRL* is positive and significant at the 10% level or better in each of the five columns, consistent with H2 that XBRL adoption is positively associated with the quality of SEC comment letters.

Our results are also economically significant. Specifically, the coefficient estimate on *XBRL* in column (2) (0.251) represents a 35.3% increase in the quality of comment letters relative

to the mean value of *CLQUALITY* in Table 2 (0.711) after the adoption of XBRL. The coefficient estimates on *XBRL* in columns (3)-(6) translate to an increase of 4.8%, 5.7%, 19.4%, and 7.4% in the number of comments, the number of issues referenced, the number of negative-tone words, and the total word count, respectively, after the adoption of XBRL.¹⁸ These findings suggest that the SEC performed higher-quality reviews during the post-adoption period, consistent with H2.

XBRL Adoption and the Resolution of Comment Letters

We complement the main comment letter quality analyses with an examination of how XBRL adoption affects the resolution of SEC comments. We capture comment letter resolution in three ways following prior studies. First, since SEC reviews aim to assess compliance with financial disclosure regulations, we examine firms' concurrence to amend or revise their current or future filings in their response to the SEC (Ege et al. 2020). Specifically, *AMENDREVISE* equals the number of times "amend" and "revise" appear in firms' response letters.

Second, we capture whether the comment letter detects material errors by examining whether the firm subsequently restates the referenced 10-K after the receipt of the comment letter (*RESTATECL*). Third, among firms that restate the referenced 10-K, we examine whether the restatement occurs during the comment letter process or within 135 days of the end of the comment letter conversation and is triggered by a topic discussed in the comment letter (*CAUGHT_DIRECT*) (Kubic 2021). The 135-day window reflects the time a registrant may correct an error in the next filing per SAB 108, following Kubic (2021, p. 318). If reduced disclosure processing costs allow the SEC to shift review focus toward less obvious yet more trivial issues, XBRL adoption may not lead to a higher restatement likelihood for 10-Ks referenced in the comment letters. In Panel A of Table 4, we estimate the impact of XBRL adoption on comment letter resolution using the 5,047

¹⁸ $e^{0.047} - 1 \approx 4.8\%$; $e^{0.055} - 1 \approx 5.7\%$; $e^{0.177} - 1 \approx 19.4\%$; $e^{0.071} - 1 \approx 7.4\%$.

observations with comment letters in columns (1) and (2), and the 1,106 observations with subsequent restatements in column (3). We find that the coefficient on XBRL is positive and significant at the 10% level or better in all three columns regardless of how we measure comment letter resolution.¹⁹ These findings are consistent with H2 that the SEC comment letters are more likely to identify more material issues after the XBRL adoption.²⁰

XBRL Adoption and Type II Errors of SEC Reviews

A Type II error occurs when the SEC reviews a 10-K, issues no comment letter, yet the filing is subsequently restated, indicating the review fails to identify a deficiency. If XBRL improves the SEC's review quality, we should observe fewer restatements among reviewed-without-comment firms after XBRL adoption.

To test this conjecture, in column (1) of Table 4 Panel B, we examine whether XBRL adoption affects the likelihood of annual report restatements among the 10,755 firm-years without comment letters. The dependent variable *FUT_RESTATE* equals 1 if the firm subsequently restates its current-year annual report, 0 otherwise. The coefficient on *XBRL* is negative and significant at

¹⁹ The results are also economically meaningful. The coefficient on *XBRL* in column (1) (1.12) represents a 33.3% increase in *AMENDREVISE*, relative to its sample mean of 3.36 from Table 2. The coefficients on *XBRL* in columns (2) and (3) (0.074 and 0.172) translate to increases of 33.8% and 162.3% in the likelihood that the referenced 10-K filing is subsequently restated, or restated for topics mentioned in the comment letter, relative to the sample means of 0.219 and 0.106, respectively.

²⁰ The reduction in information processing costs pursuant to XBRL could shift the SEC's review focus toward less obvious issues, ranging from relatively minor or inadvertent errors to serious violations that are deeply concealed. By facilitating more effective risk assessment, XBRL should help the SEC better distinguish between more serious and less serious issues, thereby enabling it to allocate more of its limited resources to the former. To test this prediction, we further examine whether XBRL adoption shifts the SEC's focus toward more serious or less serious reporting issues. We proxy for more serious issues with comment letters that result in a 10-K restatement (*COMMENT_RESTATECL*) or to which firms agree to amend or restate their 10-K (*COMMENT_AMEND*). We proxy for minor issues with comment letters that lead to neither an amendment nor a subsequent restatement (*COMMENT_NO_RESTATECL_NO_AMEND*). We re-estimate column (1) of Table 3 and find that XBRL is positively associated with *COMMENT_RESTATECL* and *COMMENT_AMEND*, but not with *COMMENT_NO_RESTATECL_NO_AMEND*, indicating that the SEC is more likely to detect more serious issues, but not minor issues, following XBRL adoption. This pattern is consistent with XBRL enhancing the efficiency and precision of SEC enforcement by facilitating the identification of more serious violations.

the 1% level, suggesting that the likelihood of restatements decreases for firms for which the SEC does not issue a comment letter after XBRL adoption.

It is possible that the SEC does not issue a comment letter because it does not review the firm. Therefore, the sample in column (1) also includes firms that were not reviewed. Since we cannot directly identify all firms reviewed by the SEC, we construct an SEC attention score (*SEC_ATTENTION*) to proxy for the *ex-ante* probability that a firm's current-year 10-K is reviewed by the SEC following Stice-Lawrence (2026).²¹ Specifically, we use the coefficient estimates from column (4) of Internet Appendix Table A1 of Stice-Lawrence (2026), which models SEC downloads of 10-K filings, to obtain a predicted SEC attention score for each firm-year in our sample. Appendix A details the construction of *SEC_ATTENTION*. To test its construct validity, in Panel C of Table 4, we find a monotonic positive relationship between the tercile rank of *SEC_ATTENTION* and the probability of comment letter issuance among all sample observations with non-missing values, suggesting that it is a reasonable proxy for the probability of SEC review.

In column (2) of Panel B, we continue to find a negative and significant coefficient on XBRL when we further restrict the sample to observations with non-missing *SEC_ATTENTION*. In columns (3) and (4) of Panel B, we partition firm-years into terciles based on *SEC_ATTENTION* and re-estimate the model separately for the top and bottom terciles, representing firms with the highest and lowest *ex ante* likelihood of attracting SEC attention, respectively. We exclude the middle tercile to maximize the contrast in expected SEC scrutiny. We find that among firm-years that did not receive a comment letter, the reduction in restatement likelihood occurs only in the top

²¹ The number of SEC downloads of firms' filings is another reasonable measure of SEC review probability. However, because SEC traffic was routed to internal servers and their IPs were not available during 2009-2012 (Stice-Lawrence 2026), this data is not publicly available for the majority of our sample period.

tercile of *SEC_ATTENTION* in column (3) but not in the bottom tercile in column (4). This evidence indicates that the SEC is more justified in not issuing a letter for those reviewed-without-comment firms, i.e., fewer Type II errors, following XBRL adoption. Overall, results in Tables 3 and 4 are consistent with our main conjecture that XBRL adoption reduces the SEC’s disclosure processing costs and increases the frequency and quality of SEC comment letters.

In the next three sections, we examine how XBRL adoption improves SEC reviews through three channels: automation of data extraction, standardization of financial reporting, and enhanced monitoring of complex reporting issues. We recognize that these channels are fundamentally interconnected, making it difficult to cleanly isolate their individual effects.

5.2 The Effect of XBRL Automation on the Efficiency of SEC Reviews

First, XBRL’s automation capability should allow the SEC to enhance monitoring efficiency by conducting reviews more promptly. We thus test whether XBRL improves the timeliness of SEC comment letters, measured as the natural logarithm of one plus the number of days between the 10-K filing date and the date of the first comment letter (*TIMELINESS*) (Gunny and Hermis 2020). This test is conducted with the 5,047 observations with comment letters using the same model specification as in Table 3 column (2). In Panel A column (1) of Table 5, the coefficient on XBRL is -0.142 and significant at the 1% level. This corresponds to a 13.2% reduction ($e^{-0.142} - 1$), or approximately 19.8 fewer days relative to the sample mean of 149.88 days. This evidence is consistent with automated data extraction facilitating more timely SEC reviews. In columns (2) and (3), we re-estimate the regression separately for the top and bottom tercile of comment letter length, respectively. We find that XBRL is associated with timelier issuance of longer comment letters, but not shorter ones, consistent with the notion that XBRL

particularly improves the efficiency of reviews that likely involve greater information processing costs.

Second, to the extent automation improves the efficiency of SEC reviews, its positive impact on comment letter frequency and quality is likely to be more pronounced when SEC staff are busier due to greater expected and unexpected resource constraints. We measure the SEC's expected resource constraints based on its seasonal busyness associated with registrants with a December fiscal year-end (Gunny and Hermis 2020). *DECEMBER_FYE* is set to 1 for firms with a December fiscal year-end, and 0 otherwise. We measure the SEC's unexpected resource constraints based on its workload from concurrent reviews of transactional filings (Ege et al. 2020). Specifically, for the test of comment letter frequency (quality), *HIGH_TRANSFILINGS* is set to 1 if the transactional filing volume in the firm's assigned SEC industry office, measured over the month of the 10-K filing (the issuance of the initial letter when *CLQUALITY* is the dependent variable) and the immediately preceding month is in the top quartile of the year, and 0 otherwise. In Panel B of Table 5, we interact *XBRL* with these two variables. The dependent variable is *COMMENT* in columns (1) and (2) and *CLQUALITY* in columns (3) and (4). We find that the coefficient on $XBRL \times DECEMBER_FYE$ and $XBRL \times HIGH_TRANSFILINGS$ are both positive and significant at the 10% level or better across all columns, supporting the prediction of more pronounced beneficial effects of XBRL automation when the SEC faces tighter resource constraints.²²

Third, we investigate whether SEC review quality varies with the accessibility of XBRL data analysis tools—such as IDAP—given their critical role in enabling the SEC to automate data

²² Since only 1% of sample firms have within-firm variation in *DECEMBER_FYE*, we caution the interpretation of its main effect given the inclusion of firm fixed effects in the regression.

acquisition. While we do not have direct evidence on the exact timing of the SEC's development or initial use of these tools, Starr (2012) suggests that IDAP was in extensive use by April 2012 and likely in limited use during 2011. These tools were still in their early stages during the initial XBRL adoption period of 2009–2010. Accordingly, we expect the main effects to be more pronounced as these tools mature over time.

