

To Change or Not to Change: The Informativeness of REIT Annual Reports

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Abstract:

Increasingly similar corporate disclosures may fail to provide potential investors with adequate information about a company to facilitate astute, informed, and/or rational decision making. In light of this repeatedly expressed SEC concern, the current investigation uses a sample of 1,910 annual report (10-k) filings by 234 separate equity REITs from 2000-2020 to examine the impact of year-over-year linguistic similarity on the perceived information content of corporate disclosures. Consistent with the aforementioned concerns, we document a significant increase in the degree of REIT annual report similarity over time. Despite this trend, we find that innovations in annual report disclosures remain directly related to observable changes in both the operational complexity and financial position of the firm. Furthermore, these innovations engender significant market reactions including changes in options trading activity, annual report readability, and the firm's cost of equity capital. Lastly, these findings are both robust to the inclusion of alternative information channels and are significantly more pronounced within informationally opaque market settings. In sum, we find REIT annual reports remain a value-relevant source of information for market participants.

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Introduction

The Securities and Exchange Commission (SEC) repeatedly expresses concern that financial disclosures are becoming increasingly dense and repetitive, thus potentially limiting their ability to deliver value relevant information to both key stakeholders and the broader marketplace.¹ Consistent with these concerns, Brown and Tucker (2011) present evidence documenting Management Discussion and Analysis (MD&A) disclosures contained within annual reports are indeed becoming both more repetitive and less informative. Specifically, using computational linguistic metrics, they find MD&A disclosures have become increasingly similar to the prior year's report, and further show that the market response to the release of annual reports is diminished when the disclosure is increasingly similar. Such reductions in the degree of information conveyed by an annual report may well exert a significant impact on the firm, as the prior literature has repeatedly found that firms with more informative corporate disclosures are rewarded with a lower cost of capital.

Conceptually, this general decline in the informativeness of annual reports should be uniquely impactful for, and likely detrimental to, both real estate investment trusts (REITs) and their investors. Of note, current regulatory guidelines mandate that REITs distribute at least 90% of their taxable income to their investors in order to maintain their pass-through status with respect to federal income taxation. Given the typical size of commercial real estate projects along with their limited ability to retain internally generated profits, REITs are highly dependent on external capital markets to fund their acquisition, development, and expansion activities. Thus, REITs have a direct, significant economic incentive to buck the trend of increasingly boilerplate disclosures, and rather, provide increasingly informative annual reports to the market. Against this backdrop, the current paper explores whether REIT annual reports are indeed becoming increasingly repetitive, and if so, are they less informative to investors and broader market participants.

Previewing our empirical results, despite the aforementioned economic incentives regarding transparent disclosures, we find REIT annual reports, similar to those of their non-REIT counterparts, are becoming increasingly repetitive and boilerplate in nature. This pattern is

¹ See, for example, the SEC's initial proposed rule governing MD&A disclosures (<https://www.sec.gov/rules/proposed/33-8098.htm>), as well as public comments by former SEC Chair Mary Jo White (<https://www.cfo.com/accounting-2/2014/12/tackling-disclosure-overload/>).

illustrated in both Figure 1 for our full sample of equity REITs, and in Figure 2 for subsets of REITs disaggregated by the property type focus of their investment portfolio holdings. While we defer a detailed discussion of the calculation of our similarity score metric until later in the paper, to facilitate the understanding of these figures we note that “Similarity” ranges from 0 (if the two documents are nothing alike), to 1 (if the two documents are completely identical). Somewhat surprisingly, however, while these trends would suggest the market response to the release of a REIT’s annual report should diminish as the annual reports become increasingly repetitive, we observe that the market continues to respond to the release of REIT annual reports (see Figure 3). In fact, we observe that unlike non-REIT firms in the broader economy where the market exhibits larger reactions to earnings announcements than to the release of the annual report (e.g., Cready and Mynatt (1991) and Brown and Tucker (2011)), for REITs this pattern is reversed, with the market exhibiting a larger reaction to annual report disclosures than to earnings announcements.

This divergence underscores a fundamental difference between REITs and the broader, non-REIT market. As previously mentioned, REITs are generally viewed as uniquely transparent due to both the nature of their asset holdings, as well as regulatory distribution mandates associated with maintaining their preferred pass-through tax status. As such, one possible explanation for these seemingly divergent results is that REIT investors are less concerned with quarterly earnings announcements, as they already have significant insight into the firms’ finances and operation, and are thus primarily concerned with the broader view on the firm’s prospects as discussed and explained in the annual report.² This contrasts with the broader market where the opaque nature of firm operations means that each earnings announcement provides insight into the firm’s operations. This distinction highlights the unique position of REITs within this study, as it suggests annual reports are particularly impactful for REIT investors, whereas strategic foresight and market understanding play a more pronounced role in shaping investor behavior and market dynamics.

Operationally, with the ultimate goal of helping us better understand both the changes occurring in REIT annual reports as well as the impact of those changes on observable market outcomes, the current investigation first examines the fundamental drivers of year-over-year REIT annual report similarity. Next, we explore the relation between annual report similarity and the

² Specifically, within this context earnings stability means that significant insights into a REIT's performance and future prospects are less likely to be gleaned from routine financial metrics, and more likely to be found in the strategic discussions and innovative content of annual reports.

market's reaction to the release of the annual report, specifically examining potential relations between annual report similarity and both returns and the implied cost of equity capital. We then examine the robustness of these relations to the inclusion of timelier information provided by the options market. Specifically, motivated by recent examinations of options trading in both REIT and non-REIT markets which indicate options traders are generally informed (i.e., able to predict short-term price movements in the underlying security), we explore whether options traders are utilizing information similar to that conveyed by innovations in REIT annual reports to front-run the market. Finally, as market makers use bid-ask spreads to protect and compensate themselves against anticipated losses from trading against informed parties, we view spreads as a proxy for the general level of informational opacity regarding a firm.³ Within this context, we anticipate the information content of annual report innovations will be most pronounced within the subset of informationally opaque firms characterized by high bid-ask spreads.

Further highlighting our key takeaways, we find that while REIT annual reports are indeed becoming increasingly repetitive, the level of similarity between the current report and the prior report is systematically related to changes in the REIT's economic situation. Specifically, we find that changes in the REIT's capital structure, property portfolio, funds from operations, equity price volatility, as well as the presence of more investors engaged in active monitoring are all associated with increasingly dis-similar annual reports. This finding is entirely consistent with similarity proxying for the informativeness of the annual report.

Additionally, we observe that the market reaction to the release of the annual report is inversely related to the report's year-over-year similarity. This is once again consistent with the notion that annual reports contain value relevant information, and further implies that the level of information contained in the report is a function of the level of similarity between this year's report and last year's filing. Specifically, market participants find less repetitive annual reports to be more informative than reports that are more similar to the prior year's report. Moreover, the market reaction to the information contained in the annual report is not simply a temporary price

³ While bid-ask spreads are commonly used to measure the level of informational opacity surrounding a firm, we acknowledge that they may not always provide an ideal indication. Therefore, in our robustness tests, we take into account other potential factors that could be associated with the spread measure, such as the liquidity of the firm. Specifically, we conduct regression analysis on various well-established determinants of bid-ask spreads, and then calculate the residuals to control for these factors.

fluctuation, but rather a key operational parameter as the level of the report's similarity influences the REIT's cost of capital.

Moreover, we also find evidence suggesting annual reports serve as a unique information channel for market participants. Of note, while options trading is disproportionately concentrated in REITs which are more operationally complex and characterized by more innovations in their year-over-year corporate disclosures, we find only limited evidence that options traders are able to front-run the release of this value-relevant information. Specifically, even among REITs with active options trading, annual report similarity continues to influence the market's reaction to the release of the annual report.

While the evidence suggests annual reports and options trading are two different information channels, we do find evidence that they interact, as annual reports are significantly less similar following the introduction of option trading on the REIT. Additionally, we find that increased levels of option trading can mitigate the price impact of dissimilar annual reports, however, it's important to note that a firm's annual report similarity remains economically meaningful, as reports with greater information innovations continue to elicit more pronounced market reactions. Lastly, we find evidence that the informativeness of annual reports is more influential among the more informationally opaque REITs.

Taken together, our findings suggest that the SEC is correct to be concerned with the increasing repetitiveness of annual reports. We document that even in an industry characterized by a heavy reliance on capital markets, where informational transparency is rewarded, firms' annual reports are becoming increasingly repetitive. However, this concern is somewhat mitigated by our results suggesting that the market continues to find annual reports informative, and that while the average level of similarity is increasing through time, fluctuations in a report's level of similarity with the prior year's report is a function of changes in the REIT's economic situation. Additionally, we provide information that annual reports continue to provide value relevant information to the market, even after controlling for alternative information channels.

The remainder of this paper is organized as follows. In Section two, we focus on both reviewing the relevant literature concerning the information content of corporate disclosures and developing our main hypotheses. Section three then outlines the data and methodological approaches used to examine our focal hypotheses. The results of our primary empirical analysis are presented in section four, while section five examines the robustness and stability of these

findings in relation to alternative information channels. Lastly, our final section (six) summarizes our key findings, outlines their implications, and concludes.

Literature Review and Hypothesis Development

We are not the first researchers to examine the impact financial disclosure exerts on various market outcomes. While considerable formal guidance discourages narrative disclosures which are long and/or unchanging, emerging research suggests these types of disclosures are viewed quite favorably when placed under regulatory or judicial review (e.g., Cazier, McMullin and Treu (2021)). Of note, across many jurisdictions risk disclosures are explicitly mandated by law or other regulations (El-Haj et al. (2020)), while Rich, Roberts, Wall, and Zhang (2021) find that narrative disclosures subject to such regulatory mandates tend to use more boilerplate language. Further contributing to the financial disclosure discourse, Dyer, Lang, and Stice-Lawrence (2017) document trends in 10-K disclosure driven by new regulatory requirements and arrive at similar conclusions. Specifically, they note a rise in both report length and boilerplate content, but a decline in the specificity and readability of annual reports. Operationally, these regulatory incentives may well influence market outcomes, as McClane (2019) finds the use of generic boilerplate language in corporate disclosures reduces readability, and Arikan (2022) concludes that non-professional investors exhibit reduced confidence and lower eagerness to invest in firms with less specific financial disclosures.⁴ Against this backdrop, we aver that corporate stock investors, who generally favor enhanced informational transparency, value dynamic changes in narrative disclosures.

Consistent with this notion, Brown and Tucker (2011) report firms with larger financial changes during a given year increasingly modify the management discussion and analysis (MD&A) sections of their annual reports. To measure such differences in narration, they develop and employ a method of capturing the year-over-year changes in narrative disclosure based upon computational linguistics. Huang, Wang, and Yang (2023) offer an alternative machine learning

⁴ Additional research along this dimension includes Li (2010), who employs a Naïve Bayesian Machine Learning approach to unravel the information content within corporate filings and demonstrates how these statements shape market perceptions and influence decision-making processes; Campbell et al. (2014), who assess the information content of mandatory risk factor disclosures in corporate filings after an SEC mandate and conclude these disclosures are instrumental in shaping perceptions of firm risk and value; and Bushee, Gow, and Taylor (2018), who investigate the multifaceted nature of linguistic complexity in corporate disclosures, and attempt to distinguish between obfuscation and information signaling.

algorithm (FinBERT) designed specifically for financial text. Their application has been found to be particularly informative with respect to sentiment classification on discussions pertaining to environmental, social, and governance issues. Expanding upon this methodology, Peterson, Schmardebeck, and Wilks (2015) use the tool to measure changes in the accounting footnotes contained within SEC form 10-k filings. They document that an increased number of business segments, or the presence of a merger, increases the likelihood of narrative changes. Similarly, Lang and Stice-Lawrence (2015) examine changes in the narrative construction of annual reports and note that non-U.S. companies reporting under IFRS exhibit relatively fewer narrative changes when compared to non-U.S. companies using alternative local accounting standards. Moreover, Berns, Bick, Flugum, and Houston (2022) find changes in MD&A tone predict subsequent merger and capital expenditure activity.