To test this conjecture, we proxy the timing of SEC reviews based on the comment letter issuance date and use the comment letter subsample. *CL_2011_ISSUANCE* (*CL_2012_2013_ISSUANCE*) equals 1 if the letter was issued in 2011 (2012 or 2013), and 0 otherwise. In Panel C of Table 5, the coefficients on *XBRL* × *CL_2011_ISSUANCE* and *XBRL* × *CL_2012_2013_ISSUANCE* capture the incremental impact of XBRL adoption on letters issued in 2011 and 2012 or thereafter, respectively, relative to letters issued to XBRL adopters in prior years.²³ The coefficients on both interaction terms are positive and significant at the 5% level or better, indicating that the XBRL effect on comment letter quality grows once the SEC's analytical tools became more mature. The insignificant coefficients on *CL_2011_ISSUANCE* and *CL_2012_2013_ISSUANCE* mitigate concerns that the observed effects are driven by a general time trend or other concurrent changes in the SEC's review process post-2011. Importantly, the main effect of *XBRL* is insignificant. This evidence suggests that before analytical tools became available, standardized reporting of XBRL alone did not improve SEC monitoring. The benefits of XBRL emerged only after the SEC can automate data extraction and analysis using analytical

²³ The SEC issued 15, 133, 347, 825, and 39 comment letters to XBRL-adopting firms in calendar years 2009, 2010, 2011, 2012, and 2013, respectively. Due to the small number of such comment letters issued in 2013, we combine them with those issued in 2012 in this test. Although our sample period ends in 2011, due to the typical time lag between the fiscal year-end date, 10-K filing date, and SEC letter issuance date, the majority (347+825+39=1,211) of comment letters to XBRL-adopting firms were issued after 2010. We observe a similar pattern for the comment letters issued to non-XBRL-adopting firms.

tools such as IDAP. Therefore, this test further highlights the role of automation for SEC monitoring.

5.3 The Effect of XBRL Standardization on Peer Benchmarking and Deviation Detection

Since standardization under XBRL improves financial reporting comparability across firms and over time (Hoitash and Hoitash 2018), we test whether it enhances the SEC's ability to detect disclosure deviations through peer benchmarking.

First, we examine how the extent of standard tags impacts comment letter frequency and quality. As discussed earlier, compared to standard tags, extended tags significantly impede the comparison of financial reports (Kim, Kim, and Lim 2019). Therefore, while all XBRL filings are machine-readable, only those with a high extent of standard tags benefit more from standardization. Specifically, we re-estimate Model (1) after replacing the test variable *XBRL* with two indicators, *SCALED_HIGH_STANDARD_TAG* (*SCALED_LOW_STANDARD_TAG*), which equals 1 if the XBRL filing has an above-median (below-median) ratio of the number of standard tags to total tags, and 0 otherwise. We use the scaled measure since the number of standard tags may simply proxy for firm size (Johnston 2020), although results are similar if we use the unscaled measure. In this specification, the coefficient on *SCALED_HIGH_STANDARD_TAG* (*SCALED_LOW_STANDARD_TAG*) captures the impact of XBRL adoption on SEC monitoring of firms with high (low) extent of standardization in XBRL reporting, compared to firm-years without XBRL adoption. The difference between these two coefficients reveals the incremental impact of standardization. As an alternative way to account for firm size, we adjust the standard tags by firm size, based on the decile ranking of the firm's market capitalization in the full sample.

In Table 6, Panel A, across all four columns, the coefficients on *SCALED_HIGH_STANDARD_TAG* and *SIZEADJ_HIGH_STANDARD_TAG* are both positive

and significant at the 5% level or better, while the coefficients on *SCALED_LOW_STANDARD_TAG* and *SIZEADJ_LOW_STANDARD_TAG* are both insignificant. Further, the coefficient differences between the two indicators in each pair are all significant except for column (4). This evidence suggests that conditioning on automation, standardization incrementally enhances SEC monitoring.

Second, the U.S. GAAP taxonomy often provides multiple standard tags for the same class of accounts or transactions.²⁴ Even in the absence of extended tags, differences in standard tag selection can still hinder comparability. Moreover, because industry peers are most likely the benchmark group employed by the SEC in its reviews, we measure the overall XBRL tag similarity of the firm compared to its industry peers using TF-IDF cosine similarity, a validated approach in the textual analysis literature (Brown and Tucker 2011; Peterson et al. 2015). Specifically, for firm *i* in year *t*, we compute the tag similarity between its full set of XBRL tags and that of each of the other firms in the same two-digit SIC industry and year. We then calculate tag similarity (*TAG_SIMILARITY*) as the mean value of firm *i*'s pairwise similarity across all industry-year peers, requiring at least three observations per industry-year. This measure reflects how similar a firm's reporting vocabulary is to its peers in a machine-readable environment. We then re-estimate Model (1) by replacing *XBRL* with two indicators, *HIGH_TAG_SIMILARITY* (*LOW_TAG_SIMILARITY*), which equals 1 for observations with above-median (below-median) value of tag similarity, and 0 otherwise. As standardization facilitates benchmarking, the benefits of XBRL should be more pronounced for firms exhibiting greater tag similarity.

²⁴ For instance, in the 2009 U.S. GAAP taxonomy, there are 132 tags related to revenue, 29 to interest income, 31 to interest expense, 17 to depreciation expense, 84 to impairment, 18 to income tax expense, and 96 to fair value items. See <https://xbrl.us/xbrl-taxonomy/2009-us-gaap/> for details.

In Panel B of Table 6, the coefficient on *HIGH_TAG_SIMILARITY* is positive and significant at the 1% level in both columns, while the coefficient on *LOW_TAG_SIMILARITY* is significant at the 1% level in column (2) but insignificant in column (1). Importantly, the coefficients on the former are significantly larger than those on the latter at the 10% level or better in both columns. These results suggest that the impact of XBRL adoption on SEC monitoring is stronger for firms whose tags are more closely aligned with those of industry peers and arguably have a higher degree of standardization in digital financial reporting. These findings strengthen the argument that XBRL enhances SEC monitoring through standardization.

Prior research suggests that the similarity of human-readable financial reports plays a role in SEC oversight. Brown et al. (2023) introduce a measure of financial statement similarity that captures how closely a firm's financial reporting of its economic activities aligns with that of its industry peers. They find that firms with low financial statement similarity are more likely to receive SEC comment letters and interpret the results as suggesting increased regulatory scrutiny for firms that deviate more from industry peers.²⁵ We extend prior research on the role of financial statement comparability in SEC monitoring to the digital reporting setting. Since one of the primary goals of XBRL is to standardize digital reporting language to facilitate comparison, our tag similarity measure directly maps to this goal. To the extent that the SEC relies on XBRL data for monitoring in the digital reporting era, we expect that tag similarity will enhance the SEC's ability to benchmark and identify reporting deficiencies.

We test whether the association between financial statement similarity from Brown et al. (2023) and SEC monitoring varies with tag similarity. Specifically, we classify all XBRL filers

²⁵ Using the financial statement comparability measure in De Franco et al. (2011), Nam and Thompson (2023) find that among firms with higher abnormal accruals, the likelihood of receiving an SEC comment letter increases with greater comparability. They interpret the results as indicating that more comparable accounting systems enhance the SEC's ability to identify accounting deviations.

into four groups based on whether their tag similarity and financial statement similarity are above or below the sample median (*HIGH_TAG* vs. *LOW_TAG*; *HIGH_FS* vs. *LOW_FS*). We then replace *XBRL* with the four indicators and additionally control for the indicator of low financial statement similarity (*LOW_FS*). In this specification, the benchmark group comprises firms without XBRL adoption and with high financial statement similarity (*HIGH_FS*). The coefficient on *HIGH_TAG_LOW_FS* (*LOW_TAG_LOW_FS*) captures, among firms with low financial statement similarity, the incremental association between firms with high (low) tag similarity and SEC monitoring relative to firms without XBRL adoption.

In Panel C of Table 6, the coefficient on *HIGH_TAG_LOW_FS* is positive and significant at the 10% level or better in both columns. In contrast, the coefficient on *LOW_TAG_LOW_FS* is insignificant. Importantly, the coefficient on *LOW_FS* is also insignificant.²⁶ These results suggest that firms whose financial statements deviate more from those of industry peers face increased SEC scrutiny primarily when they have adopted XBRL and their XBRL filings exhibit high tag similarity with those of industry peers. This finding further supports the idea that XBRL facilitates the detection of deviation through standardization.

5.4 The Effect of XBRL Adoption on the Monitoring of Complex Reporting Issues

As noted earlier, complex accounting issues inherently engender greater information processing costs. Since XBRL can enhance the analytical capability of the SEC by allowing

²⁶ In their Table 8 Panel D, Brown et al. (2023) find that the negative association between financial statement similarity and the issuance of SEC comment letters is present only during the latter half (2013-2021) but not the earlier half (1997-2012) of the sample period. Our finding of the insignificant coefficient on *LOW_FS* is consistent with their result during the 1997-2012 period. They attribute this pattern to the launch of the Accounting Quality Model (i.e., RoboCop) in 2013, which is a tool used by the SEC to monitor firm financial reporting disclosures. To the extent that the SEC uses structured digital data to feed the Accounting Quality Model, XBRL adoption could be an alternative reason for why their results only concentrate during the latter half of the sample period.

broadened review scope and more in-depth examination, we expect more pronounced effects of XBRL on more complex items within each filing and on firms with more complex filings.

First, we explore how XBRL affects the type of accounts questioned by the SEC. We follow the method in Cassell et al. (2013) and identify comment letters referencing accounts related to core earnings (*CORE*) and non-core earnings (*NONCORE*). Non-core earnings encompass non-recurring, complex, and firm-specific transactions, such as impairments, restructurings, discontinued operations, mergers and acquisitions, and extraordinary items, which are subject to greater reporting risk and require greater accounting expertise (Chychyla et al. 2019). In contrast, core earnings relate to more routine and less complicated transactions, rendering them relatively easier to monitor even without XBRL. In columns (1) and (2) of Table 7 Panel A, we find that XBRL increases the likelihood of a comment letter for non-core earnings, but not for core earnings. In columns (3) and (4), we find that within the subsample of firms with comment letters, XBRL increases the number of topics related to non-core earnings (*#TOPICS_NONCORE*), but not the number of topics related to core earnings (*#TOPICS_CORE*), discussed in the comment letter.²⁷ Our findings suggest that XBRL is particularly effective in facilitating the SEC's monitoring of more complicated accounts.²⁸

Second, compared to the face of financial statements, footnotes are more complex to analyze and engender higher information processing costs. Prior research finds that investors react

²⁷ We test the number of topics for core vs. non-core earnings, rather than the other three attributes of comment letter quality, because we can clearly delineate whether a comment letter topic is for the core vs. non-core earnings from the *LIST_CL_ISSUE_TAXGRP* field in Audit Analytics. However, we cannot clearly separate the number of comments, the number of negative-tone words, or the total number of words into those related to core vs. non-core earnings.

²⁸ In addition to the robustness test in footnote 14 on effects of the 2008 financial crisis, we implement two additional tests to further rule out the possibility that our results in Table 7 Panel A may be driven by increased regulatory focus on banks during the financial crisis. First, we rerun our main analyses as well as that in Table 7 Panel A after excluding financial firms and find similar results. Second, we directly examine the association between *XBRL* and bank-specific topics related to non-core items. Untabulated results suggest that XBRL adoption does not have a significant effect on the issuance or number of SEC comments related to loan receivables and loss reserves, indicating that our results are not driven by the increase in regulatory focus on banks during the financial crisis.

more strongly to information recognized on the face of financial statements than to information disclosed in footnotes (Ahmed et al. 2006), likely due to the lower reliability and higher information processing costs of footnotes (Müller et al. 2015). Similar to the specification in Table 6 Panel A, we re-estimate Model (1) after replacing *XBRL* with two indicators, *SCALED_HIGH_NOTE_TAG* (*SCALED_LOW_NOTE_TAG*), which equals 1 if the XBRL filing for firm *i* in year *t* has an above-median (below-median) ratio of the number of footnote tags to total tags, and 0 otherwise. Similar to Table 6 Panel A, we also construct the corresponding size-adjusted measures. In Panel B of Table 7, the coefficients on *SCALED_HIGH_NOTE_TAG* and *SIZEADJ_HIGH_NOTE_TAG* are positive and significant at the 1% level in all columns, while the coefficients on *SCALED_LOW_NOTE_TAG* and *SIZEADJ_LOW_NOTE_TAG* are insignificant. Further, the coefficient difference in each pair is significant in all columns. This result suggests the main impact of XBRL on comment letters is primarily driven by firms using more footnote tags. This evidence corroborates the notion that XBRL is particularly beneficial for the more complicated sections of financial reports.

Third, to the extent XBRL adoption enables the SEC to be more adept with complex issues, we expect the effect of XBRL to be stronger when financial reports are more complex. To test this prediction, we interact *XBRL* with two proxies for annual report complexity (Loughran and McDonald 2014; Baugh et al. 2022; Cahan et al. 2022). Specifically, *HIGH_FILING_LENGTH* (*HIGH_FILING_SIZE*) is set to 1 if the word count (file size) of the 10-K filing is in the top quartile of the year, and 0 otherwise.²⁹ In Panel C of Table 7, the coefficients on the interaction terms *XBRL*×*HIGH_FILING_LENGTH* and *XBRL*×*HIGH_FILING_SIZE* are positive and significant at

²⁹ Our results are similar if we replace *HIGH_FILING_LENGTH* and *HIGH_FILING_SIZE* with their respective continuous variables in this test.

the 10% level or better in all four columns, consistent with the prediction that the positive effects of XBRL adoption are more pronounced for firms with more complex annual reports.

Lastly, we explore the moderating effect of reviewer characteristics. On the one hand, reviewers with greater expertise are more likely to be assigned to more complex filings and thus may benefit more from XBRL adoption. On the other hand, standardization may make it easier for less-experienced reviewers to interpret data by enabling a more methodical evaluation of the data, which implies stronger effects of XBRL adoption for junior reviewers. We measure SEC review teams' expertise by the presence of supervisory personnel on the team. *SUPERVISOR* is set to 1 if at least one SEC reviewer for the firm is a senior assistant chief or a branch chief, and 0 otherwise.³⁰ Then, we include in the regression *SUPERVISOR* and its interaction with *XBRL* in Panel D of Table 7. As this analysis is restricted to firm-years with comment letters, we only examine *CLQUALITY*. The coefficient on *SUPERVISOR* is positive and significant at the 1% level, consistent with the expected higher review quality when a supervisor is on the review team. Importantly, we find the coefficient on *XBRL*×*SUPERVISOR* is positive and significant at the 10% level, suggesting that the effect of XBRL adoption on comment letter quality is most noticeable when a supervisor is on the review team.³¹

5.5 Robustness Tests

Given that the initial adoption of XBRL imposed substantial regulatory and operational burdens on registrants, it is possible that our main findings are driven by the SEC's enforcement

³⁰ We thank Professor Matthew Kubic for providing SEC review team size and composition data at <https://www.mattkubic.com/data>.

³¹ In a related test, we examine whether reviewer-specific effects diminish after XBRL adoption as it potentially makes the SEC review process more standardized. Specifically, we collect SEC reviewer information from Audit Analytics and manually parse the data field to identify individual reviewers for each 10-K reviewed. Then, we partition our sample by XBRL adoption and re-estimate Table 3 column (2) without and with reviewer fixed effects. We find that the incremental adjusted R^2 introduced by reviewer fixed effects is 0.076 for the pre-XBRL adoption sample, compared to 0.087 for the post-XBRL adoption sample. At a minimum, these results do not support the notion that reviewer-specific effects diminish after XBRL adoption.

of compliance with the XBRL mandate, rather than by its actual use of XBRL data in the review process. Under this explanation, we expect the SEC to frequently cite deficiencies related to XBRL compliance issues in comment letters. Contrary to this expectation, however, we find that only one out of the 5,047 comment letters in our sample explicitly references issues with XBRL compliance.

While XBRL adoption reflects an exogenous regulatory shock for most adopting firms, the implementation is phased in based on firm size. Hence, our main results may simply reflect greater SEC scrutiny over larger firms. This alternative explanation implies a differential pre-existing trend between adopting and non-adopting firms. Although we control for firm size (*MCAP*) and firm fixed effects in our main regressions, we nonetheless perform several analyses to further address this concern. First, we test the parallel trends assumption by creating indicator variables for the years surrounding XBRL adoption: the adoption year (*POSTXBRL[0]*), two or three years before the firm's adoption (*PREXBRL[-2]* and *PREXBRL[-3]*), as well as one and two/more years after the firm's adoption (*POSTXBRL[+1]* and *POSTXBRL[+2 & after]*). The year prior to XBRL adoption (*PREXBRL[-1]*) is set as the baseline (hence omitted from the regression) following prior literature (Baker et al. 2022; She 2022; Schafhäutle and Veenman 2024). We expand the sample period to 2006 to construct these indicators. In Panel A of Table 8, the coefficients are insignificant for the pre-XBRL indicators and positive and significant only for the post-XBRL indicators; we thus fail to reject the parallel trends assumption.

It is also possible that concurrent with XBRL adoption, the SEC steps up its scrutiny of larger firms due to their greater economic impact. We address this concern through two falsification tests. First, we examine the MD&A section and qualitative disclosures on risk factors, internal control effectiveness, and non-accounting issues since they are excluded from XBRL requirements. Panel B of Table 8 shows that *XBRL* is not associated with the likelihood of

comment letters for any of these issues. This evidence suggests that XBRL does not generate negative externalities for the review of qualitative disclosures in 10-K filings as the SEC improves the reviews of quantitative disclosures through analysis of tagged data. Second, since the XBRL mandate does not apply to transactional filings, in Panel C of Table 8 we examine SEC comment letters on transactional filings and fail to find an effect of XBRL adoption. Collectively, these findings suggest that the improved SEC monitoring only occurs for filings and sections of filings that are subject to the XBRL mandate, further corroborating our main results.

To further address firm size as a confounding factor and strengthen our inferences, we employ a regression discontinuity design to compare firms around the XBRL adoption threshold. Specifically, for the Phase 1 adoption in 2009, we identify treatment firms as the smallest 100 mandatory adopters with public float immediately above the adoption threshold, and control firms as the largest 100 non-adopters with public float immediately below the adoption threshold. We repeat the same procedure for the Phase 2 adoption in 2010.³² In Panel D of Table 8, results are consistent with our main findings.

The standard DiD regression with staggered treatment timing may provide a biased estimate of the causal effect due to “bad comparisons” (Baker et al. 2022, p. 372). Hence, we adopt stacked DiD regression. Specifically, we construct two cohorts of treated firms that adopted XBRL in 2009 and 2010 respectively along with control groups, which are firms that adopted XBRL later. We then re-estimate Model (1) using the stacked cohorts, substituting firm and year fixed effects with cohort-firm and cohort-year fixed effects. The results in Panel E of Table 8 support our main findings.

³² Given the small sample size, we replace firm fixed effects with industry fixed effects in this test.

Prior studies suggest that the SEC’s download of firm filings reflects regulatory attention to firm disclosures (Stice-Lawrence 2026; Holzman et al. 2024). To provide a direct link between the SEC’s attention and comment letter outcomes during the XBRL era, we examine how the association between SEC downloads and monitoring outcomes varies after XBRL adoption. Because XBRL filings are submitted in XML format, we use SEC downloads of XML filings to proxy for SEC access to XBRL data. *XML_DOWNLOAD* (*HTML_DOWNLOAD*) is the natural logarithm of one plus the number of SEC downloads of XML filings (HTML filings).³³ In Table 8 Panel F, we find that the SEC’s download of XBRL data, but not non-XBRL data, is positively associated with comment letter frequency and quality, corroborating the conjecture that the SEC more effectively leverages XBRL data to improve its monitoring.

To assure that our main results are driven by XBRL adoption rather than concurrent economic events, we conduct a falsification test by assigning the pseudo-adoption year of XBRL as one, two, or three years before or after the actual adoption year. In untabulated tests, we find that the frequency and quality of SEC comment letters do not change following the pseudo-adoption, assuring the validity of our main inferences. Additionally, changes in firm reporting and disclosures pursuant to XBRL adoption may affect SEC reviews. For example, post-adoption, standardized reporting under XBRL could constrain earnings management and lead to a reduction in abnormal accruals (Kim, Kim, and Lim 2019), which may shape SEC comment letters. Our main results remain robust after controlling for discretionary accruals (untabulated).

³³ We use the list of the SEC’s IP addresses in Guo and Tian (2024) to conduct this test. We thank the authors for providing this list. For this test, we focus on the sample period of 2013 to 2016 since the SEC’s downloads of XML filings are more widely available after 2013. We exclude years prior to 2009 because XML filings were almost non-existent before 2009. We exclude years between 2009 and 2012 because SEC traffic was routed to internal servers and their IPs were not available during this period (Stice-Lawrence 2026). We end in 2016 because daily log files for 2017 are incomplete.

Similarly, since firms may increase their quantitative footnote disclosure following XBRL implementation (Blankespoor 2019), our main results could be driven by more SEC comments on expanded footnote disclosures. If so, the effect should be concentrated in footnote-related comments. We re-estimate Table 3 column (1) by replacing *COMMENT* with *CL_Footnote* (*CL_NonFootnote*), which is set to 1 if the initial letter does (does not) mention footnotes. We find the coefficient on *XBRL* is insignificant when *CL_Footnote* is the dependent variable and is only marginally significant when *CL_NonFootnote* is used ($t=1.60$), indicating that the increase in comment letters is unlikely to be driven by footnote-related comments. Additionally, we fail to find any association between *XBRL* and the number of times the SEC mentions footnote disclosure in its comment letters. Thus, our main results cannot be solely explained by changes in firm footnote disclosure. Lastly, in the main tests we rely on Ege et al. (2020) to measure comment letter quality. In an untabulated test, we use four alternative measures of comment letter quality derived from Table 3 of Kubic and Toynbee (2023) and continue to find a positive association between *XBRL* and comment letter quality.