In an intricate review of disclosure processing costs, Blankespoor, deHaan, and Marinovic (2020) look into how these costs influence investor information choices and market outcomes. They argue that due to these costs, disclosures shift from being public information to a form of costly private information, thereby impacting market dynamics and managerial disclosure strategies. Further examining the efficacy of corporate disclosures and information conduits, Loughran and McDonald (2016) conduct a survey on textual analysis in accounting and finance, and find the traditional concept of readability does not map well onto determining the effectiveness of business documents.

Within the real estate literature, Paulus, Koelbl, and Schaefer (2021) utilize Brown and Tucker's (2011) methodology to explore the dynamics of REIT IPO underpricing. Their findings reveal a significant correlation between the provision of qualitative information in Form S-11 and reductions in IPO underpricing. A number of additional studies across the real estate literature also examine the value relevance of alternative computational linguistic measures. Of note, both Dempsey, Harrison, Luchtenberg, and Seiler (2012) and Danielsen, Harrison, Van Ness, and Warr (2014) use readability scores and find increasingly transparent financial disclosures are related to lower capital acquisition costs for REITs, while Kim, Lim and Wiley (2022) employ textual analysis to construct an investment-risk measure. In related work, Carstens and Freybote (2019) and Carstens and Freybote (2021) examine the “tone” of REIT financial statements and find such measures provide valuable information to market participants. Thus, taken together, an emerging stream of research consistently suggests that year-over-year changes in financial disclosure

narratives (i.e., reduced similarity) are significantly influenced by events affecting the organization and, in turn, significantly influence the actions of the users of the statements in which those disclosures appear.

Building upon this prior research, the current investigation proposes that despite annual reports becoming increasingly similar over time, the market will continue to exhibit a significant reaction to their release.⁵ We further expect this reaction to be inversely related to the level of similarity between the new and prior report, as the existing literature contends repetitive language is indicative of lower levels of informativeness (e.g., Hassan and Barber (2021); Giulianelli, Sinclair, and Fernandez (2022); and Ye, Liu, and Schutze (2023)).

Centering our efforts within the context of the existing literature, we note Cashman, Harrison, and Sheng (2021) and Cashman, Harrison, and Sheng (2022) both highlight the ability of options trading to forecast future REIT returns. Specifically, they contend this ability to predict returns points directly to the unique insights and valuable contributions to information flow and price discovery made by options traders in the market. Our second hypothesis builds upon this foundation and explores the idea that options traders might possess and exploit information similar to that contained in annual report innovations. Empirically, we examine how the presence of an active option market impacts the broader market's reaction to an annual reports level of similarity. Conceptually, given that options trading is continuously ongoing, while corporate disclosures are relatively infrequent in nature, we expect that informed option traders should impart some of the strategic information content contained in the annual report innovations to the market early. As such, we expect that the market's reaction to less similar annual reports will be moderated by active options trading. Lastly, as annual report innovations may provide more valuable insight into firm operations for less transparent REITs, we also expect that the market will exhibit a larger reaction to annual reports for REITs that are less informationally transparent.

Data and Methodology

⁵ We also recognize the potential impact of SEC readability requirements. However, we argue that while these requirements might standardize certain elements of report structure and language, they do not dictate the extent of year-over-year informational repetition. We encourage future researchers to delve deeper into distinguishing the effects of regulatory compliance from genuine linguistic redundancy. In this study, our primary aim is to provide a preliminary exploration into whether and how linguistic repetitiveness may serve as a proxy for information richness, while readily acknowledging that this is only a starting point for a more comprehensive investigation into the complex dynamics between textual presentation and informational value in corporate disclosures.

In this section, we first outline and describe the data sources and sampling procedures employed throughout this study. Next, we detail the methodology used in measuring year-over-year annual report (i.e., 10-k filing) similarity. Finally, we present summary statistics and univariate comparisons for key attributes across the firms in our sample.

Data

Our sample period extends from fiscal year 2000 through fiscal year 2020. That said, as we require the prior year's filing to calculate our focal similarity score metrics, we only formally report similarity scores from fiscal years 2001 through 2020. In constructing a complete and integrated sample appropriate for the current analysis, we obtain data from several sources. First, we manually collect 10-k filings for all U.S. equity REITs directly from the SEC's EDGAR database. We use annual data to avoid seasonality, but supplement and revise this information with quarterly updates from Compustat when a firm restates its reported results.⁶ Further support and justification for using annual disclosures is provided by Griffin (2003), who finds the market reaction to 10-k reports is stronger than to 10-Q reports. Next, we obtain relevant stock market data from the Center for Research in Security Prices (CRSP), institutional ownership data from Thomson Reuters 13F holdings, and accounting data from Compustat. Lastly, we source data on REIT options from the Ivy DB database provided by OptionMetrics. More specifically, to ensure the liquidity of options trading, for all traded options we require their expiration dates to be within 5 to 35 trading days of our event date. Moreover, for each optionable REIT stock, we select call and put option contracts with trading volumes greater than zero for a given quarter.

To merge the aforementioned databases, we begin by matching the REIT 10-k filings with Compustat data using the Central Index Key (CIK). We then use CUSIPs to match with and merge in: 1) CRSP data, 2) institutional ownership data, and 3) options data. After excluding observations with missing values, our final estimation sample includes 1,910 firm-year observations across 234 unique equity REITs.

Measuring Year-over-Year 10-k Filing Similarity for REITs

⁶ The Compustat annual database is maintained as originally reported by the firm, but the Compustat Quarterly database is updated when a firm restates its previously reported quarterly results. See Feldman, Govindaraj, Livnat, and Segal (2010) for further discussion of this issue.

To measure the extent to which REITs in our sample use boilerplate language in their year-over-year 10-k filings, we utilize a slightly modified variant of the method described by Brown and Tucker (2011). Specifically, we use the entire annual report (minus any numeric information) in calculating our similarity metrics rather than only focusing on the MD&A section. We believe this is the theoretically preferred framework for multiple reasons. First, as outlined in the WRDS SEC Analytics Manual: “For researchers interested in section-by-section analysis, it is important to be cognizant of the high variability of SEC filings, even within a particular class of filing. This variability can lead to biased samples when focusing on only a particular section...focusing on the MD&A only produces a nonrandom sample.”⁷ Additionally, while we agree companies would appear to have more reporting and disclosure flexibility within the MD&A section, this does not appear to be an empirically meaningful distinction. More specifically, and of direct import to the current investigation, Loughran and McDonald (2011) find that nearly one-quarter of their 10-k observations contain MD&A sections of less than 250 words, thus rendering tonal analysis inappropriate. They further conclude: “the MD&A section does not contain richer tonal content [than the full 10-k]...[and] because the empirical results do not indicate that the MD&A section provides more discriminating content and because of the systematic shifts in the sample, we only consider the full 10-Ks in subsequent tests.” Finally, we acknowledge that the use of complete 10-k filing disclosures when computing our similarity metrics might lead to “more similar” year-over-year disclosures, thus biasing us against finding a relation between disclosure innovations and firm performance outcomes. Thus, we believe the use of the entire 10-k, despite the potential conservative bias it may induce, is preferable to the concerns arising from parsing corporate disclosure and examining potentially non-random subsets of firms/data.

For perspective on the potential relevance of Brown and Tucker’s (2011) methodology, we note Nelson and Pritchard (2016) study word combinations and find heavy clustering in certain singular words. As an example, in a search of a series of form 10-k filings they examine, the words “will” or “would” occur 16.8 percent of the time, as opposed to the words “aim” or “aims” which occur just 0.02% of the time. Interestingly, the spread of this distortion grows as the number of pairings compared increases (i.e., two-word pairing comparisons exhibit a larger skew than single words, while three-word pairing comparisons have an even larger skew than their two-word pairing counterparts). To further illustrate the conceptual foundations of this approach, Gibbon,

⁷ https://wrds-www.wharton.upenn.edu/documents/751/WRDS_SEC_Readability_and_Sentiment_Manual.pdf

Moore, and Winski (1997) compare 38 million three-word combinations (known as trigrams) and find that 77% of trigrams occur only one time. With this idea in mind, we convert each REIT annual report into a text file (excluding numbers and exhibits). We then create trigrams out of every possible consecutive three-word pairing within each annual report. We then determine the percentage of trigrams that are the same across this year's and last year's annual report. In other words, we compute a similarity score based on the trigrams found within each of the two documents under comparison. Specifically, we measure the extent to which each REIT's annual 10-k filing document is similar to its previous year filing using trigram commonality to calculate the similarity score.⁸ This similarity score measure theoretically ranges from 0 (nothing in common) to 1 (everything is copied), and this methodology has been employed across a variety of fields and applications (e.g., Bao, Lyon and Lane (2007), Nelson and Pritchard (2007), Rainer, Lane, Malcolm and Scholz (2008), Green, Lane, Rainer and Scholz (2011), and Rich, Roberts, Wall and Zhang (2021)).

By focusing exclusively on REITs, we mitigate a substantial fraction of the noise resulting from comparing similarity score differences across alternative industries with widely divergent operating and/or regulatory characteristics and attributes. However, even within REIT markets, boilerplate language and complexity may vary across subsectors. Thus, due to variations in the business complexity levels within REIT subsectors, we recognize financial report length may still distort and bias our findings if left uncontrolled. As such, following Brown and Tucker (2011), to mitigate against this potential bias we adjust each REIT's similarity score by empirically approximating the functional form of the relation between raw similarity scores and document length via a Taylor expansion at 0.⁹ We then calculate and define adjusted similarity scores as the expected difference score given the document length.

Figure 1 illustrates both the annual average raw similarity score (*raw_simscore*) and adjusted similarity score (*adj_simscore*) over time for the REITs in our sample, while Figure 2 delves deeper and shows the average annual similarity scores for REITs grouped across alternative property type investment focus.¹⁰ A cursory examination of these plots reveals two key insights. First, REIT

⁸ Prior to 2003, our sample includes the 10-k and 10-k405 filings. The 10-k405 was discontinued after 2002.

⁹ More specifically, we regress raw similarity scores on the first five polynomials of length and calculate the residuals as the adjusted similarity score. In our sample, REIT annual report lengths vary from as few as 9,549 words (Agree Realty Corporation in 2001) to as many as 50,654 words (Ventas, Inc. in 2011).

¹⁰ The graphs are similar if we look at adjusted similarity scores across REIT property types. For the sake of easy readability, the adjusted similarity score graphs are not reported.

annual reports do indeed exhibit the increasing similarity pattern the SEC is publicly concerned about. Notably, over the course of our sample time frame, REIT annual reports have become increasingly similar to prior year reports. Second, and perhaps equally problematic, this pattern is generally consistent and observable across all REIT property types, thereby suggesting this is a widespread phenomenon not driven by the unique idiosyncrasies of a relatively small subset of firms.

Summary Statistics and Univariate Analysis

Before turning to our multivariate analysis, we present relevant summary statistics for each of our attribute variables in Table 1. Exploring the numbers, we find that the distributions of both raw (raw_simscore) and adjusted (adj_simscore) similarity scores appear quite reasonable within our sample. Specifically, the raw_simscore exhibits an average value of 0.6616, while ranging from 0.332 at the 1st percentile to 0.8580 at the 99th percentile. Our adj_simscore exhibits an average value of 0.0260, with a corresponding range from -0.3030 to 0.2318.¹¹ In untabulated results, we find that the correlation between these raw and adjusted similarity score metrics is strongly positive ($\rho = 0.9765$) and highly significant ($p < 0.0001$).

Following Griffin (2003) and Brown and Tucker (2011), we measure market reactions to REIT 10-k filings using $|CAR3|$, the absolute value of the cumulative market adjusted REIT stock return over the three-day window beginning with the 10-k filing date.¹² Across our sample, the mean market reaction on REIT 10-k filing dates is 2.1%. Furthermore, in untabulated correlation tests, we find these returns are significantly negatively correlated with both raw and adjusted similarity scores. Complicating our analysis and potentially impacting the interpretability and generalizability of our findings, earnings announcements are often made shortly before a firm's filing date. As such, in order to cleanly examine the cross-sectional relation between 10-k filings and earnings announcements, we control for the market reaction to earnings announcements using $|CAR^{EA}|$. This metric is the absolute value of the cumulative market adjusted REIT stock return

¹¹ The adjusted similarity score numbers are in line with the range reported in Brown and Tucker (2011). More specifically, they estimate score ranges from -0.090 at the 25th percentile to 0.047 at the 75th percentile.