VI. Conclusion

Although information processing costs impede all users of firm disclosures, there is limited evidence regarding how these costs influence the SEC. By leveraging the exogenous shock to disclosure processing costs induced by XBRL adoption, we find that both the likelihood and quality of SEC comment letters increase following the adoption. Post-XBRL adoption, the SEC identifies more serious disclosure deficiencies, as evidenced by more amendments and restatements of 10-K filings and lower Type II errors. Further, we document three channels through which XBRL enhances SEC monitoring. First, consistent with automation improving review efficiency, we find improved timeliness of comment letters, more pronounced effects of

XBRL when the SEC faces greater resource constraints, and materialized XBRL benefits only after the SEC can automate data management through analytical tools. Second, in line with standardization enhancing cross-firm benchmarking, we find greater effects of XBRL for firms with more standard tags and tags more similar to those of industry-year peers. Third, supporting the notion that XBRL enhances the SEC's ability to monitor complex reporting issues, we find that the benefits of XBRL are concentrated primarily in more complex accounts and among firms with more complex financial reports.

In conclusion, our study provides evidence that a reduction in disclosure processing costs significantly enhances SEC monitoring. This finding implies that XBRL adoption benefits not only capital market participants but also the capital market regulator—the SEC—in fulfilling its monitoring responsibilities. Future research could explore whether and how other recent advancements in financial reporting technology affect regulatory monitoring.

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Appendix A: Variable Definitions

Variables	Variable Definitions
Dependent Variables	
<i>COMMENT</i>	Indicator variable set to 1 if the SEC issues a comment letter on the firm's 10-K filing for year t , and 0 otherwise.
<i>#COMMENTS</i>	Logarithm of one plus the number of comments in the initial letter referencing the 10-K filing for year t .
<i>#TOPICS</i>	Logarithm of one plus the number of issue codes listed in the LIST_CL_ISSUE_TAXGRP field in Audit Analytics in the initial letter referencing the 10-K filing for year t .
<i>#NEGSTONE</i>	Logarithm of one plus the number of negative-tone words in the initial letter referencing the 10-K filing for year t , where negative tone is measured using the Loughran and McDonald dictionary.
<i>#WORDS</i>	Logarithm of one plus the total number of words in the initial letter referencing the 10-K filing for year t .
<i>CLQUALITY</i>	The first factor obtained using factor analysis on <i>#COMMENTS</i> , <i>#TOPICS</i> , <i>#NEGSTONE</i> , and <i>#WORDS</i> .
<i>AMENDREVISE</i>	Number of counts of 'amend' or 'revise' in the firm's first response letter.
<i>RESTATECL</i>	Indicator variable set to 1 if the firm subsequently restates the 10-K filing for year t referenced in the SEC comment letter, and 0 otherwise.
<i>CAUGHT_DIRECT</i>	Indicator variable set to 1 if the firm restates a financial statement under review by the SEC during the comment letter process or within 135 days from the end of the comment letter conversation, and the comment letter content relates to the error(s) causing the restatement based on the mapping in Appendix C of Kubic (2021), and 0 otherwise.
<i>FUT_RESTATE</i>	Indicator variable set to 1 if the 10-K filing for year t is subsequently restated, and 0 otherwise.
<i>TIMELINESS</i>	Logarithm of one plus the number of days between the 10-K filing date and the date of the first SEC comment letter.
<i>CORE</i>	Indicator variable set to 1 if the SEC issues a comment letter on the firm's 10-K filing raising issues related to core earnings (e.g., revenues, cost of goods sold, selling, general, and administrative expenses) for year t , and 0 otherwise. Core and non-core earnings-related issues are assigned based on Appendix B of Cassell et al. (2013).
<i>NONCORE</i>	Indicator variable set to 1 if the SEC issues a comment letter on the firm's 10-K filing raising issues related to non-core earnings (e.g., impairments, restructurings, M&A, discontinued operations, extraordinary items, taxes and goodwill) for year t , and 0 otherwise.
<i>#TOPICS_CORE</i>	Logarithm of one plus the number of codes listed in the LIST_CL_ISSUE_TAXGRP field in Audit Analytics related to core earnings items (e.g., revenues, cost of goods sold, selling, general, and administrative expenses) in the initial letter referencing the 10-K filing for year t . Core and non-core earnings-related issues are assigned based on Appendix B of Cassell et al. (2013).
<i>#TOPICS_NONCORE</i>	Logarithm of one plus the number of codes listed in the LIST_CL_ISSUE_TAXGRP field in Audit Analytics related to non-core earnings items (e.g., impairments, restructurings, M&A, discontinued operations, extraordinary items, taxes and goodwill) in the initial letter referencing the 10-K filing for year t .
<i>COMMENT_TRANS</i>	Indicator variable set to 1 if the SEC issues a comment letter on the firm's transactional filings for year t , and 0 otherwise. We include comment letters that do not reference any annual or quarterly filings but do reference at least one of the following: Form S-1, S-1/A, S-3, S-3/A, S-4, S-4/A, PREM14A, DEFM14A, SB-2, SB-2/A, 10-12G, 10-12G/A, 10-12B, 10-12B/A, DRS, DRS/A, F-1, F-1/A, F-3, F-3/A, F-4, or F-4/A (Cunningham and Leidner 2022).
<i>CLQUALITY_TRANS</i>	The first factor obtained using factor analysis on <i>#COMMENTS</i> , <i>#TOPICS</i> , <i>#NEGSTONE</i> , and <i>#WORDS</i> for comment letters referencing transactional filings.

<i>COMMENT_MD&A</i>	Indicator variable set to 1 if the SEC issues a comment letter referencing issues in the MD&A section of the 10-K filing for year <i>t</i> , and 0 otherwise.
<i>COMMENT_RISKFACTOR</i>	Indicator variable set to 1 if the SEC issues a comment letter referencing issues in the risk-factor disclosure section of the 10-K filing for year <i>t</i> , and 0 otherwise.
<i>COMMENT_CONTROL</i>	Indicator variable set to 1 if the SEC issues a comment letter referencing issues in the internal control disclosure in the 10-K filing for year <i>t</i> , and 0 otherwise.
<i>COMMENT_NONACCT</i>	Indicator variable set to 1 if the SEC issues a comment letter referencing issues other than accounting rule application and accounting-related disclosure of the 10-K filing for year <i>t</i> , and 0 otherwise.
Test and Moderating Variables	
<i>XBRL</i>	Indicator variable set to 1 if the firm in year <i>t</i> files its 10-K using XBRL-tagged data, and 0 otherwise.
<i>SEC_ATTENTION</i>	A firm-year measure of predicted SEC attention to 10-K filings, constructed by applying the coefficient estimates from column (4) of Internet Appendix Table A1 of Stice-Lawrence (2026) to firm-year determinants: $SEC_ATTENTION_t = 0.151*Restatement_t + 0.278*ICW_{t-1} + 0.962*Stock_Vol_t + 0.0887*ln_MVE_{t-1} - 0.0346*EP_Ratio_{t-1} + 0.363*10K_Filed_t + 0.0457*ln_8K_t + 0.0584*ln_Other_Filings_t - 0.0365*Return_t + 0.0190*Loss_{t-1} + 0.000715*EA_Lag_{t-1} - 0.143*Big4_{t-1} - 0.00881*ln_SEC_Office_Dist_t$. <i>Restatement_t</i> = Indicator variable set to 1 if the firm announced a restatement during fiscal year <i>t</i> . <i>ICW_{t-1}</i> = Indicator variable set to 1 if the firm reported a Section 404 internal control weakness in fiscal year <i>t</i> –1. <i>Stock_Vol_t</i> = Standard deviation of daily stock returns over fiscal year <i>t</i> . <i>ln_MVE_{t-1}</i> = Natural logarithm of the market value of equity at the end of fiscal year <i>t</i> –1. <i>EP_Ratio_{t-1}</i> = Earnings before extraordinary items divided by market value of equity at the end of fiscal year <i>t</i> –1. <i>10K_Filed</i> = Indicator variable set to 1 if the firm filed a 10-K during fiscal year <i>t</i> . <i>ln_8K</i> = Natural logarithm of 1 plus the number of 8-Ks filed during fiscal year <i>t</i> . <i>ln_Other_Filings</i> = Natural logarithm of 1 plus the number of EDGAR filings during fiscal year <i>t</i> , excluding 8-Ks, 10-Ks, and 10-Qs. <i>Return_t</i> = Cumulative stock return over fiscal year <i>t</i> . <i>Loss_{t-1}</i> = Indicator variable set to 1 if the firm reported negative income before extraordinary items in fiscal year <i>t</i> –1. <i>EA_Lag_{t-1}</i> = Number of days between fiscal year-end <i>t</i> –1 and the annual earnings announcement date. <i>Big4_{t-1}</i> = Indicator variable set to 1 if the firm was audited by a Big 4 auditor in fiscal year <i>t</i> –1. <i>ln_SEC_Office_Dist_t</i> = Natural logarithm of 1 plus the distance in miles from the firm's headquarters to the nearest SEC regional office. The press coverage term in Stice-Lawrence (2026) is omitted due to the lack of access to RavenPack.
<i>DECEMBER_FYE</i>	Indicator variable set to 1 for firms with a December fiscal year-end, and 0 otherwise.
<i>HIGH_TRANSFILINGS</i>	For the comment letter frequency (quality) test, this indicator variable equals to 1 if the transactional filing volume in the firm's assigned SEC industry office measured over the month of the 10-K filing (the issuance of the initial comment letter when <i>CLQUALITY</i> is the dependent variable) and the immediately preceding month, is in the top quartile of the year, and 0 otherwise. Industry office is defined based on direct link between SIC 4-digit code and SEC industry office at https://www.sec.gov/search-filings/standard-industrial-classification-sic-code-list .
<i>CL_2011_ISSUANCE</i> (<i>CL_2012_2013_ISSUANCE</i>)	Indicator variable set to 1 if the SEC comment letter was issued in calendar year 2011 (2012 and 2013), and 0 otherwise.
<i>SCALED_HIGH_STANDARD_TAG</i> (<i>SCALED_LOW_STANDARD_TAG</i>)	Indicator variable set to 1 if the firm is an XBRL filer with above (below) the sample median ratio of the number of standard tags to the total number of tags among XBRL filers, and 0 otherwise.
<i>SIZEADJ_HIGH_STANDARD_TAG</i> (<i>SIZEADJ_LOW_STANDARD_TAG</i>)	Indicator variable set to 1 if the firm is an XBRL filer with above (below) sample median number of size-adjusted standard tags among XBRL filers, and 0 otherwise. We size-adjust the number of standard tags by subtracting the average number of standard tags of firms in the same size decile, where size is measured by market capitalization.
<i>TAG_SIMILARITY</i>	Tag similarity score calculated as the mean value of pairwise cosine similarity between the focal firm's full set of XBRL tags and those of each of its industry-

<i>HIGH_TAG_SIMILARITY</i> (<i>LOW_TAG_SIMILARITY</i>) <i>HIGH_TAG_HIGH_FS</i> (<i>HIGH_TAG_LOW_FS</i>)	year peers, where industry is defined based on two-digit SIC codes. Indicator variable set to 1 if the firm is an XBRL filer with above (below) sample median value of tag similarity score, and 0 otherwise. Indicator variable set to 1 if a firm is an XBRL filer and has above-sample-median tag similarity and above-sample-median (below-sample-median) financial statement similarity based on the measure of Brown et al. (2023), and 0 otherwise.
<i>LOW_TAG_HIGH_FS</i> (<i>LOW_TAG_LOW_FS</i>)	Indicator variable set to 1 if a firm is an XBRL filer and has below-sample-median tag similarity and above-sample-median (below-sample-median) financial statement similarity based on the measure of Brown et al. (2023), and 0 otherwise.
<i>SCALED_HIGH_NOTE_TAG</i> (<i>SCALED_LOW_NOTE_TAG</i>)	Indicator variable set to 1 if the firm is an XBRL filer with above (below) the sample median ratio of the number of footnote tags to the total number of tags among XBRL filers, and 0 otherwise.
<i>SIZEADJ_HIGH_NOTE_TAG</i> (<i>SIZEADJ_LOW_NOTE_TAG</i>)	Indicator variable set to 1 if the firm is an XBRL filer with above (below) sample median number of size-adjusted footnote tags among XBRL filers, and 0 otherwise. We size-adjust the number of footnote tags by subtracting the average number of footnote tags of firms in the same size decile, where size is measured by market capitalization.
<i>PREXBRL</i> [-3]([-2])	Indicator variable set to 1 for three (two) years before the firm starts to file its 10-K using XBRL format, and 0 otherwise.
<i>POSTXBRL</i> [0]	Indicator variable set to 1 for the year when the firm starts to file its 10-K using XBRL format, and 0 otherwise.
<i>POSTXBRL</i> [+1]([+2 & after])	Indicator variable set to 1 for one year (two or more years) after the firm starts to file its 10-K using XBRL format, and 0 otherwise.
<i>HIGH_FILING_LENGTH</i>	Indicator variable set to 1 if the word count of 10-K filing is in the top quartile of the year, and 0 otherwise.
<i>HIGH_FILING_SIZE</i>	Indicator variable set to 1 if file size of 10-K filing is in the top quartile of the year, and 0 otherwise.
<i>SUPERVISOR</i>	Indicator variable set to 1 if at least one SEC staff member involved in the review is a senior assistant chief or branch chief, and 0 otherwise.
<i>XML_DOWNLOAD</i> <i>HTML_DOWNLOAD</i>	Logarithm of one plus the number of SEC downloads of XML filings. Logarithm of one plus the number of SEC downloads of HTML filings.
Control Variables	
<i>MWEAK</i> (<i>L_MWEAK</i>)	Indicator variable set to 1 if the firm reports a material weakness in internal control for year t ($t-1$) under SOX 302, and 0 otherwise.
<i>RESTATE</i> (<i>L_RESTATE</i>)	Indicator variable set to 1 if the firm filed a 10-K restatement in year t ($t-1$), and 0 otherwise.
<i>HVOLATILITY</i>	Indicator variable set to 1 if the firm's monthly stock return volatility is in the highest quartile in year t , and 0 otherwise.
<i>MCAP</i>	Logarithm of one plus the firm's market value of equity at the end of year t .
<i>FILINGS</i>	The number of regulatory filings the firm has filed with the SEC in year t .
<i>LOSS</i>	Indicator variable set to 1 if the firm's income before extraordinary items in year t is negative, and 0 otherwise.
<i>ALTMAN</i>	Decile rank of the firm's Altman's z-score in year t . Altman's z-score is measured following Altman (1968) and equals $1.2*[\text{net working capital (ACT-LCT)}/\text{total assets (AT)}] + 1.4*[\text{retained earnings (RE)}/\text{total assets}] + 3.3*[\text{earnings before interest and taxes (PI+XINT)}/\text{total assets}] + 0.6*[\text{market value of equity (CSHO*PRCC_F)}/\text{book value of liabilities (LT)}] + 1.0*[\text{sales (SALE)}/\text{total assets}]$ in year t .
<i>SEGMENTS</i>	The number of business segments of the firm in year t .
<i>M&A</i>	Indicator variable set to 1 for non-zero acquisitions or mergers (AQP) in year t , and 0 otherwise.
<i>RESTRUCTURING</i>	Indicator variable set to 1 for non-zero restructuring costs (RCP) in year t , and 0 otherwise.
<i>EXTFINANCING</i>	Sum of equity and debt financing scaled by total assets following Ettredge et al. (2011). Equity financing is measured as sales of common and preferred stock (SSTK) minus dividends (DV). Debt financing is measured as long-term debt issued (DLTIS) minus long-term debt reduction (DLTR) minus the

<i>BIG4</i>	change in current debt (DLCCH). Indicator variable set to 1 if the firm is audited by a Big 4 auditor in year t , and 0 otherwise.
<i>AUDTENURE</i>	The number of years the auditor has audited the firm in year t .
<i>AUDCHANGE</i>	Indicator variable set to 1 if there is an auditor switch in year t , and 0 otherwise.
<i>CEOCHAIR</i>	Indicator variable set to 1 if the CEO is also chairman of the board of directors in year t , and 0 otherwise.
<i>CEOTENURE</i>	The number of years the CEO has served in his/her current role in year t .
<i>%INST</i>	Percentage of institutional ownership in year t .
<i>INDPBOARD</i>	The percentage of independent board members in year t .
<i>FILINGLENGTH</i>	Logarithm of one plus the word count in the 10-K filing for year t .
<i>FILINGSCL</i>	Number of filings addressed in the initial SEC comment letter to the 10-K.
<i>COMMENT_{$t-1$}</i> <i>(COMMENT_{$t-2$})</i>	Indicator variable set to 1 if the SEC issues a comment letter on the firm's 10-K filing in year $t-1$ ($t-2$), and 0 otherwise.

Table 1
Sample Selection Process and Distribution

Panel A: Sample Selection

	Firm-year	Firm
SEC 10-K filings for Compustat firms from 2007 to 2011	26,159	6,261
Less firms with missing information from Compustat, CRSP, Audit Analytics, BoardEx, or Thomson Reuters	(10,357)	(2,331)
Final sample for comment letter frequency analysis	15,802	3,930
Less firms that did not receive comment letter on 10-K filings	(10,755)	(1,229)
Final sample for comment letter quality analysis	5,047	2,701

Panel B: Sample Composition

	Large accelerated filers with public float of \$5 billion or more that adopted XBRL	Accelerated filers with public float between \$700 million and \$5 billion that adopted XBRL	Other filers that adopted XBRL	Total treatment observations that adopted XBRL	Total control observations that did not adopt XBRL
2007	3	0	1	4	3,191
2008	16	2	3	21	3,265
2009	182	49	9	240	3,035
2010	339	326	37	702	2,482
2011	376	754	1,732	2,862	0
Total	916	1,131	1,782	3,829	11,973

Table 2
Descriptive Statistics

	N	Mean	SD	p25	P50	p75
Dependent Variables						
<i>COMMENT</i>	15,802	0.319	0.466	0.000	0.000	1.000
<i>#COMMENTS</i>	5,047	1.938	0.717	1.386	1.946	2.485
<i>#COMMENTS (raw)</i>	5,047	7.994	7.524	3.000	6.000	11.000
<i>#TOPICS</i>	5,047	2.241	0.679	1.792	2.303	2.773
<i>#TOPICS (raw)</i>	5,047	10.548	6.965	5.000	9.000	15.000
<i>#NEGTONE</i>	5,047	2.494	0.695	1.952	2.487	2.994
<i>#NEGTONE (raw)</i>	5,047	14.325	11.466	6.044	11.027	18.972
<i>#WORDS</i>	5,047	6.963	0.525	6.620	6.926	7.290
<i>#WORDS (raw)</i>	5,047	1211.411	704.584	750.000	1018.000	1465.00
<i>CLQUALITY</i>	5,047	0.711	1.759	-0.573	0.742	1.960
<i>AMENDREVISE</i>	5,047	3.360	4.772	0.500	2.000	4.333
<i>RESTATECL</i>	5,047	0.219	0.414	0.000	0.000	0.000
<i>CAUGHT_DIRECT</i>	1,106	0.106	0.308	0.000	0.000	0.000
<i>FUT_RESTATE</i>	10,755	0.068	0.252	0.000	0.000	0.000
<i>TIMELINESS</i>	5,047	4.782	0.809	4.344	4.942	5.389
<i>TIMELINESS (raw)</i>	5,047	149.882	86.405	76.000	139.000	218.000
<i>CORE</i>	15,802	0.133	0.340	0.000	0.000	0.000
<i>NONCORE</i>	15,802	0.193	0.394	0.000	0.000	0.000
<i>#TOPICS_CORE</i>	5,047	0.388	0.499	0.000	0.000	0.693
<i>#TOPICS_CORE (raw)</i>	5,047	0.695	1.019	0.000	0.000	1.000
<i># TOPICS_NONCORE</i>	5,047	0.665	0.624	0.000	0.693	1.099
<i># TOPICS_NONCORE (raw)</i>	5,047	1.379	1.620	0.000	1.000	2.000
<i>COMMENT_TRANS</i>	15,802	0.059	0.236	0.000	0.000	0.000
<i>CLQUALITY_TRANS</i>	939	0.762	1.613	-0.419	0.305	1.525
<i>COMMENT_MD&A</i>	15,802	0.051	0.220	0.000	0.000	0.000
<i>COMMENT_RISKFACTOR</i>	15,802	0.011	0.103	0.000	0.000	0.000
<i>COMMENT_CONTROL</i>	15,802	0.003	0.058	0.000	0.000	0.000
<i>COMMENT_NONACCT</i>	15,802	0.072	0.259	0.000	0.000	0.000
Test and Moderating Variables						
<i>XBRL</i>	15,802	0.242	0.428	0.000	0.000	0.000
<i>SEC_ATTENTION</i>	12,334	2.017	0.821	1.000	2.000	3.000
<i>DECEMBER_FYE</i>	15,802	0.709	0.454	0.000	1.000	1.000
<i>HIGH_TRANSFILINGS</i>	15,802	0.192	0.394	0.000	0.000	0.000
<i>CL_2011_ISSUANCE</i>	5,047	0.171	0.377	0.000	0.000	0.000
<i>CL_2012_2013_ISSUANCE</i>	5,047	0.177	0.382	0.000	0.000	0.000
<i>SCALED_HIGH_STANDARD_TAG</i>	15,802	0.130	0.337	0.000	0.000	0.000
<i>SCALED_LOW_STANDARD_TAG</i>	15,802	0.112	0.315	0.000	0.000	0.000
<i>SIZEADJ_HIGH_STANDARD_TAG</i>	15,802	0.131	0.337	0.000	0.000	0.000
<i>SIZEADJ_LOW_STANDARD_TAG</i>	15,802	0.111	0.315	0.000	0.000	0.000
<i>TAG_SIMILARITY</i>	12,852	0.008	0.030	0.000	0.000	0.000
<i>HIGH_TAG_SIMILARITY</i>	12,852	0.032	0.175	0.000	0.000	0.000
<i>LOW_TAG_SIMILARITY</i>	12,852	0.037	0.188	0.000	0.000	0.000
<i>SCALED_HIGH_NOTE_TAG</i>	15,802	0.117	0.322	0.000	0.000	0.000
<i>SCALED_LOW_NOTE_TAG</i>	15,802	0.125	0.331	0.000	0.000	0.000
<i>SIZEADJ_HIGH_NOTE_TAG</i>	15,802	0.123	0.328	0.000	0.000	0.000
<i>SIZEADJ_LOW_NOTE_TAG</i>	15,802	0.120	0.325	0.000	0.000	0.000
<i>HIGH_FILING_LENGTH</i>	15,802	0.253	0.435	0.000	0.000	1.000
<i>HIGH_FILING_SIZE</i>	15,802	0.233	0.423	0.000	0.000	0.000
<i>SUPERVISOR</i>	5,047	0.416	0.493	0.000	0.000	1.000
<i>XML_DOWNLOAD</i>	14,182	3.146	1.676	1.386	4.007	4.595
<i>HTML_DOWNLOAD</i>	14,182	1.330	1.172	0.000	1.386	2.303