¹² As a robustness test, we also replicate our main results across a broader range of alternative measurement windows. Specifically, we've examined one-day, two-day, four-day, and five-day cumulative abnormal returns, with the results from each alternative observation window providing very consistent findings. More specifically, while one-day window abnormal returns exhibit the weakest impact, they remain statistically significant for our variables of interest. As such, and in the interest of brevity, only 3-day (Panel A of Table 3) and 5-day window (Panel D of Table 3) results are reported.

over the three-day window beginning with the date immediately preceding the earnings announcement date. Conceptually, if the earnings announcement and 10-k filing are substitute channels through which firms disclose value relevant information to market participants, we would not expect market prices to materially react to the 10-k release of a REIT whose earnings announcement has already provided such information. Alternatively, if the 10-k filings and earnings announcements of a REIT function as complementary information signals, we would anticipate that 10-k filings would reveal new information to market participants, over and above that found in simple earnings announcements, and thus lead to potentially material market reactions.

Exploring this dichotomy, Figure 3 shows the price reaction of REITs around 10-k filings and earnings announcement events. Unlike the results for non-REIT firms found in Brown and Tucker (2011), we find the reaction to 10-k filings is larger than the reaction to earnings announcements. This clearly suggests 10-k filings are information events, and further implies these events are more important to REIT investors than earnings announcements.¹³ This is not particularly surprising for a number of reasons, many of which are related to the inherent transparency of this market sector. Of note, REITs typically invest in large, long-lived, tangible assets, and are required to pass along the majority of their earnings to investors, resulting in relatively transparent cash flows. Furthermore, many REIT owned properties have long-term leases in place. As such, quarterly earnings announcements may be relatively mechanical, and uninformative within this market sector, as the cashflows are largely contractually assured. On the other hand, strategic innovations (e.g., entry into new markets or new property type sectors) are more likely to be explicitly denoted within annual report (or other discretionary corporate) disclosures. Thus, while investors react strongly to non-REIT earnings announcements, as they provide insight into the company's operations (e.g., Brown and Tucker's (2011)), we find the exact opposite for REIT investors (i.e., the market responds more strongly to innovations in annual reports than quarterly earnings announcements), thus highlighting the unique role of annual reports for REIT investors who value strategic insights over merely numeric data.

¹³ We note the market reaction to such disclosures is uniquely pronounced during the period surrounding the Global Financial Crisis of 2007-09. As this era was broadly characterized by heightened levels of economic uncertainty, it is not surprising that value relevant information disclosures exhibit increased economic significance during this period.

To further account for specific firm-level attributes which may impact a REIT's information environment, and by extension both the nature of its disclosures and the subsequent market response, we also control for each REIT's liquidity conditions, market (volatility) risk, changes in business components, and differences in monitoring intensity from institutional investors. Following Brown and Tucker (2011), we use $|\text{chg_debt due}|$ and $|\text{chg_lev}|$ to measure liquidity changes. More specifically, $|\text{chg_debt due}|$ is the absolute value of the change in the amount of debt due in the coming year scaled by total assets, while $|\text{chg_lev}|$ is the absolute value of the change in total liabilities scaled by total assets. Consistent with *a priori* expectations, both attributes are negatively correlated with similarity scores in our sample, thereby suggesting alterations in a firm's financial structure are typically reflected in corporate disclosures. Regarding market risks, we use the absolute value of the change in daily stock return volatility from the previous year to the current year, $|\text{chg_stdret}|$. Conceptually, the greater the market risk exposure, the more volatile the stock price should be. As expected, the correlations between $|\text{chg_stdret}|$ and our two similarity score metrics are negative and significant, suggesting market risk exposure is associated with reduced firm usage of boilerplate language in their 10-k filings. With respect to changes in business components, we use a pair of indicator variables to control for substantial asset changes, Acquire and Downsize. Acquire is set equal to 1 if total assets increased by more than one-third from the previous year, and is set equal to zero otherwise. In this same vein, Downsize is set equal to 1 if total assets decreased by more than one-third from the previous year, and is set equal to zero otherwise. As expected, large scale asset acquisitions and/or dispositions are associated with reduced similarity in year-over-year REIT annual reports.

When investigating the impact of market reactions to 10-k filings, we also control for firm size (Size), filing delays (filelate), additional financial information beyond earnings announcements (new items), the magnitude of the market reaction surrounding any potential earnings announcement $|\text{CAR}^{\text{EA}}|$, institutional ownership levels (IO), and the volatility of those institutional ownership levels. Detailed definitions for each of these variables are provided in Appendix A. Evaluating these attribute values within the context of our current sample, and consistent with the existing literature, Table 1 reports the average market capitalization of equity REITs within our sample is approximately \$4 billion. Furthermore, in our unreported results, REIT equity market capitalization is significantly positively correlated with both raw ($\rho < .0001$) and adjusted ($\rho = 0.0382$) similarity scores. Continuing, while only 1.41% of firms in our sample filed their 10-k

more than 90 days after the fiscal year end, we observe such late filings are (significantly) negatively related to similarity scores in our untabulated correlation results. Logically, corporate disruptions and/or strategic paradigm shifts which delay the release of 10-k filings likely warrant explicit discussion and analysis by corporate leaders, with boilerplate disclosures unlikely to fully and transparently convey robust, meaningful conclusions to interested stakeholders. Following Brown and Tucker (2011), we include newitems as one of our control variables. This construct measures the number of corporate innovations disclosed to investors in each REIT's annual 10-k filing.. The average number of newitems in our sample is 186, with such disclosures ranging from 105 items at the 1st percentile to 257 items at the 99th percentile.

Finally, we examine and employ two institutional ownership metrics to control for the potential impacts of monitoring on boilerplate language in year-over-year 10-k filings. Specifically, we obtain both the institutional ownership percentage (IO) and the volatility of institutional ownership holdings over the past five years (Volatility of IO) to address not only the level of institutional monitoring, but also the potential concern that the simple institutional ownership percentages may not be the best, or even an adequate, measure of institutional influence. Of note, along this latter dimension an emerging stream of literature argues institutional investors vary widely in their degree of active engagement with firm management and monitoring. Proactive firm management may lead to clientele effects or “monitor shopping.” Given the notoriously high levels of institutional ownership across REIT markets, these issues may well be uniquely impactful within this market sector.¹⁴ Along this dimension, Table 1 shows that nearly 74% of sample REIT shares were controlled by institutional owners, while the five-year rolling average ownership volatility averaged a robust 7.9% across our sample interval. In sum, each of our sample attributes are broadly consistent with those reported in the extant literature (e.g., Feng, Ghosh, and Sirmans (2007), Boudry, Kallberg, and Liu (2010), and Harrison, Panasian, and Seiler (2011)).

Empirical Results

Similarity Score Determinants

¹⁴ See Downs (1998); Elyasiani and Jia (2010); Elyasiani, Jia and Mao (2010); Huang and Petkevich (2016); Hardin III, Nagel, Roskelley and Seagraves (2017); Cline, Fu and Tang (2020); Gilstrap, Petkevich, Sezer and Teterin (2021); and Ling, Wang and Zhou (2021) for additional discussion and analysis of the role of motivated institutional investors in monitoring firm activities, including within REITs and REIT markets.

We begin the multivariate portion of our analysis by exploring the drivers of this year’s annual report similarity relative to last year’s. Specifically, we examine the relations between similarity and changes in the REIT’s financing ($|\text{chg_debt due}|$ and $|\text{chg_lev}|$), operations ($|\text{chg_ffo}|$), market risks ($|\text{chg_stdret}|$), properties under management (acquire, downsize, and assets), and institutional ownership (IO and Volatility of IO) to predict our previously defined similarity score metrics.¹⁵ Additionally, as we are not the first paper to explore the importance of a REIT’s annual report, we also control for the tone of the prior year’s report. This is motivated by the works of Ertugrul, Lei, Qiu, and Wan (2017) and Huang, Teoh, and Zhang (2014) which show that the readability of an annual report, as well as the tone of the writing in a report, can influence the report’s informativeness. As such, we control for the readability/tone of the prior year’s report. Specifically, we include the Loughran and McDonald (2011) litigious word proportion (LM_litigious), modal weak word proportion (LM_weak), modal strong word proportion (LM_strong), negative word proportion (LM_negative), positive word proportion (LM_positive), and uncertainty words proportion (LM_uncertainty) from previous year.¹⁶

The results of this analysis are presented in Table 2.¹⁷ As the observed relations are qualitatively consistent across both our raw and adjusted similarity metrics, for the sake of brevity, we only report the raw similarity score results in Table 2 and provide the results for adjusted similarity scores in Appendix B. Turning to the results, column 1 of Table 2 presents the results from using actual values of our similarity measure, while columns 2 through 4 utilize quintile-based rankings of similarity scores. In general, these results are consistent with the notion that annual reports continue to convey material information. Specifically, in terms of the tone/readability of the annual reports, we find that the use of uncertainty words in REIT annual reports is significantly associated with year-over-year innovations in those disclosures, while the use of litigious, positive, and/or negative words do not meaningfully impact the year-over-year similarity of such disclosures. This observation is consistent with the notion that when managers are more uncertain about the REIT’s prospects, they tend to rely on more boilerplate language in an attempt to avoid providing bad information to the market. Regarding a REIT’s economic

¹⁵ We note this methodology follows that of Brown and Tucker (2011). LCR is the mean decile ranking of $|\text{chg_debt due}|$, $|\text{chg_lev}|$, and $|\text{chg_ffo}|$.

¹⁶ The data for these readability measures are provided by SEC Analytics Suite.

¹⁷ In untabulated results, we employ firm fixed effects instead of property fixed effects, and find that the results are qualitatively similar.

situation, we find that the report's year-over-year similarity is significantly related to changes in the REIT's economic condition. More specifically, we find that changes in the REITs's overall financial leverage as well as in the amount of debt due within the year are both inversely related to the level of similarity in the REIT's annual report. For perspective, a one standard deviation increase in the $|\text{chg_lev}|$ is associated with a 104 (87) basis point decrease in the firm's raw (adjusted) similarity score for that year. Likewise, a one standard deviation increase in the $|\text{chg_debt due}|$ is associated with a 48-basis point decrease in the firm's annual raw similarity score and 91 basis point reduction in its adjusted similarity score. Additionally, we observe that changes in a REIT's current operations, as proxied by changes in FFO, are significantly associated with reduced levels of similarity. Continuing, we also find that non-trivial changes in a REIT's portfolio of investment properties (through either acquisitions or dispositions), as well as the overall size of their investment property portfolio are all negatively related to the level of year-over-year similarity in REIT annual reports. These findings indicate that material changes in a REIT's economic situation and/or operating environment are typically directly reflected by linguistic changes in the narrative descriptions contained in the annual report the firm releases, thus suggesting that while REIT annual reports are becoming increasingly repetitive, they continue to provide valuable information.

Our results additionally indicate that REITs with higher levels of institutional ownership issue annual reports that are more similar to their prior year disclosures, however, when the institutional owners are more active monitors of the REIT, as proxied by the volatility of institutional ownership, annual reports tend to be less similar. This finding is consistent with the emerging literature on incentivized monitoring (e.g., Downs (1998); Elyasiani and Jia (2010); Elyasiani, Jia, and Mao (2010); Huang and Petkevich (2016); Hardin III, Nagel, Roskelley, and Seagraves (2017); Cline, Fu, and Tang (2020); Gilstrap, Petkevich, Sezer and Teterin (2021); and Ling, Wang, and Zhou (2021)), and supports the notion that not all institutions are the same. As such, we encourage future researchers in this domain to continue exploring the various roles played by alternative types of institutional investors.¹⁸ Overall, the results presented in Table 2 indicate

¹⁸ In untabulated results, we also investigate whether the change of auditors would have an impact on the annual report's similarity. We find that only 3.1% of our sample year observations were characterized by REITs involved in changing auditors, while the coefficient estimates surrounding the impact of auditor changes are consistently insignificant (though they are notionally negative). This suggests auditor changes may not be a major driving force or determining factor regarding innovations in REIT annual reports.

that changes in an annual report are a function of changes in the REIT's economic operating environment, thus suggesting annual reports continue to provide valuable information to the market. We next explore whether the market recognizes this value and incorporates it into observable market outcomes.