Control Variables						
<i>MWEAK</i>	15,802	0.143	0.350	0.000	0.000	0.000
<i>L_MWEAK</i>	15,802	0.151	0.358	0.000	0.000	0.000
<i>RESTATE</i>	15,802	0.050	0.218	0.000	0.000	0.000
<i>L_RESTATE</i>	15,802	0.049	0.215	0.000	0.000	0.000
<i>HVOLATILITY</i>	15,802	0.272	0.445	0.000	0.000	1.000
<i>MCAP</i>	15,802	5.620	2.462	3.824	5.715	7.353
<i>FILINGS</i>	15,802	30.679	15.833	21.000	29.000	38.000
<i>LOSS</i>	15,802	0.396	0.489	0.000	0.000	1.000
<i>ALTMAN</i>	15,802	4.676	2.753	2.000	5.000	7.000
<i>SEGMENTS</i>	15,802	4.531	3.745	2.000	4.000	6.000
<i>M&A</i>	15,802	0.133	0.339	0.000	0.000	0.000
<i>RESTRUCTURING</i>	15,802	0.253	0.435	0.000	0.000	1.000
<i>EXTFINANCING</i>	15,802	0.044	0.315	-0.032	0.000	0.019
<i>BIG4</i>	15,802	0.641	0.480	0.000	1.000	1.000
<i>AUDTENURE</i>	15,802	9.932	8.719	4.000	7.000	13.000
<i>AUDCHANGE</i>	15,802	0.072	0.259	0.000	0.000	0.000
<i>CEOCHAIR</i>	15,802	0.210	0.407	0.000	0.000	0.000
<i>CEOTENURE</i>	15,802	0.743	1.992	0.000	0.000	0.000
<i>%INST</i>	15,802	0.420	0.384	0.000	0.380	0.796
<i>INDPBOARD</i>	15,802	0.691	0.429	0.000	0.950	1.000
<i>FILINGLENGTH</i>	15,802	9.256	4.058	10.219	10.786	11.270
<i>FILINGSCL</i>	5,047	1.379	1.012	1.000	1.000	1.000
<i>COMMENT_{t-1}</i>	15,802	0.310	0.463	0.000	0.000	1.000
<i>COMMENT_{t-2}</i>	15,802	0.294	0.456	0.000	0.000	1.000

Table 3
Comment Letter Issuance and Quality after the XBRL Adoption

This table reports the results examining the impact of XBRL adoption on the probability of receiving a comment letter and comment letter quality. *XBRL* equals 1 if firm *i* in year *t* files its 10-K using XBRL-tagged data, and 0 otherwise. In column (1), *COMMENT* is an indicator that equals 1 if a firm receives a comment letter referencing its 10-K for year *t*, and 0 otherwise. In column (2), *CLQUALITY* is the first factor obtained using factor analysis on *#COMMENTS*, *#TOPICS*, *#NEGSTONE*, and *#WORDS*. In column (3) – (6), *#COMMENTS*, *#TOPICS*, *#NEGSTONE*, and *#WORDS* are the natural logarithm of one plus the number of comments, number of issues raised, number of negative-tone words, and total number of words, respectively, in the initial comment letter referencing the 10-K for year *t*. Regressions include fixed effects as indicated. *t*-statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Dep. Var.=	(1)	(2)	(3)	(4)	(5)	(6)
	<i>COMMENT</i>	<i>CLQUALITY</i>	<i>#COMMENTS</i>	<i>#TOPICS</i>	<i>#NEGSTONE</i>	<i>#WORDS</i>
<i>XBRL</i>	0.040** (2.10)	0.251** (2.01)	0.047* (1.62)	0.055* (1.75)	0.177*** (3.46)	0.071** (1.95)
<i>MWEAK</i>	0.046*** (2.86)	0.093 (0.73)	-0.001 (-0.03)	0.008 (0.26)	0.043 (0.85)	0.041 (0.98)
<i>L_MWEAK</i>	0.007 (0.48)	-0.051 (-0.40)	-0.012 (-0.43)	0.015 (0.51)	-0.038 (-0.74)	-0.013 (-0.34)
<i>RESTATE</i>	-0.006 (-0.29)	0.031 (0.21)	-0.018 (-0.52)	-0.033 (-0.95)	0.054 (0.87)	0.024 (0.55)
<i>L_RESTATE</i>	0.014 (0.70)	-0.000 (-0.00)	0.016 (0.44)	0.056 (1.45)	0.015 (0.24)	-0.013 (-0.29)
<i>HVOLATILITY</i>	0.007 (0.61)	-0.107 (-1.14)	-0.008 (-0.35)	-0.017 (-0.77)	-0.044 (-1.13)	-0.025 (-0.86)
<i>MCAP</i>	0.028*** (3.24)	0.030 (0.42)	0.001 (0.07)	-0.019 (-1.06)	0.002 (0.08)	0.016 (0.75)
<i>FILINGS</i>	-0.001 (-1.11)	0.001 (0.27)	0.001 (0.87)	0.001 (0.80)	-0.000 (-0.13)	0.000 (0.35)
<i>LOSS</i>	-0.013 (-1.04)	0.118 (1.11)	0.042* (1.70)	0.028 (1.09)	0.050 (1.17)	0.014 (0.43)
<i>ALTMAN</i>	0.003 (0.97)	0.014 (0.41)	0.006 (0.81)	0.011 (1.50)	0.003 (0.22)	0.001 (0.06)
<i>SEGMENTS</i>	0.004 (0.97)	0.008 (0.29)	0.004 (0.54)	0.002 (0.32)	-0.000 (-0.03)	0.003 (0.40)
<i>M&A</i>	0.015 (1.05)	0.058 (0.58)	0.016 (0.70)	0.028 (1.10)	0.014 (0.34)	0.007 (0.23)
<i>RESTRUCTURING</i>	0.035*** (2.47)	-0.011 (-0.11)	-0.027 (-1.15)	-0.030 (-1.14)	-0.007 (-0.18)	0.017 (0.61)
<i>EXTFINANCING</i>	-0.003 (-0.20)	0.193 (1.02)	0.025 (0.49)	-0.002 (-0.04)	0.089 (1.23)	0.029 (0.49)
<i>DECEMBER_FYE</i>	0.100 (1.07)	-0.464 (-0.93)	0.038 (0.27)	-0.002 (-0.02)	-0.336* (-1.75)	-0.253* (-1.81)
<i>BIG4</i>	0.010 (0.37)	0.735** (2.11)	0.151** (2.09)	0.165** (2.35)	0.258* (1.90)	0.253** (2.18)
<i>AUDTENURE</i>	-0.001 (-0.85)	-0.024* (-1.78)	-0.003 (-0.93)	-0.002 (-0.49)	-0.008 (-1.32)	-0.009** (-2.09)
<i>AUDCHANGE</i>	0.003 (0.20)	-0.119 (-0.73)	-0.031 (-0.82)	-0.019 (-0.48)	-0.008 (-0.13)	-0.018 (-0.36)
<i>CEOCHAIR</i>	0.002 (0.07)	-0.006 (-0.04)	0.016 (0.46)	0.023 (0.57)	-0.018 (-0.27)	-0.008 (-0.16)
<i>CEOTENURE</i>	0.000 (0.02)	-0.015 (-0.48)	-0.008 (-1.09)	-0.011 (-1.42)	-0.012 (-0.97)	-0.001 (-0.16)

<i>%INST</i>	0.010 (0.28)	-0.040 (-0.18)	-0.003 (-0.05)	0.008 (0.15)	-0.016 (-0.19)	-0.004 (-0.06)
<i>INDPBOARD</i>	0.028 (1.08)	-0.195 (-0.81)	-0.022 (-0.44)	0.071 (1.23)	-0.067 (-0.69)	-0.074 (-0.98)
<i>FILINGLENGTH</i>	0.031*** (10.38)	-0.002 (-0.04)	0.000 (0.05)	-0.000 (-0.04)	0.005 (0.33)	-0.007 (-0.66)
<i>FILINGSCL</i>		-0.174*** (-4.40)	-0.037*** (-4.30)	-0.022** (-2.27)	-0.052*** (-3.43)	-0.051*** (-4.25)
<i>COMMENT_{T-1}</i>	-0.459*** (-46.56)	-0.067 (-0.78)	-0.022 (-1.10)	-0.039* (-1.79)	-0.008 (-0.22)	-0.015 (-0.57)
<i>COMMENT_{T-2}</i>	-0.183*** (-18.37)	0.175*** (2.45)	0.017 (1.04)	0.037** (2.05)	0.063** (2.18)	0.051*** (2.44)
<i>Firm FEs</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	15,802	5,047	5,047	5,047	5,047	5,047
<i>adj. R²</i>	23.0%	23.6%	29.8%	18.6%	19.8%	22.4%

Table 4

Resolution of Comment Letters and Type II Errors of SEC Reviews after the XBRL Adoption