Market Reaction to Annual Report Modifications

The results presented above indicate that changes in a REIT's annual report reflect changes in the REIT's economic circumstances, thereby suggesting that while annual reports are becoming increasingly repetitive they continue to provide valuable information. As such, we now explore how the market reacts to the information contained in those reports. Specifically, we examine the relation between similarity and the market's response to the release of the annual report. Operationally, we examine the absolute value of the market reaction, as while we argue that changes in annual reports convey information to the market, we are not assigning a directional value to that information. In some cases, the information is likely to be good news regarding the firm's prospects, while in other instances negative news may predominate. By examining the magnitude rather than the directionality of such changes, we mitigate the potential of positive and negative market reactions cancelling out meaningful effects.

The results of this analysis are presented in Panel A of Table 3 and reveal that the market exhibits a statistically significant and economically meaningful reaction to the release of a REIT's annual report. Consistent with Brown and Tucker (2011), the results also indicate that the market's response to the release of the annual report is somewhat muted for those firms whose annual report filings are relatively similar to their prior year report. Specifically, we observe that a one standard deviation decrease in the annual report's similarity score (adjusted similarity score) is associated with a 21 bp (24 bp) increase in the market's reaction to the annual report's release.¹⁹ Such market reactions suggest REIT annual reports continue to provide value relevant information to market participants, while the negative relation between the report's level of year-over-year similarity and the market's response to such disclosures suggests that the SEC is justifiably concerned about the increasing level of similarity we document in Figure 1.

Interestingly, however, given the findings of Table 2 that changes in report similarity are a function of changes in the REIT's underlying economic situation, one possible explanation for the

¹⁹ The 21 bp and 24 bp increases represent the average reaction across the various specifications shown in Table 3.

results observed in Panel A of Table 3 is that our similarity variable is simply proxying for changes in the REIT's economic vitality. To address this concern and ensure the robustness of the observed relation between our similarity scores and subsequent REIT market reactions, we next replace our raw (adjusted) similarity score measures with the similarity score residuals from column 4 of Table 2 ($\varepsilon_{\text{raw_simscore}}$) [Appendix B ($\varepsilon_{\text{adj_simscore}}$)].²⁰ In doing so, we find that the coefficient estimates for both similarity score residual measures are also negative and statistically significant across all the columns, suggesting our similarity measures are not redundant to firm characteristic changes.

Another potential concern is that our sample observation window includes the global financial crisis period. Annual reports during this era of elevated economic stress and uncertainty may well be significantly different from prior (or subsequent) years, which could potentially bias our results. To address this concern, we also replicate our Panel A, Table 3 approach while excluding observations from the financial crisis period (i.e., years 2007 and 2008). The results of this endeavor are presented in Panel C of Table 3, where we find that although the economic magnitudes of the coefficient estimates on our similarity measures are slightly weaker than was observed using the full sample, the market still significantly responds to the release of REIT annual reports in a virtually identical fashion during this alternative estimation window. This indicates our main findings and primary contribution are neither driven by, nor exclusively limited to, the financial crisis period.

Lastly, to ensure our focal results are not dependent on the return window selected, we replicate our Panel A analysis while replacing $|\text{CAR3}|$ with $|\text{CAR5}|$, where $|\text{CAR5}|$ is the absolute value of the cumulative market-adjusted stock return over the five days beginning with the 10-k filing date.²¹ Employing this longer window (see Panel D, Table 3), we again find our results are very consistent with those previously reported, thus suggesting the market's reaction to innovations in a firm's annual report is not driven by the event window we choose.

In sum, the results presented in Table 3 consistently suggest the market responds to the release of REIT annual reports in an economically meaningful way, and further, indicate that the market's reaction is influenced by the level of similarity between this year's annual report and the prior year's filing. Taken together, these results suggest that while REIT annual reports are

²⁰ Our results are again very consistent if we control for the readability/tone of the annual reports.

²¹ As additional robustness tests, in untabulated analyses we further replicate our main results based on one-day, two-day, and four-day cumulative abnormal returns and the results remain qualitatively consistent.

becoming increasingly repetitive, they continue to provide value relevant information to the marketplace.

Implied Cost of Equity Capital and Annual Report Modifications

In addition to examining the market's immediate reaction to the annual report's level of similarity, we also explore the longer-term impact of disclosure similarity. Specifically, we examine the relation between the annual report's level of similarity and changes in the REIT's implied cost of equity capital. As an annual report that is similar to the prior year's report will contain relatively little new information, we would expect equity investors will not materially adjust their expectations regarding the REIT's future cash flows for such firms. Conversely, an annual report that is less similar to the prior year's filing will likely contain more valuable information for investors, thus leading them to more readily adjust their expectations regarding the REIT's future prospects.

In our analysis of the relation between similarity and the cost of equity, we rely on three different approaches to estimate the REITs cost of equity: 1) mainstream finance/accounting proxies (re_{gm} , re_{ea} , re_{ct} , and re_{ojn}), 2) the Fama and French four factor proxy, and 3) the Danielsen, Harrison, Van Ness, and Warr (2014) modified residual income approach. In operationalizing these metrics, we note that our calculations rely on data from Compustat, CRSP, and I/B/E/S. Starting with our finance/accounting cost of equity proxies, the first technique we employ is derived from the model examined in Gode and Mohanram (2003). Mathematically, we use the following pricing equation:

$$re_{gm} = \frac{1}{2} \left(g + \frac{d * EPS_{t+1}}{P_t} \right) + \sqrt{\left[\frac{1}{2} \left(g + \frac{d * EPS_{t+1}}{P_t} \right) \right]^2 + \left(\frac{EPS_{t+1}}{P_t} \right) \left(\frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}} - g \right)}, \quad (1)$$

where re_{gm} is the implied cost of equity. d is the dividend payout ratio calculated as the actual dividends per share divided by the actual earnings per share in time t-1, while EPS_{t+1} and EPS_{t+2} are the consensus analyst forecast estimates of one-year and two-year ahead earnings per share as reported by I/B/E/S. Lastly, g is the growth rate of residual earnings in perpetuity, which is set equal to the expected inflation rate (and assumed to be 3% in our models).

The second finance/accounting cost of equity estimate we employ is from Easton (2004), and uses the price earnings growth ratio to compute a firm's cost of equity. Following Francis,

LaFond, Olsson, and Schipper (2005), Plumlee and Botosan (2005), and Callahan, Smith, and Spencer (2012), we estimate Easton's (2004) implied cost of equity by solving the following price equation for the cost of equity:

$$P_0 = \frac{EPS_2 - EPS_1}{(re_{ea})^2}, \quad (2)$$

where re_{ea} is the implied cost of equity. P_0 is the current stock price, while EPS_1 and EPS_2 are forecasted earnings per share for periods t_1 and t_2 as reported by I/B/E/S. Because of positive expectations surrounding growth in earnings, the model has a closed form solution for re_{ea} .

Next, our third proxy is based on the residual income valuation model of Claus and Thomas (2001). More specifically, under their model the cost of equity estimate is derived from the following price equation:

$$P_0 = BV_0 + \sum_{t=1}^4 \frac{EPS_t - re_{ct}(BV_{t-1})}{(1+re_{ct})^t} + \frac{(EPS_5 - re_{ct}BV_4)(1+g)}{(re_{ct}-g)(1+re_{ct})^5}, \quad (3)$$

where re_{ct} is the implied cost of equity capital, P_0 is the current stock price, BV is the book value of equity per share, EPS_t is the t period forecasted earnings per share reported by I/B/E/S, and g is the expected inflation rate.²² One key assumption of this model is that residual income grows at a rate equal to inflation after five years. Following Hutchens and Rego (2015), we assume the expected inflation rate to be 3%, which is also the lower bound of our iteration process.

The last cost of equity proxy we adopt from the finance/accounting literature is based on an abnormal earnings growth model, which requires positive growth in forecasted earnings. Specifically, following Ohlson and Juettner-Nauroth (2005), we impute the implied cost of equity capital from the following pricing model:

$$P_0 = \left(\frac{EPS_1}{re_{ojn}} \right) \left[\frac{\left(\frac{EPS_2 - EPS_1}{EPS_1} \right) + re_{ojn} \left(\frac{DPS_1}{EPS_1} - ltg \right)}{re_{ojn} - ltg} \right], \quad (4)$$

where re_{ojn} is the implied cost of equity capital, EPS_1 and EPS_2 are defined as before, DPS_1 is the dividend per share, and ltg is the analysts' long-term growth rate forecast reported by I/B/E/S.

²² Following Naiker, Navissi, and Truong (2013), if analysts' forecasted earnings per share for three-, four-, and five-years ahead are not reported by I/B/E/S, we estimate the EPS_t as $EPS_{t-1}(1 + ltg)$, where ltg is the analysts' long term growth rate forecast reported by I/B/E/S.

We note that implementing each of these finance/accounting literature measures requires subjective judgment, and that any imprecision in the estimates would likely bias us against finding significant results. Thus, after creating these four implied cost of equity capital measures (re_{gm} , re_{ea} , re_{ct} , and re_{ojn}), our final step is to take the average of these metrics to arrive at the ultimate implied cost of equity capital variable (re) used throughout our empirical specifications. This process helps to mitigate the potential impact of potential model misspecification, subjective judgment errors, and outliers, and thus enhances the reliability of our estimation process.

The results of this analysis into the impact of disclosure similarity on the average cost of equity are presented in Panel A of Table 4. Specifically, this table explores the relation between the absolute change in the implied cost of equity from before to after the annual report filing date. Consistent with the level of disclosure similarity capturing the degree of information contained in the annual report, we find that the more similar a report is to the firm's prior year filing, the smaller the change in the REIT's implied cost of equity.

In addition to using cost of equity proxies from the broader finance/accounting literature, to further ensure our results are not dependent on the cost of equity estimation models employed, we next replicate our Panel A analysis using the cost of equity proxy suggested by Fama and French (1997) and D'mello and Shroff (2000). Specifically, this alternative approach uses the expected return based on the Fama and French (1993) three-factor plus momentum factor model as our cost of equity capital. Operationally, using daily data we estimate each REIT's Fama and French three-factor and momentum factor loadings each year.²³ Next, we use our estimated factor loadings from the previous year, along with the four factors, to construct the expected return estimate. The results of this analysis are presented in Panel B of Table 4, and are broadly consistent with the results presented in Panel A. More specifically, we again find evidence that similarity serves as an important proxy for the degree of information contained in the annual report, as more similar reports are associated with smaller changes in the REIT's observed cost of equity.

Lastly, because regulations require REITs to distribute 90% of their taxable income as dividends, cost of equity estimates that rely on EPS may be problematic. As such, to further assess the robustness of our results, we also examine the cost of equity measure proposed by Danielsen, Harrison, Van Ness, and Warr (2014). This technique relies on a residual income approach that

²³ Both Fama and French (1993) three-factor and momentum factor data is obtained from https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

replaces EPS with funds from operations (FFO). Specifically, to implement this approach we again solve the following price equation for the implied cost of equity capital:

$$P_0 = BV_0 + \sum_{t=1}^3 \frac{(ROE_t - re)(BV_{t-1})}{(1 + re)^t}, \quad (5)$$

where ROE_t is the REIT's funds from operations (FFO) at time t . For the forecasted book value of equity (BV), we use the clean surplus relation:

$$BV_t = BV_{t-1} + NI_t - DIV_{t-1}, \quad (6)$$

in which dividends (DIV) are assumed to be 85% of FFO. After utilizing the available data to construct all known model inputs, we proceed with an iterative approach to calculate the implied cost of capital (re) recursively. The results from this process are reported in Panel C of Table 4, and once again appear extremely consistent with our earlier findings. With respect to the economic significance of our results, we note that an increase in the adjusted (raw) similarity score from its median value to the 75th percentile level results in an average 0.46% (0.53%) decrease in the absolute change in the firm's implied cost of equity capital across our three, alternative cost of equity capital metrics.

Overall, the results present in Table 4 clearly indicate the market responds to the information contained in the REIT's annual report, as we repeatedly find reduced similarity in year-over-year corporate disclosures is directly related to larger changes in the REIT's implied cost of equity, regardless of how we estimate these implied capital costs.²⁴ These findings also reinforce the notion that innovations in the grammatical construction, presentation, and content of REIT annual reports continue to contain value relevant information for both key stakeholders and broader market participants.

Alternative Information Channels

²⁴In untabulated results, we also examine whether annual report modifications are related to changes in the cost of debt, where the cost of debt is measured as total interest expenses divided by the sum of total long-term debt and current liabilities. Consistent with the results for the implied cost of equity, we find that reduced similarity in year-over-year annual reports is directly related to larger changes in the REIT's cost of debt.

The Role of Options Trading

Having presented evidence that annual reports continue to provide the market with value relevant information, we next examine whether this information is a substitute for, or a complement to, other information channels. Specifically, we explore how option trading impacts the market's response to the information contained in the annual report. Of note, Cashman, Harrison, and Sheng (2021) and Cashman, Harrison, and Sheng (2022) demonstrate that options trading is predictive of future REIT returns. They further contend this return predictability indicates options traders are uniquely informed and provide value relevant information to the marketplace through their trading activities. Under this paradigm (of informed options trading), to the extent options traders are utilizing the same information conveyed by changes in the annual report, we would expect to see innovations in options trading as predictive of the level of year-over-year annual report (dis)similarity. Furthermore, as options trading occurs on a virtually continuous basis, while corporate disclosures and regulatory filings are relatively infrequent, periodic events, informed options traders would appear to be well situated to front-run any value relevant information contained in annual reports to which they are privy. As such, we would expect to see the market reaction to less similar annual reports mitigated by the presence of active options trading, as some portion of the information contained in the annual report innovations are likely to already be incorporated into current market prices via option driven price discovery. We explore these conjectures in Tables 5, 6, and 7.

In conducting this examination, we first note that (by construction) our sample along this dimension is constrained to those REITs with an active options market. We recognize this potentially limits our sample to relatively large, informationally transparent REITs for which formal corporate disclosures may add relatively little value. Along this dimension, recall our previous findings from Table 3 which document larger firms exhibit significantly more muted market reactions surrounding the disclosure of their annual reports. As such, our ability to estimate the true information content potential of options trading may be somewhat limited. Nevertheless, descriptive statistics for this constrained sample of REITs with active options trading are presented in Table 5.

A cursory review of this summary data confirms REITs characterized by active options trading are indeed larger than their non-optionable counterparts. Additionally, they are less likely to be late filers of regulatorily mandated disclosures, while their annual reports are characterized

by both similar year-over-year linguistic similarity and market reactions once disclosed. Finally, as revealed in untabulated correlation analyses, we note the relative level of options trading over the last one, two, and four quarters immediately preceding the release of each firm's annual report are all negatively correlated with the year-over-year similarity of REIT 10-k disclosures. This latter result is consistent with conventional wisdom and suggests options traders may well be uniquely active in more informationally opaque markets, thereby playing an important role in the price discovery process for such firms.

Continuing, Table 6 presents the results of our multivariate analysis into the relation between options trading and the level of year-over-year REIT annual report similarity. In operationalizing these tests, we include all of the firm-level control variables from Table 3, as well as the ratio of options trading volume to stock trading volume (i.e., the O/S ratio) over the observation window.²⁵ For all traded options, we require their expiration dates to be within the next 5 to 35 trading days to ensure the liquidity of options trading. Moreover, for each optionable REIT stock, we select call and put option contracts with a trading volume greater than zero for a given quarter. The results of this analysis over alternative options trading intervals (i.e., the immediately preceding one, two, and four quarters) are reported in columns 1, 2, and 3 of Table 6, respectively. As the observed relations exhibit qualitative consistency across both similarity measures, for the sake of brevity in our discussion, we again focus our exposition on the raw similarity score results in Table 6 and provide the corresponding findings from using adjusted similarity scores in Appendix C. Turning to the results, consistent with options trading and changes in the annual report both serving as alternative means of conveying information to the marketplace, we find that across all three observation intervals higher levels of options trading (relative to stock trading) are associated with greater changes (i.e., reduced similarity) in year-over-year REIT annual reports.

Continuing, as outlined above, given the ability of options traders to rapidly respond to changes in the REIT's operating environment and/or financial position, theory suggests increased options trading should mitigate the market response to annual report innovations. More specifically, to the extent options traders are truly informed investors, changes in the relative level of options

²⁵ Given the inherent uncertainty regarding the timing of corporate events which drive year-over-year expositional changes in each firm's annual report, we examine three alternative options trading observation intervals: one quarter, two quarters, and the full year immediately preceding the filing and release of the REIT's annual report.

market trading activity should (at least partially) inform market participants about the REIT's changing circumstances. Thus, by the time each firm's 10-k is filed and released to the public, the disclosure may contain relatively little new, value relevant information. As such, we expect the market response to our similarity score metrics will be relatively muted for firms characterized by active options trading.

Table 7 presents the results of our analysis exploring this possibility. We start by replicating our previous analysis of the relation between similarity and the market's reaction to annual report filings on the subsample of REITs which exhibit active options trading. This process helps to ensure that the switch from our full sample to this sub-sample of REITs with active options trading does not materially impact and distort our key findings. The results of this analysis are presented in Panel A of Table 7, where we continue to observe that both our raw and adjusted similarity metrics continue to be negatively related to the market's reaction to annual report disclosures. Importantly, however, we note that within this sub-sample both the statistical and economic significance of these relations are considerably weaker than those previously observed for the broader sample of all equity REITs.²⁶ This result is also entirely in line with expectations, as one likely potential explanation for this drop in significance is that option trading is "front running" the information contained in the annual report. Taken together, these results imply that both options trading and innovations in the linguistic similarity of REIT annual reports provide value relevant information to market participants and enhance the price discovery process.

We next expand our analysis to account and control for the actual level, rather than mere presence, of REIT option market trading activity. To account for the impact of options trading on the REIT's annual report similarity scores, we take the similarity score measure residuals from Table 6 ($\varepsilon_{\text{raw_simscore}}$). We then replicate Panel A of Table 7, while replacing the similarity score measures with similarity score residuals.²⁷ Specifically, Panel B presents the results of re-estimating the market reaction to annual report innovations after controlling for the relative intensity of option market activity (i.e., the ratio of option trading volume to stock trading volume) over the quarter, two quarters, and four quarters immediately preceding the filing of the REIT's

²⁶ More specifically, across the four model specifications reported in Panel A of Table 7, the estimated coefficient values on our focal similarity metrics dropped by 23%, 18%, 30%, and 24%, respectively, when compared to their corresponding full sample estimates in Table 3.

²⁷ We also replicate the findings for adjusted similarity score residuals from Appendix C ($\varepsilon_{\text{adj_simscore}}$) in Appendix D. As the observed relations exhibit qualitative consistency across both similarity measures, for the sake of clarity, we once again focus our discussion on Panel B of Table 7.

annual report. As the focal relations presented across all columns in Panel B are qualitatively consistent, our discussion focuses exclusively on the findings in columns 1 and 2.

More specifically, in these two columns we observe that the relation between year-over-year REIT annual report similarity and the market reaction to firm 10-k disclosures remains negative and statistically significant. In untabulated results, we further include both similarity score measures and option measures in the same model rather than taking the similarity score measure residuals from Table 6. Using this alternative framework, we again find the results with respect to our similarity score measures are very consistent with those previously reported, while the relation between the relative intensity of options trading and the market reaction to REIT 10-k disclosures is positive and significant. These findings are also generally consistent with both Johnson and So (2012) and Cashman, Harrison, and Sheng (2021), who document the value relevance of the O/S ratio in both broad and REIT specific markets, respectively.

Taken together, these results suggest that while options trading enhances the information environment for REITs, such derivative market trading does not completely capture and subsume the information contained in the narrative disclosure of REIT 10-k filings. In sum, both options trading and the annual report's year-over-year level of similarity provide value relevant information to the market.

Market Makers and the Bid-Ask Spread

Our preceding analysis suggests that both annual report disclosures and option market trading activities provide market participants with value relevant information. From an investment perspective, such insight may be uniquely valuable in informationally opaque market settings. As such, on an ex-ante basis we would expect the observed market reaction to year-over-year innovations in REIT annual report similarity to be concentrated among the more informationally opaque (i.e., less transparent) firms within our sample.

We explore this notion empirically in Table 8. Specifically, using observed levels of each REIT's equity bid-ask spread we (median) split the sample into REITs that are informationally transparent and those that are informationally opaque. Conceptually, as outlined above, market makers use bid-ask spreads to protect themselves and compensate for anticipated losses associated with trading against informed parties. Within this context, spreads may serve as a useful proxy for the level of valuation uncertainty surrounding a firm. However, we acknowledge that spreads may

not purely proxy for the relative informational opacity of a firm. For example, bid-ask spreads may also proxy for the liquidity of a firm. Therefore, to mitigate this concern, in a robustness test we conduct further regression analyses on various well-established determinants of bid-ask spreads, and then calculate the residuals of the spreads to measure the level of informational opacity characterizing the firm. Specifically, following Danielsen and Harrison (2000), we estimate the residuals of bid-ask spreads based on the following model:

$$Spread_{i,t} = \alpha + \beta_1 MV_{i,t} + \beta_2 DebtRatio_{i,t} + \beta_3 Vol_{i,t} + \beta_4 Exchg_{i,t} + FE + \varepsilon_{i,t}, \quad (7)$$

where $Spread_{i,t}$ is the percentage spread, which is defined as the average quoted spread scaled by the quote midpoint for the quarter immediately preceding the filing date of the firm's annual report. $MV_{i,t}$ is the natural log of the market value of the firm's total assets measured as the market capitalization of equity plus the book value of debt as of the year-end immediately preceding the annual report filing date. $Vol_{i,t}$ is the natural log of the REIT's trading volume over the quarter immediately preceding the filing date of their annual report. $Exchg_{i,t}$ is a set of exchange dummy variables identifying where the security is traded, while FE indicates fixed effects for both property type and year.

To the extent our prior assertions regarding information transmission are correct, we would expect to see the market reaction to year-over-year innovations in corporate disclosure similarity concentrated amongst the less transparent (i.e., high bid-ask spread) REITs within our sample. Exploring this possibility, Panel A (Panel B) presents the results from re-estimating our market reaction models on the sub-sample of REITs that are less (more) informationally transparent as proxied by their observed bid-ask spreads, while Panel C (Panel D) reports the re-estimation results for the sub-sample of REITs that are relatively less (more) transparent as proxied by their bid-ask spread residuals.²⁸

As expected, the results across all panels in Table 8 confirm that the market's reaction to the year-over-year level of annual report similarity is indeed concentrated in our less transparent

²⁸ Specifically, we identify and define informationally transparent REITs using a median split based on each REIT's average bid-ask spread (or bid-ask spread residuals) over the quarter immediately preceding the filing date of their annual report. Firms with relatively low (high) spreads (or spread residuals) are classified as informationally transparent (opaque).

sample REITs.²⁹ More specifically, in Panel A (Panel C) both of our similarity metrics are found to be inversely related to the magnitude of the market response to REIT 10-k disclosures for informationally opaque firms, while in Panel B (D) neither of our similarity metrics approaches statistical significance at conventionally accepted levels for our subsample of informationally transparent firms. Once again, as outlined above, these findings confirm our focal results are most pronounced within those REITs that the market possesses the least information about prior to their corporate (annual report) disclosures.

Option Introductions and Option Market Reactions to Annual Report Innovations

Cashman, Harrison, and Sheng (2022) demonstrate that options trading on Real Estate Investment Trusts (REITs) has experienced exponential growth over the past two decades. Their research findings also underscore the substantial influence of active options trading on the performance of REITs in financial markets. Introducing options trading to a company often triggers heightened scrutiny from investors, institutions, and regulatory bodies. This increased attention tends to drive companies towards producing more comprehensive and transparent annual reports. As such, we would expect option introductions to have a positive impact on firm reporting transparency. To examine this hypothesis, we first create an option introduction indicator variable (Option Intro) which is set equal to 1 for the year in which options trading was first available for the firm, and zero otherwise. We then add this metric to our existing baseline model specifications and re-estimate our focal regressions. The results from this estimate procedure are reported in Table 9, where we find that the impact of option introductions on REIT annual report similarity scores is significantly negative. This finding implies that options influence firm reporting transparency and is consistent with the notion that enhanced monitoring increases firm transparency.