Panel A of this table reports the results examining SEC comment letter resolution after the XBRL adoption using observations with an SEC comment letter. *XBRL* equals 1 if firm *i* in year *t* files its 10-K using XBRL-tagged data, and 0 otherwise. *AMENDREVISE* is the number of counts of ‘amend’ or ‘revise’ in the firm’s first response letter. *RESTATECL* equals 1 if the firm subsequently restates the 10-K filing for year *t* referenced in the comment letter, and 0 otherwise. *CAUGHT_DIRECT* equals 1 if the firm subsequently restates the item of 10-K filing referenced in the SEC comment letter during the comment letter process or within 135 days of the end of comment letter conversation, and the comment letter content relates to the error(s) causing the restatement based on the mapping in Appendix C of Kubic (2021), and 0 otherwise. Panel B reports the results examining the likelihood of subsequent 10-K restatements after the XBRL adoption for observations without a comment letter (column (1)), observations without a comment letter and with non-missing *SEC_ATTENTION* scores (column (2)), and observations without a comment letter and with *SEC_ATTENTION* in the top (column (3)) and bottom (column (4)) terciles of the sample. *FUT_RESTATE* equals 1 if the 10-K filing for year *t* is subsequently restated, and 0 otherwise. Panel C reports the mean value of *COMMENT* across terciles of *SEC_ATTENTION* within observations with non-missing values of *SEC_ATTENTION*, which captures the ex-ante likelihood that a firm’s 10-K for year *t* is reviewed by the SEC. Regressions include fixed effects as indicated. Control variables in Panels A and B are the same as those in the comment letter quality regressions in Table 3 and are omitted for brevity. *t*-statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Panel A: Resolution of SEC Comments

	(1)	(2)	(3)
Dep. Var.=	<i>AMENDREVISE</i>	<i>RESTATECL</i>	<i>CAUGHT_DIRECT</i>
Sample=	<i>COMMENT</i> =1	<i>COMMENT</i> =1	<i>COMMENT</i> =1& <i>RESTATECL</i> =1
<i>XBRL</i>	1.120*** (3.11)	0.074*** (2.55)	0.172** (2.10)
<i>Controls</i>	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes
<i>N</i>	5,047	5,047	1,106
<i>adj. R</i> ²	10.8%	14.1%	15.0%

Panel B: Type II Errors of SEC Reviews after XBRL Adoption

	(1)	(2)	(3)	(4)
Dep. Var.=	<i>FUT_RESTATE</i>	<i>FUT_RESTATE</i>	<i>FUT_RESTATE</i>	<i>FUT_RESTATE</i>
Sample=	<i>COMMENT</i> =0	<i>COMMENT</i> =0 and with non-missing <i>SEC_ATTENTION</i>	<i>COMMENT</i> =0 and <i>SEC_ATTENTION</i> in the top tercile	<i>COMMENT</i> =0 and <i>SEC_ATTENTION</i> in the bottom tercile
<i>XBRL</i>	-0.023*** (-3.20)	-0.034** (-2.13)	-0.063** (-2.23)	-0.029 (-0.76)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	10,755	7,944	2,622	2,620
<i>adj. R</i> ²	24.3%	23.5%	19.2%	29.0%

Panel C: The Association between *SEC_ATTENTION* and the Likelihood of Receiving a Comment Letter among Observations with Non-missing *SEC_ATTENTION*

<i>SEC_ATTENTION</i> Tercile	Number of Observations	Mean of <i>COMMENT</i>
1	4,055	0.188
2	4,018	0.376
3	4,261	0.497

Table 5

The Effect of Automation after the XBRL Adoption on SEC Reviews

This table reports the results examining the benefits of XBRL automation on SEC reviews. XBRL equals 1 if firm i in year t files its 10-K using XBRL-tagged data, and 0 otherwise. Panel A reports the regression results of SEC comment letter timeliness on XBRL adoption for firm-years that receive a comment letter. *TIMELINESS* is the natural logarithm of one plus the number of days between the 10-K filing date and the date of the first SEC comment letter (Gunny and Hermis 2020). Panel B reports the moderating effects of SEC's resource constraints. *DECEMBER_FYE* equals 1 for firms with a December fiscal year-end, and 0 otherwise. For comment letter frequency (quality) test, *HIGH_TRANSFILINGS* equals 1 if the transactional filing volume in the firm's assigned SEC industry office, measured over the month of the 10-K filing (the issuance of the initial comment letter when *CLQUALITY* is the dependent variable) and the immediately preceding month is in the top quartile of the year, and 0 otherwise. *COMMENT* is an indicator that equals 1 if a firm receives a comment letter referencing its 10-K for year t , and 0 otherwise. *CLQUALITY* is the first factor obtained using factor analysis on *#COMMENTS*, *#TOPICS*, *#NEG TONE*, and *#WORDS*. Panel C reports the moderating effects of the accessibility of XBRL data analysis tools to the SEC. *CL_2011_ISSUANCE* (*CL_2012_2013_ISSUANCE*) is an indicator variable set to 1 if the SEC comment letter was issued in calendar year 2011 (2012 and 2013), and 0 otherwise. Regressions include fixed effects as indicated. Control variables in all panels are the same as those in the comment letter frequency and quality regressions in Table 3 and are omitted for brevity. t -statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Panel A: Timeliness of SEC Comments

	(1)	(2)	(3)
Dep. Var.=	<i>TIMELINESS</i>	<i>TIMELINESS</i>	<i>TIMELINESS</i>
Sample=	<i>COMMENT</i> =1	<i>COMMENT</i> =1 & <i>#WORDS</i> in the top tercile	<i>COMMENT</i> =1 & <i>#WORDS</i> in the bottom tercile
<i>XBRL</i>	-0.142*** (-2.67)	-0.491*** (-3.84)	0.079 (0.56)
<i>Controls</i>	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes
<i>N</i>	5,047	1,681	1,658
<i>adj. R</i> ²	16.9%	36.6%	24.8%

Panel B: SEC Resource Constraints

	(1)	(2)	(3)	(4)
Dep. Var.=	<i>COMMENT</i>	<i>COMMENT</i>	<i>CLQUALITY</i>	<i>CLQUALITY</i>
<i>XBRL</i>	-0.014 (-0.60)	0.025 (1.28)	-0.026 (-0.16)	0.132 (1.02)
<i>DECEMBER_FYE</i>	0.066 (0.70)		-0.608 (-1.09)	
<i>HIGH_TRANSFILINGS</i>		-0.027* (-1.63)		-0.141 (-1.43)
<i>XBRL</i>×<i>DECEMBER_FYE</i>	0.062*** (2.50)		0.333** (2.01)	
<i>XBRL</i>×<i>HIGH_TRANSFILINGS</i>		0.047* (1.89)		0.248* (1.64)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	15,802	5,047	5,047
<i>adj. R</i> ²	22.9%	22.9%	22.9%	23.8%

Panel C: The Availability of XBRL Data Analysis Tools to the SEC

Dep. Var.=	(1) <i>CLQUALITY</i>
<i>XBRL</i>	-0.154 (-0.86)
<i>CL_2011_ISSUANCE</i>	0.004 (0.01)
<i>CL_2012_2013_ISSUANCE</i>	-0.517 (-0.81)
<i>XBRL×CL_2011_ISSUANCE</i>	0.562^{***} (2.54)
<i>XBRL×CL_2012_2013_ISSUANCE</i>	1.586^{**} (2.37)
<i>Controls</i>	Yes
<i>Firm FEs</i>	Yes
<i>Year FEs</i>	Yes
<i>N</i>	5,047
<i>adj. R²</i>	22.4%
Test of coefficient equality	F-stat. (p-value)
<i>XBRL×CL_2011_ISSUANCE = XBRL×CL_2012_2013_ISSUANCE</i>	2.45 (0.118)

Table 6

The Effect of XBRL Standardization on Peer Benchmarking and Deviation Detection

This table reports the results examining the benefits of XBRL standardization on SEC reviews. Panel A reports the moderating effects of XBRL tag standardization. *SCALED_HIGH_STANDARD_TAG* (*SCALED_LOW_STANDARD_TAG*) is set to 1 if the firm is an XBRL filer with above (below) the sample median ratio of the number of standard tags to the total number of tags, and 0 otherwise. *SIZEADJ_HIGH_STANDARD_TAG* (*SIZEADJ_LOW_STANDARD_TAG*) is set to 1 if the firm is an XBRL filer with above (below) the sample median number of size-adjusted standard tags, and 0 otherwise. Panel B reports the moderating effects of XBRL tag similarity. *HIGH_TAG_SIMILARITY* (*LOW_TAG_SIMILARITY*) is set to 1 if the firm is an XBRL filer with above (below) sample median value of tag similarity, and 0 otherwise. Panel C reports the joint effect of XBRL tag similarity and Brown et al.'s (2023) financial statement similarity on comment letter issuance and quality. *HIGH_TAG_HIGH_FS* (*HIGH_TAG_LOW_FS*) is set to 1 if a firm is an XBRL filer and has above-sample-median tag similarity and above-sample-median (below-sample-median) financial statement similarity, and 0 otherwise. *LOW_TAG_HIGH_FS* (*LOW_TAG_LOW_FS*) is set to 1 if a firm is an XBRL filer and has below-sample-median tag similarity and above-sample-median (below-sample-median) financial statement similarity, and 0 otherwise. Regressions include fixed effects as indicated. Control variables in all panels are the same as those in the comment letter frequency and quality regressions in Table 3 and are omitted for brevity. *t*-statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Panel A: Standardized Tags

	(1)	(2)	(3)	(4)
Dep. Var.=	<i>COMMENT</i>	<i>CLQUALITY</i>	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>SCALED_HIGH_STANDARD_TAG</i>	0.100*** (4.30)	0.390*** (2.54)		
<i>SCALED_LOW_STANDARD_TAG</i>	0.000 (0.02)	0.196 (1.55)		
<i>SIZEADJ_HIGH_STANDARD_TAG</i>			0.122*** (5.19)	0.335** (2.33)
<i>SIZEADJ_LOW_STANDARD_TAG</i>			0.008 (0.39)	0.154 (1.48)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	5,047	15,802	5,047
<i>adj. R²</i>	23.4%	23.6%	23.4%	23.6%
Test of coefficient equality	F-stat. (p-value)			
<i>SCALED_HIGH_STANDARD_TAG</i> = <i>SCALED_LOW_STANDARD_TAG</i>	31.35 (<0.001)	2.86 (0.091)		
<i>SIZEADJ_HIGH_STANDARD_TAG</i> = <i>SIZEADJ_LOW_STANDARD_TAG</i>			45.95 (<0.001)	1.83 (0.176)

Panel B: XBRL Tag Similarity

	(1)	(2)
Dep. Var.=	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>HIGH_TAG_SIMILARITY</i>	0.444^{***} (10.31)	0.958^{***} (3.95)
<i>LOW_TAG_SIMILARITY</i>	0.004 (0.09)	0.627 ^{***} (2.55)
<i>Controls</i>	Yes	Yes
<i>Firm FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	12,852	4,169
<i>adj. R²</i>	23.0%	23.5%
Test of coefficient equality	F-stat. (p-value)	
<i>HIGH_TAG_SIMILARITY = LOW_TAG_SIMILARITY</i>	15.910 (<0.001)	3.67 (0.056)

Panel C: Joint Effect of XBRL Tag Similarity and Financial Statement Similarity

	(1)	(2)
Dep. Var.=	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>HIGH_TAG_HIGH_FS</i>	0.062 (1.10)	0.200 (1.07)
<i>HIGH_TAG_LOW_FS</i>	0.102^{**} (1.99)	0.290[*] (1.68)
<i>LOW_TAG_HIGH_FS</i>	0.100 (1.49)	0.102 (0.47)
<i>LOW_TAG_LOW_FS</i>	0.094 (1.58)	0.146 (1.41)
<i>LOW_FS</i>	0.022 (1.53)	0.059 (0.83)
<i>Controls</i>	Yes	Yes
<i>Firm FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	12,852	4,169
<i>adj. R²</i>	23.2%	23.4%
Test of coefficient equality	F-stat. (p-value)	
<i>HIGH_TAG_LOW_FS=LOW_TAG_LOW_FS</i>	0.01 (0.937)	0.80 (0.372)

Table 7

The Effect of XBRL Adoption on the Monitoring of Complex Reporting Issues and Filings

This table reports the results examining the effect of XBRL adoption on the monitoring of complex reporting issues and 10-K filings. XBRL equals 1 if firm i in year t files its 10-K using XBRL-tagged data, and 0 otherwise. Panel A reports the effect of XBRL on the issuance and quality of comment letter by the comment topic. *CORE* (*NONCORE*) is set to 1 if a firm receives a comment for issues related to core earnings (non-core earnings), and 0 otherwise. *#TOPICS_CORE* (*#TOPICS_NONCORE*) is the natural logarithm of one plus the number of issues related to core (non-core) earnings referenced in comment letters. Panel B reports the moderating effects of footnote tags. *SCALED_HIGH_NOTE_TAG* (*SCALED_LOW_NOTE_TAG*) is set to 1 if the firm is an XBRL filer with above (below) the sample median ratio of footnote tags to the total number of tags, and 0 otherwise. *SIZEADJ_HIGH_NOTE_TAG* (*SIZEADJ_LOW_NOTE_TAG*) is set to 1 if the firm is an XBRL filer with above (below) the sample median number of size-adjusted footnote tags, and 0 otherwise. Panel C reports the moderating effects of 10-K filing complexity. *HIGH_FILING_LENGTH* (*HIGH_FILING_SIZE*) equals 1 if the word count of 10-K filing (10-K file size) is in the top quartile of the year, and 0 otherwise. Panel D reports the moderating effects of SEC reviewer type. *SUPERVISOR* equals 1 if at least one SEC staff member involved in the review is a senior assistant chief or branch chief, and 0 otherwise. Regressions include fixed effects as indicated. Control variables in all panels are the same as those in the comment letter frequency and quality regressions in Table 3 and are omitted for brevity. t -statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Panel A: Comment Letter Issuance and Quality by Comment Topic

	(1)	(2)	(3)	(4)
	<i>CORE</i>	<i>NONCORE</i>	<i>#TOPICS_CORE</i>	<i>#TOPICS_NONCORE</i>
<i>XBRL</i>	0.018	0.058***	-0.032	0.109**
	(1.15)	(3.23)	(-0.84)	(2.24)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	15,802	5,047	5,047
<i>adj. R²</i>	9.2%	14.1%	8.3%	13.5%

Panel B: The Moderating Effects of Footnote Tags

	(1)	(2)	(3)	(4)
Dep. Var.=	<i>COMMENT</i>	<i>CLOQUALITY</i>	<i>COMMENT</i>	<i>CLOQUALITY</i>
<i>SCALED_HIGH_NOTE_TAG</i>	0.110***	0.469***		
	(4.72)	(2.89)		
<i>SCALED_LOW_NOTE_TAG</i>	0.009	0.198		
	(0.45)	(1.57)		
<i>SIZEADJ_HIGH_NOTE_TAG</i>			0.133***	0.491***
			(5.62)	(2.97)
<i>SIZEADJ_LOW_NOTE_TAG</i>			0.007	0.202
			(0.36)	(1.61)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	5,047	15,802	5,047
<i>adj. R²</i>	23.4%	23.7%	23.5%	23.7%
Test of Coefficient Equality		F-stat. (p-value)		
<i>SCALED_HIGH_NOTE_TAG</i> =	35.88	4.49		
<i>SCALED_LOW_NOTE_TAG</i>	(<0.001)	(0.034)		
<i>SIZEADJ_HIGH_NOTE_TAG</i> =			56.82	5.14
<i>SIZEADJ_LOW_NOTE_TAG</i>			(<0.001)	(0.024)

Panel C: The Moderating Effects of 10-K Filing Complexity

Dep. Var.=	(1)	(2)	(3)	(4)
	<i>COMMENT</i>	<i>COMMENT</i>	<i>CLQUALITY</i>	<i>CLQUALITY</i>
<i>XBRL</i>	0.000 (0.01)	0.015 (0.79)	0.128 (1.00)	0.160 (1.23)
<i>HIGH_FILING_LENGTH</i>	-0.008 (-0.56)		0.199 (1.55)	
<i>HIGH_FILING_SIZE</i>		-0.016 (-1.08)		0.084 (0.70)
<i>XBRL×HIGH_FILING_LENGTH</i>	0.082*** (3.91)		0.255* (1.62)	
<i>XBRL×HIGH_FILING_SIZE</i>		0.081*** (3.73)		0.341** (2.13)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	15,802	5,047	5,047
<i>adj. R²</i>	23.2%	23.2%	23.8%	23.8%

Panel D: The Moderating Effects of SEC Reviewer Type

Dep. Var.=	(1)
	<i>CLQUALITY</i>
<i>XBRL</i>	0.209* (1.68)
<i>SUPERVISOR</i>	0.287** (2.09)
<i>XBRL×SUPERVISOR</i>	0.308* (1.65)
<i>Controls</i>	Yes
<i>Firm FEs</i>	Yes
<i>Year FEs</i>	Yes
<i>N</i>	5,047
<i>adj. R²</i>	24.0%

Table 8
Robustness and Falsification Tests

Panel A of this table reports the results examining the parallel trends assumption using 18,790 (5,814) firm-year observations from 2006 to 2011 for the comment letter frequency (quality) analysis. *PREXBRL*[-3] and *PREXBRL*[-2] are the indicator variables for three years and two years before the XBRL adoption, respectively. *POSTXBRL*[0], *POSTXBRL*[+1], and *POSTXBRL*[+2 & after] are indicator variables for the year of XBRL adoption, one year after the adoption, and two or more years after the XBRL adoption, respectively. Panel B reports the results of a falsification test using SEC comment letters on 10-K sections that are not subject to the XBRL mandate. *COMMENT_MD&A* (*COMMENT_RISKFACTOR*, *COMMENT_CONTROL*, and *COMMENT_NONACCT*) is set to 1 if the SEC issues a comment letter on the MD&A section (risk factor disclosure, internal control disclosure, non-accounting-related disclosure) of the 10-K filing for year *t*, and 0 otherwise. Panel C reports the results of a falsification test using SEC comment letters on transactional filings that are not subject to the XBRL mandate. *COMMENT_TRANS* is set to 1 if the SEC issues a comment letter on the firm's transactional filings for year *t*, and 0 otherwise. *CLQUALITY_TRANS* is the first factor obtained using factor analysis on *#COMMENTS*, *#TOPICS*, *#NEG TONE*, and *#WORDS* for comment letters referencing transactional filings. Panel D presents the results of a regression discontinuity analysis. Panel E presents the results of a stacked DiD analysis. Panel F presents the results examining how the SEC's downloads of XML and HTML filings affect comment letter outcomes. *XML_DOWNLOAD* (*HTML_DOWNLOAD*) is the natural logarithm of one plus the number of SEC downloads of XML (HTML) filings for year *t*. Regressions include fixed effects as indicated. Control variables in all panels are the same as those in the comment letter frequency and quality regressions in Table 3 and are omitted for brevity. *t*-statistics in parentheses are based on standard errors clustered by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. Variables are defined in Appendix A.

Panel A: Parallel Trends Analysis

Dep. Var.=	(1)	(2)
	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>PREXBRL</i> [-3]	0.008 (0.39)	-0.019 (-0.23)
<i>PREXBRL</i> [-2]	0.003 (0.18)	-0.006 (-0.11)
<i>POSTXBRL</i> [0]	0.060*** (2.95)	0.147** (2.10)
<i>POSTXBRL</i> [+1]	0.142*** (4.24)	0.220** (2.17)
<i>POSTXBRL</i> [+2 & after]	0.224*** (4.33)	0.144 (0.95)
<i>Controls</i>	Yes	Yes
<i>Firm FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	18,790	5,814
<i>adj. R</i> ²	22.2%	21.8%

Panel B: Falsification Test Using Comment Letters Referencing Qualitative Disclosures

Dep. Var.=	(1)	(2)	(3)	(4)
	<i>COMMENT MD&A</i>	<i>COMMENT RISKFACTOR</i>	<i>COMMENT CONTROL</i>	<i>COMMENT NONACCT</i>
<i>XBRL</i>	-0.015 (-1.22)	-0.003 (-0.44)	0.001 (0.24)	-0.022 (-1.44)
<i>Controls</i>	Yes	Yes	Yes	Yes
<i>Firm FEs</i>	Yes	Yes	Yes	Yes
<i>Year FEs</i>	Yes	Yes	Yes	Yes
<i>N</i>	15,802	15,802	15,802	15,802
<i>adj. R</i> ²	3.4%	0.3%	2.0%	3.9%

Panel C: Falsification Test Using Comment Letters Referencing Transactional Filings

	(1)	(2)
Dep. Var.=	<i>COMMENT TRANS</i>	<i>CLQUALITY TRANS</i>
<i>XBRL</i>	-0.003 (-0.33)	1.151 (1.37)
<i>Controls</i>	Yes	Yes
<i>Firm FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	15,802	939
<i>adj. R²</i>	11.5%	23.0%

Panel D: Regression Discontinuity Design

	(1)	(2)
Dep. Var.=	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>XBRL</i>	0.260* (1.70)	1.669** (2.05)
<i>Controls</i>	Yes	Yes
<i>Industry FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	400	106
<i>adj. R²</i>	45.3%	2.7%

Panel E: Stacked DiD Analysis

	(1)	(2)
	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>XBRL</i>	0.080*** (3.34)	0.287* (1.82)
<i>Controls</i>	Yes	Yes
<i>Cohort-Firm FE</i>	Yes	Yes
<i>Cohort-Year FE</i>	Yes	Yes
<i>N</i>	26,159	7,527
<i>adj. R²</i>	26.8%	25.1%

Panel F: XBRL Download

	(1)	(2)
Dep. Var.=	<i>COMMENT</i>	<i>CLQUALITY</i>
<i>XML_DOWNLOAD</i>	0.010*** (3.09)	0.067* (1.86)
<i>HTML_DOWNLOAD</i>	-0.006 (-1.13)	-0.003 (-0.06)
<i>Controls</i>	Yes	Yes
<i>Firm FEs</i>	Yes	Yes
<i>Year FEs</i>	Yes	Yes
<i>N</i>	14,182	2,866
<i>adj. R²</i>	25.6%	25.8%