To increase our understanding of the interaction between options trading and annual reports disclosures, we also examine how options trading following the annual report release influences the market's reaction to the report. Specifically, for each sample firm we calculate option volume (OPVOL) for the initial five trading days following the filing of the annual report.³⁰ We then

²⁹ In untabulated results, replacing the similarity score measure residuals with raw similarity score measures produces results which are very consistent with those reported.

³⁰ The existing body of option literature predominantly focuses on the investigation of options trading at the weekly level (e.g., Johnson and So (2012) and Sheng (2022)). Furthermore, Blau, Nguyen, and Whitby (2014) demonstrate

analyze the interaction between option trading volume and similarity scores to assess how option volume influences the market's reaction to the annual report's similarity. Finally, we also examine whether options trading activity alters the impact of market reactions to annual report innovations. The results of these regressions are reported in Table 10, where we generally observe that, even after accounting for options trading activity during the same market reaction period, both raw and adjusted similarity scores exhibit a notably negative and statistically significant association with market reactions. Furthermore, across all columns of our analysis, we consistently identify positive and statistically significant coefficient estimates for the interaction terms between option trading volume and similarity scores. This pattern suggests options trading enhances price discovery, thereby reducing the economic impact of annual report disclosures, particularly for firms with substantial option trading activity and a high degree of innovation. Nonetheless, it is crucial to underscore that annual report innovations continue to hold relevance, with reports characterized by greater information modifications still evoking more pronounced market reactions, and thus emphasizing the enduring importance of comprehensive and insightful annual reporting.

Conclusion

In recent years, the Securities and Exchange Commission (SEC) has expressed concern that corporate financial disclosures are becoming increasingly similar, and further, that such boilerplate disclosures may fail to provide investors sufficient details regarding firm operations to enable them to make astute, informed, and rational decisions. This deficiency may be particularly acute for firms, such as REITs, who are capital constrained and thus forced to engage with external capital markets on a regular basis. Against this backdrop, the current investigation explores the impact of linguistic similarity in year-over-year REIT annual report (10-k) filings.

Specifically, using a sample of 1,910 annual report filings by 234 separate equity REITs from 2000-2020, we first document that despite the strong growth and increasingly sophisticated financing arrangements employed throughout this sector, REIT corporate disclosures exhibit increasing year-over-year linguistic similarity across our two-decade sample period. Interestingly, however, and contrary to the SEC's expressed concerns regarding such boilerplate disclosures being relatively uninformative to market participants, we continue to find that innovations in

that options trading holds greater return predictive power when analyzed on a weekly basis. Consequently, the current investigation delves into option market reactions with a particular emphasis on the weekly level.

annual report similarity are a function of the economic environment, operational challenges, and financing conditions faced by our sample firms, as well as the linguistic complexity (notably readability and tone) of the annual reports themselves. Moreover, the disclosure of REIT annual reports continues to result in significant market reactions, with the magnitude of such reactions inversely related to the degree of year-over-year similarity in the filing's narrative description. Similarly, annual report innovations are shown to be related to both changes in, as well as the absolute level of, the implied cost of equity capital for sample firms. Taken together, these findings suggest REIT annual report disclosures continue to be material information events, with more meaningful information disclosures generating heightened market responses.

As the price discovery process in modern financial markets often relies on competing information signals from multiple market participants, we next explore the robustness of our focal results to the inclusion of information signals from potentially informed third parties. More specifically, drawing upon recent findings from the options literature, we examine whether the intensity of options market trading activity subsumes the information content of REIT annual report disclosures. Conceptually, options traders are frequently viewed as informed parties, and their ability to transact on a virtually continuous basis positions them well to capitalize on their informational advantage before the release of periodic corporate disclosures (i.e., "front-run"). To the extent such derivatives transactions provide unique insight into the value of the underlying securities, they may subsume the information content of our focal 10-k corporate disclosures. In practice, however, this does not appear to be the case. Specifically, after controlling for the intensity of relative options market trading activity, while our effects are somewhat dampened, we continue to find that innovations in year-over-year report similarity engender statistically significant and economically meaningful market reactions.

Lastly, we also provide evidence that the economic magnitudes of each of our aforementioned effects are most pronounced among the more informationally opaque firms in our sample. Specifically, after bifurcating our sample observations using a median split based on bid-ask spreads observed over the month immediately preceding each REIT's annual report disclosure, we find our previously observed significant market responses to the year-over-year linguistic similarity of REIT 10-k filings are concentrated in our high bid-ask spread (i.e., informationally opaque) firm subsample. Taken together, our empirical results consistently find REIT annual reports remain a value-relevant source of information for market participants and are uniquely

informative when they are more innovative and/or occur in more informationally opaque market settings.

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Figure 1

Similarity Scores for REIT Annual Reports Over Time

This figure depicts the annual average raw similarity score and adjusted similarity score over time. The sample period is from 2001 through 2020.

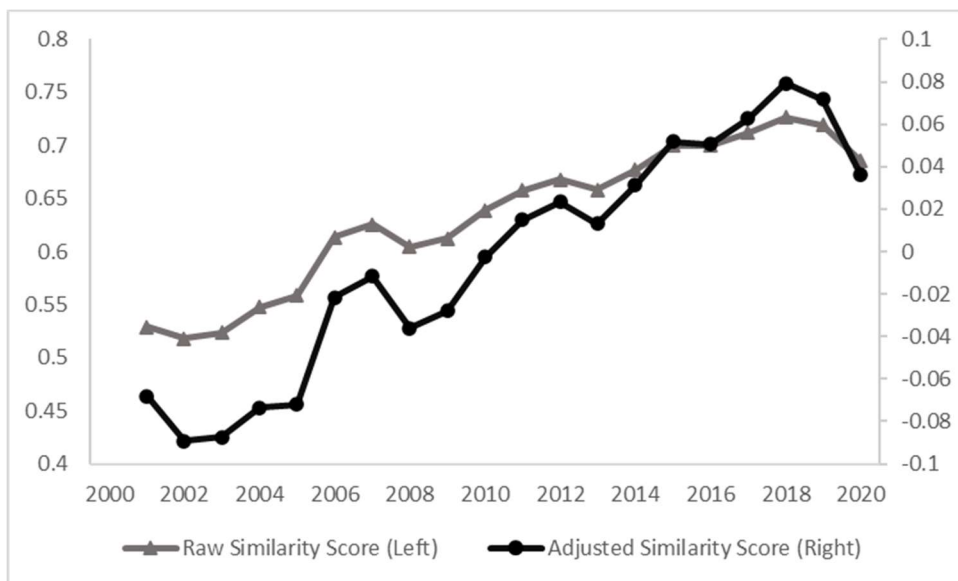


Figure 2
Raw Similarity Scores Over Time by Property Type

This figure depicts the annual average raw similarity score for REITs grouped across alternative property type investment focus. The sample period is from 2001 through 2020.

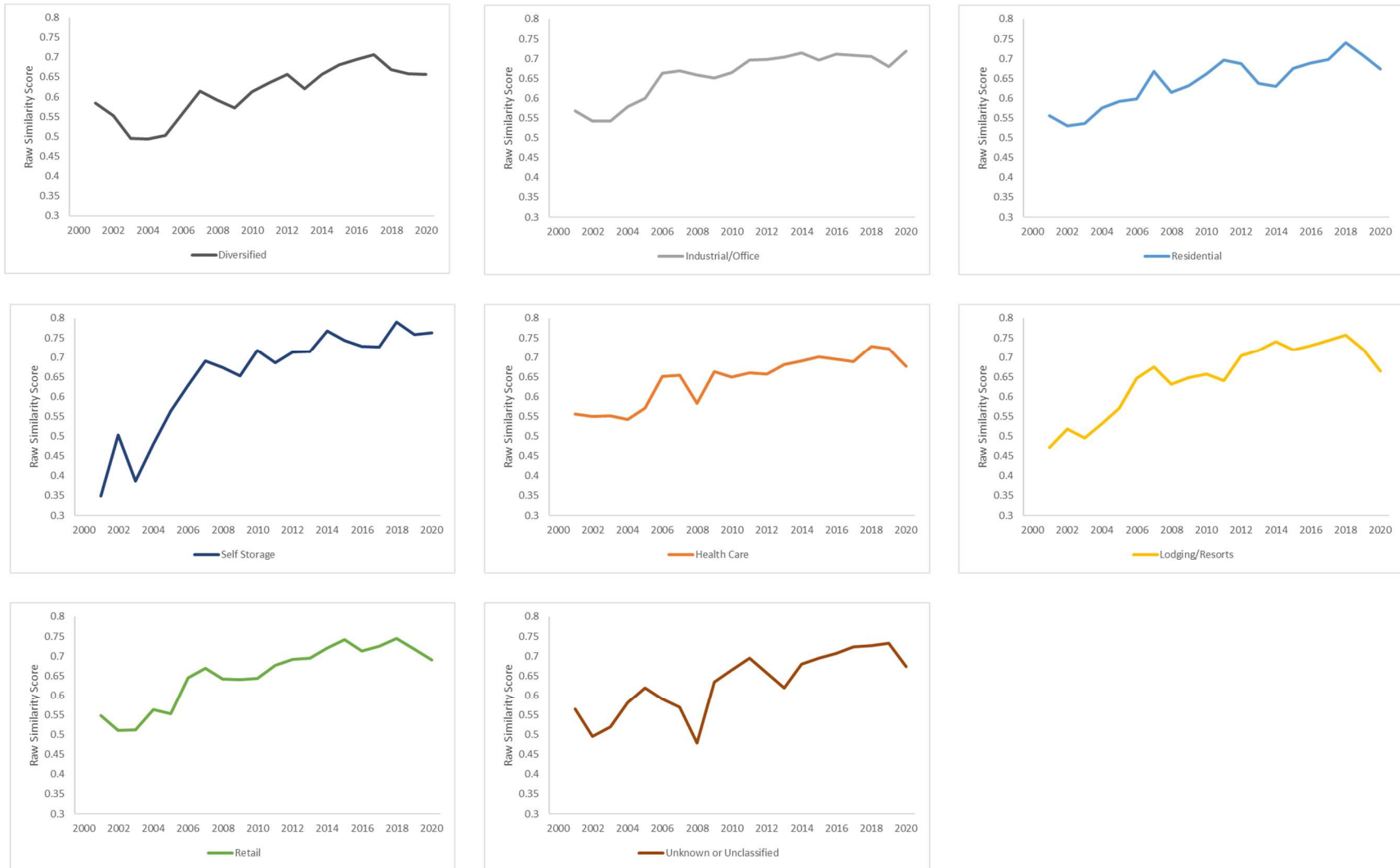


Figure 3
Market Reaction Around Corporate Disclosure Events

This figure depicts the mean (Panle A) and median (Panel B) price reaction of REITs around 10-k filings and earnings announcement events for the sample period of 2001 through 2020. |Market-adjusted 3-day return| is the absolute value of the cumulative market adjusted REIT stock return over the three-day window surrounding the filing or announcement.

Panel A:



Panel B:

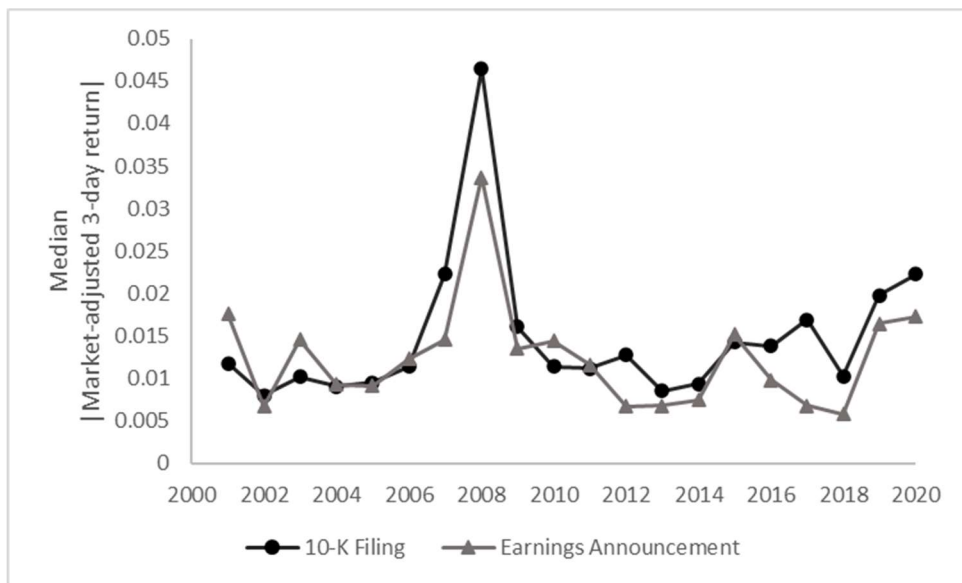


Table 1
Summary Statistics

This table provides descriptive statistics for the main variables considered in the analysis. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. |CAR3| is the absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date. Size is the market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. |CAR^{EA}| is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). |chg_debt due| is the absolute value of the change in the amount of debt due in the coming year scaled by total assets. |chg_lev| is the absolute value of the change in total liabilities scaled by total assets. |chg_ffo| is the absolute value of the difference between the current and previous fiscal year's funds from operations (FFO), scaled by total assets from the previous year. |chg_stdret| is the absolute value of the change in daily stock return volatility from the previous year to the current year. Acquire is set equal to 1 if total assets increased by more than one-third from the previous year, and is set equal to zero otherwise. Downsize is set equal to 1 if total assets decreased by more than one-third from the previous year, and is set equal to zero otherwise. Assets is defined as total assets as of the end of the fiscal year. The sample period runs from 2001 through 2020. Appendix A provides a detailed description and definition of each variable.

Variable	N	Mean	1st Pctl	25th Pctl	50th Pctl	75th Pctl	99th Pctl	Std Dev
raw_simscore	1910	0.6616	0.3320	0.5980	0.6810	0.7420	0.8580	0.1160
adj_simscore	1910	0.0260	-0.3030	-0.0344	0.0414	0.1035	0.2318	0.1117
CAR3	1910	0.0208	0.0002	0.0055	0.0123	0.0237	0.1465	0.0339
Size (in \$1000)	1910	3963926	12696	691139	1709771	3783227	38125536	7403467
filelate	1910	0.0141	0.0000	0.0000	0.0000	0.0000	1.0000	0.1181
newitems	1910	186.463	105.000	114.000	227.000	236.000	257.000	60.360
CAR ^{EA}	1910	0.0164	0.0003	0.0051	0.0102	0.0210	0.0988	0.0193
IO	1910	0.7373	0.0113	0.5477	0.8210	0.9550	1.1908	0.2960
Volatility of IO	1910	0.0789	0.0047	0.0392	0.0629	0.0998	0.3213	0.0622
chg_debt due	1910	0.0021	0.0000	0.0000	0.0000	0.0000	0.0471	0.0229
chg_lev	1910	0.0426	0.0004	0.0132	0.0291	0.0535	0.2491	0.0531
chg_ffo	1910	0.0232	0.0000	0.0039	0.0090	0.0212	0.1506	0.1192
chg_stdret	1910	0.0061	0.0001	0.0015	0.0031	0.0059	0.0446	0.0091
Acquire	1910	0.1084	0.0000	0.0000	0.0000	0.0000	1.0000	0.3109
Downsize	1910	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0722
Assets (in millions)	1910	4167.46	37.708	1159.18	2498.78	4525.41	26904.27	5321

Table 2
Similarity Score Determinants

This table explores the determinants of the raw similarity score of year-over-year REIT annual reports. Column 1 reports the results from using actual values of our similarity metrics, while columns 2 through 4 use quintile-based rankings of similarity. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. For the readability/tone metrics, they are measured as the previous year's litigious word proportion (Lag_LM_litigious), negative word proportion (Lag_LM_negative), positive word proportion (Lag_LM_positive), and uncertainty words proportion (Lag_LM_uncertainty), respectively. |chg_debt due| is the absolute value of the change in the amount of debt due in the coming year, scaled by total assets. |chg_lev| is the absolute value of the change in total liabilities, scaled by total assets. |chg_ffo| is the absolute value of the difference between the current and previous fiscal year's funds from operations (FFO), scaled by total assets from the previous year. LCR is the mean decile ranking of |chg_debt due|, |chg_lev|, and |chg_ffo|. |chg_stdret| is the absolute value of the change in daily stock return volatility from the previous year to the current year. Acquire is an indicator variable set equal to 1 if total assets increased by more than one-third from the previous year, and zero otherwise. Downsize is an indicator variable set equal to 1 if total assets decreased by more than one-third from the previous year, and zero otherwise. Assets is defined as total assets as of the end of the fiscal year. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Measurement Scale of Explanatory Variables			
	Raw	Quintile	Quintile	Quintile
Lag_LM_litigious	0.6191 (1.13)	0.5736 (1.06)	0.5661 (1.05)	0.3778 (0.70)
Lag_LM_negative	-1.3444* (-1.67)	-1.1121 (-1.37)	-1.2548 (-1.57)	-0.9764 (-1.18)
Lag_LM_positive	2.2565 (1.43)	2.3561 (1.50)	2.8314* (1.83)	2.0926 (1.35)
Lag_LM_uncertainty	3.9552*** (5.45)	3.6035*** (4.95)	3.5751*** (4.97)	3.4875*** (4.91)
chg_debt due	-0.1002*** (-3.30)	-0.0080* (-1.70)		-0.0043 (-0.88)
chg_lev	-0.1885*** (-3.84)	-0.0049*** (-3.09)		-0.0059*** (-3.75)
chg_ffo	0.0405* (1.73)	-0.0053*** (-3.58)		-0.0059*** (-4.09)
LCR			-0.0225*** (-7.42)	
chg_stdret	-0.6882* (-1.94)	-0.0024 (-1.52)	-0.0026 (-1.63)	-0.0021 (-1.33)
acquire	-0.0389*** (-5.54)	-0.0437*** (-6.14)	-0.0435*** (-6.28)	-0.0447*** (-6.39)
downsize	-0.1099*** (-2.67)	-0.0715 (-1.53)	-0.0704 (-1.55)	-0.0855** (-1.99)
Assets				-0.0145*** (-7.54)
IO				0.0114*** (5.51)
Volatility of IO				-0.0045*** (-2.95)
Constant	0.5316*** (10.77)	0.5319*** (10.47)	0.5412*** (10.85)	0.5386*** (10.45)
Year Fixed Effects	Yes	Yes	Yes	Yes
Property Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910
Adjusted R ²	0.407	0.407	0.416	0.432

Table 3
Market Reaction to Annual Report Modifications

Table 3 presents the results of examining the market reaction to annual report modifications. Panel A presents the results for absolute or logarithm transformed 3-day cumulative returns (CAR3). Panel B replicates Panel A results by replacing the similarity score measures with similarity score residuals from Table 2, Panel A ($\varepsilon_{\text{raw_simscore}}$) and Appendix B ($\varepsilon_{\text{adj_simscore}}$). Panel C replicates Panel A by excluding the financial crisis period (i.e., years 2007 and 2008). Panel D replicates Panel A results by replacing CAR3 with absolute or logarithm transformed 5-day cumulative returns (CAR5). The cumulative three-day (five-day) market-adjusted stock returns are calculated over the three (five) days beginning with the 10-k filing date. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar after adjusting for document length. Ln(Size) is the logarithm transformed market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. $|\text{CAR}^{\text{EA}}|$ is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: 3-day Cumulative Abnormal Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3
raw_simscore	-0.0176** (-2.36)	-0.0160** (-2.41)			-0.0189** (-2.40)	-0.0171** (-2.46)		
adj_simscore			-0.0208*** (-2.59)	-0.0187*** (-2.67)			-0.0219*** (-2.60)	-0.0196*** (-2.69)
Ln(Size)	-0.0059*** (-4.54)	-0.0053*** (-5.06)	-0.0060*** (-4.58)	-0.0054*** (-5.10)	-0.0064*** (-4.47)	-0.0057*** (-4.91)	-0.0065*** (-4.47)	-0.0058*** (-4.92)
Filelate	0.0163 (1.23)	0.0153 (1.31)	0.0159 (1.20)	0.0149 (1.28)	0.0159 (1.20)	0.0150 (1.29)	0.0154 (1.16)	0.0146 (1.25)
newitems	0.0000 (1.06)	0.0000 (0.99)	0.0000 (1.03)	0.0000 (0.97)	0.0000 (1.08)	0.0000 (1.01)	0.0000 (1.05)	0.0000 (0.99)
$ \text{CAR}^{\text{EA}} $	0.0743 (1.33)	0.0733 (1.48)	0.0745 (1.34)	0.0735 (1.48)	0.0737 (1.32)	0.0729 (1.47)	0.0738 (1.32)	0.0729 (1.47)
IO					0.0046 (1.09)	0.0040 (1.06)	0.0045 (1.07)	0.0039 (1.04)
Volatility of IO					-0.0110	-0.0088	-0.0121	-0.0097

Constant	0.2226*** (4.67)	0.2009*** (4.87)	0.2126*** (4.50)	0.1918*** (4.69)	(-0.99) 0.2277*** (4.73)	(-0.89) 0.2052*** (4.93)	(-1.07) 0.2169*** (4.57)	(-0.98) 0.1955*** (4.76)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910	1,910	1,910	1,910	1,910
Adjusted R ²	0.182	0.196	0.183	0.197	0.182	0.196	0.183	0.197

Panel B: Similarity Score Residuals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3
$\epsilon_{\text{raw_simscore}}$	-0.0180** (-2.40)	-0.0165** (-2.44)			-0.0180** (-2.40)	-0.0165** (-2.43)		
$\epsilon_{\text{adj_simscore}}$			-0.0201*** (-2.59)	-0.0181*** (-2.64)			-0.0200*** (-2.59)	-0.0181*** (-2.63)
Ln(Size)	-0.0058*** (-4.50)	-0.0052*** (-5.02)	-0.0058*** (-4.51)	-0.0052*** (-5.03)	-0.0062*** (-4.40)	-0.0056*** (-4.84)	-0.0062*** (-4.40)	-0.0056*** (-4.84)
filelate	0.0165 (1.25)	0.0154 (1.33)	0.0162 (1.22)	0.0152 (1.31)	0.0162 (1.23)	0.0152 (1.31)	0.0159 (1.20)	0.0150 (1.29)
newitems	0.0000 (1.11)	0.0000 (1.04)	0.0000 (1.10)	0.0000 (1.04)	0.0000 (1.12)	0.0000 (1.06)	0.0000 (1.12)	0.0000 (1.06)
CAR ^{EA}	0.0738 (1.32)	0.0729 (1.47)	0.0735 (1.31)	0.0726 (1.46)	0.0732 (1.30)	0.0724 (1.46)	0.0729 (1.30)	0.0721 (1.45)
IO					0.0036 (0.88)	0.0031 (0.85)	0.0035 (0.87)	0.0030 (0.83)
Volatility of IO					-0.0091 (-0.83)	-0.0071 (-0.73)	-0.0090 (-0.82)	-0.0069 (-0.72)
Constant	0.2132*** (4.52)	0.1923*** (4.72)	0.2132*** (4.54)	0.1924*** (4.74)	0.2166*** (4.57)	0.1953*** (4.77)	0.2166*** (4.59)	0.1952*** (4.78)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910	1,910	1,910	1,910	1,910
Adjusted R ²	0.181	0.195	0.182	0.196	0.181	0.195	0.182	0.196

Panel C: Excluding Financial Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3
raw_simscore	-0.0172** (-2.34)	-0.0157** (-2.42)			-0.0184** (-2.33)	-0.0167** (-2.42)		
adj_simscore			-0.0218*** (-2.67)	-0.0195*** (-2.78)			-0.0227*** (-2.64)	-0.0203*** (-2.74)
Ln(Size)	-0.0053*** (-3.86)	-0.0048*** (-4.32)	-0.0054*** (-3.91)	-0.0049*** (-4.37)	-0.0058*** (-3.79)	-0.0052*** (-4.17)	-0.0059*** (-3.81)	-0.0053*** (-4.18)
filelate	0.0173 (1.30)	0.0162 (1.38)	0.0168 (1.25)	0.0158 (1.35)	0.0170 (1.27)	0.0160 (1.37)	0.0165 (1.23)	0.0155 (1.33)
newitems	0.0000* (1.72)	0.0000* (1.67)	0.0000* (1.69)	0.0000 (1.64)	0.0000* (1.74)	0.0000* (1.69)	0.0000* (1.71)	0.0000* (1.66)
CAR ^{EA}	0.0596 (0.97)	0.0595 (1.10)	0.0596 (0.97)	0.0594 (1.10)	0.0599 (0.98)	0.0598 (1.10)	0.0597 (0.97)	0.0596 (1.10)
IO					0.0043 (1.02)	0.0036 (0.96)	0.0044 (1.03)	0.0036 (0.96)
Volatility of IO					-0.0053 (-0.49)	-0.0036 (-0.38)	-0.0065 (-0.59)	-0.0046 (-0.48)
Constant	0.2132*** (4.46)	0.1923*** (4.66)	0.2034*** (4.30)	0.1833*** (4.49)	0.2178*** (4.50)	0.1961*** (4.70)	0.2074*** (4.35)	0.1866*** (4.54)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,756	1,756	1,756	1,756	1,756	1,756	1,756	1,756
Adjusted R ²	0.153	0.163	0.155	0.165	0.153	0.163	0.154	0.164

Panel D: 5-day Cumulative Abnormal Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CAR5	Ln CAR5	CAR5	Ln CAR5	CAR5	Ln CAR5	CAR5	Ln CAR5
raw_simscore	-0.0223** (-2.21)	-0.0177** (-2.21)			-0.0277** (-2.12)	-0.0211** (-2.24)		
adj_simscore			-0.0297** (-2.16)	-0.0226** (-2.34)			-0.0337** (-2.10)	-0.0253** (-2.32)
Ln(Size)	-0.0081*** (-3.93)	-0.0068*** (-4.80)	-0.0083*** (-3.91)	-0.0069*** (-4.78)	-0.0105*** (-2.76)	-0.0083*** (-3.49)	-0.0107*** (-2.75)	-0.0085*** (-3.48)
filelate	0.0571 (1.21)	0.0372 (1.29)	0.0563 (1.20)	0.0367 (1.28)	0.0557 (1.21)	0.0363 (1.29)	0.0549 (1.21)	0.0357 (1.28)
newitems	0.0000 (0.22)	0.0000 (0.29)	0.0000 (0.18)	0.0000 (0.25)	0.0000 (0.37)	0.0000 (0.39)	0.0000 (0.33)	0.0000 (0.35)
CAR ^{EA}	0.0368 (0.56)	0.0446 (0.81)	0.0374 (0.58)	0.0451 (0.82)	0.0371 (0.58)	0.0444 (0.81)	0.0374 (0.58)	0.0446 (0.82)
IO					0.0217 (1.15)	0.0137 (1.20)	0.0217 (1.15)	0.0137 (1.19)
Volatility of IO					-0.0236* (-1.72)	-0.0188 (-1.63)	-0.0254* (-1.80)	-0.0202* (-1.71)
Constant	0.3821*** (4.09)	0.3177*** (4.29)	0.3693*** (4.00)	0.3076*** (4.18)	0.4048*** (4.08)	0.3322*** (4.33)	0.3890*** (4.02)	0.3201*** (4.23)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,907	1,907	1,907	1,907	1,907	1,907	1,907	1,907
Adjusted R ²	0.190	0.226	0.192	0.227	0.196	0.230	0.197	0.231

Table 4
Cost of Equity Capital Changes to Annual Report Modifications

This table presents the results of examining the relation between the annual report's level of similarity with last year's report and the REIT's subsequent implied cost of equity. Panel A reports the results for the absolute difference in the implied cost of equity before and after the annual report filing date, where the implied cost of equity (re) is calculated as the average of four commonly used implied cost of equity capital measures from the mainstream finance/accounting literature (re_{gm} , re_{ea} , re_{ct} , and re_{ojn}). Panel B replicates Panel A using the implied cost of equity estimated based upon the Fama-French 3-factor plus momentum factor model. Panel C replicates Panel A using the cost of equity estimated based on the Danielsen, Harrison, Van Ness, and Warr (2014) REIT-centric, residual income based approach. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. $|\Delta re|$ is the absolute difference in the implied cost of equity capital (re) measured before and after the annual report filing date. $\ln(|\Delta re|)$ and $\ln(re)$ are the logarithm transformed $|\Delta re|$ and re , respectively, to mitigate against possible outlier concerns. All other control variable definitions are provided in Table 3 and Appendix A. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Cost of equity capital estimated based on mainstream finance/accounting approaches				
	(1)	(2)	(3)	(4)
	$ \Delta re $	$\ln(\Delta re)$	$ \Delta re $	$\ln(\Delta re)$
raw_simscore	-0.0897** (-2.15)	-0.0670** (-2.29)		
adj_simscore			-0.1180*** (-2.77)	-0.0881*** (-2.98)
Ln(Size)	-0.0269*** (-5.11)	-0.0194*** (-5.67)	-0.0276*** (-5.15)	-0.0198*** (-5.73)
filelate	0.0735 (0.79)	0.0587 (0.80)	0.0704 (0.75)	0.0563 (0.77)
newitems	-0.0001 (-0.93)	-0.0001 (-0.96)	-0.0001 (-0.91)	-0.0000 (-0.94)
$ CAR^{EA} $	0.3294 (1.25)	0.2241 (1.24)	0.3381 (1.28)	0.2306 (1.27)
IO	0.0109 (0.41)	0.0084 (0.51)	0.0123 (0.46)	0.0095 (0.57)
Volatility of IO	-0.0185 (-0.24)	-0.0142 (-0.30)	-0.0228 (-0.30)	-0.0174 (-0.36)
Constant	0.4918*** (5.28)	0.3587*** (5.90)	0.4443*** (5.25)	0.3232*** (5.89)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	1,343	1,343	1,343	1,343
Adjusted R-squared	0.070	0.089	0.072	0.091

Panel B: Cost of equity estimated based on the Fama/French four-factor model

	(1)	(2)	(3)	(4)
	$ \Delta re $	$\text{Ln}(\Delta re)$	$ \Delta re $	$\text{Ln}(\Delta re)$
raw_simscore	-0.1740** (-2.52)	-0.1135** (-2.48)		
adj_simscore			-0.1750*** (-2.68)	-0.1180*** (-2.73)
Ln(Size)	-0.0159** (-2.06)	-0.0087* (-1.95)	-0.0165** (-2.16)	-0.0092** (-2.05)
filelate	-0.0004 (-0.01)	-0.0033 (-0.08)	-0.0022 (-0.04)	-0.0049 (-0.12)
newitems	0.0000 (0.19)	0.0000 (0.23)	0.0000 (0.18)	0.0000 (0.21)
$ \text{CAR}^{\text{EA}} $	-0.5040 (-1.34)	-0.3813 (-1.57)	-0.5057 (-1.35)	-0.3821 (-1.57)
IO	-0.0323 (-1.02)	-0.0114 (-0.56)	-0.0343 (-1.08)	-0.0125 (-0.61)
Volatility of IO	0.3557*** (3.02)	0.2142*** (2.98)	0.3492*** (2.98)	0.2095*** (2.91)
Constant	1.9050*** (13.07)	1.1054*** (16.48)	1.8054*** (12.76)	1.0405*** (16.55)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910
Adjusted R ²	0.234	0.225	0.234	0.225

Panel C: Cost of equity estimated based on the Danielsen, Harrison, Van Ness, and Warr (2014)
Residual Income approach

	(1)	(2)	(3)	(4)
	$ \Delta re $	$\ln(\Delta re)$	$ \Delta re $	$\ln(\Delta re)$
raw_simscore	-0.0144* (-1.83)	-0.0135* (-1.85)		
adj_simscore			-0.0163** (-2.11)	-0.0153** (-2.14)
Ln(Size)	-0.0029*** (-3.34)	-0.0026*** (-3.31)	-0.0030*** (-3.41)	-0.0027*** (-3.39)
filelate	0.0696 (1.22)	0.0589 (1.24)	0.0693 (1.22)	0.0586 (1.23)
newitems	0.0000 (0.91)	0.0000 (0.89)	0.0000 (0.90)	0.0000 (0.88)
$ CAR^{EA} $	0.0097 (0.15)	0.0067 (0.12)	0.0099 (0.16)	0.0069 (0.12)
IO	0.0076* (1.66)	0.0070* (1.68)	0.0075 (1.64)	0.0069* (1.65)
Volatility of IO	0.0187 (1.47)	0.0176 (1.48)	0.0181 (1.42)	0.0170 (1.43)
Constant	0.0574*** (4.12)	0.0532*** (4.14)	0.0500*** (4.11)	0.0463*** (4.15)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	976	976	976	976
Adjusted R ²	0.224	0.225	0.225	0.226

Table 5
Option Sample Attributes

This table provides descriptive statistics for the main variables considered in the sample with active options trading. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. |CAR3| is the absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date. OS_4q is the ratio of option to stock trading volume measured over the four quarters immediately preceding the filing of the annual report. OS_2q is the ratio of option to stock trading volume measured over the two quarters immediately preceding the filing of the annual report. OS_q is the ratio of option to stock trading volume measured over the quarter immediately preceding the filing of the annual report. Size is the market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. |CAR^{EA}| is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). The sample period runs from 2001 through 2020. Appendix A provides a detailed description and definition of each variable. For ease of reading and interpretability, the option related variables are multiplied by 100.

Panel A: Summary Statistics

Variable	N	Mean	1 st Pctl	25 th Pctl	50 th Pctl	75 th Pctl	99 th Pctl	Std Dev
raw_simscore	1554	0.6780	0.3640	0.6310	0.6950	0.7450	0.8480	0.1037
adj_simscore	1554	0.0323	-0.2906	-0.0179	0.0468	0.0987	0.2142	0.1025
CAR3	1554	0.0197	0.0002	0.0054	0.0127	0.0249	0.1160	0.0254
OS_4q	1554	0.0329	0.0001	0.0037	0.0125	0.0397	0.2666	0.0561
OS_2q	1554	0.0326	0.0001	0.0031	0.0117	0.0364	0.2982	0.0617
OS_q	1554	0.0333	0.0000	0.0024	0.0101	0.0350	0.3260	0.0773
Size (in \$1000)	1554	5055615	178848	1212263	2541435	5150768	43228884	8115449
filelate	1554	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0620
newitems	1554	187.62	104.00	114.00	228.00	237.00	259.00	61.0855
CAR ^{EA}	1554	0.0157	0.0003	0.0051	0.0098	0.0206	0.1130	0.0188
IO	1314	0.8477	0.2799	0.7316	0.8983	0.9822	1.2122	0.2147
Volatility of IO	1314	0.0787	0.0108	0.0409	0.0625	0.0977	0.3261	0.0610

Table 6
Option Trading vs. Similarity Scores

This table presents the results of panel regression analysis into the relation between options trading and the level of year-over-year REIT annual report similarity, where the dependent variable is the raw similarity score. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Ln(OS_4q) is the log transformed option trading volume scaled by stock trading volume over the four quarters immediately preceding the filing of the annual report. Ln(OS_2q) is the log transformed option trading volume scaled by stock trading volume over the two quarters immediately preceding the filing of the annual report. Ln(OS_q) is the log transformed option trading volume scaled by stock trading volume over the quarter immediately preceding the filing of the annual report. Size is the market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. |CAR^{EA}| is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Raw Similarity Scores

	(1)	(2)	(3)
Ln(OS_q)	-0.0028** (-2.19)		
Ln(OS_2q)		-0.0037** (-2.54)	
Ln(OS_4q)			-0.0037** (-2.46)
Ln(Size)	0.0028 (1.31)	0.0032 (1.47)	0.0031 (1.43)
filelate	-0.1447*** (-4.08)	-0.1425*** (-4.09)	-0.1441*** (-4.13)
newitems	-0.0000 (-1.06)	-0.0000 (-1.08)	-0.0000 (-1.05)
CAR ^{EA}	0.2366** (2.33)	0.2464** (2.42)	0.2494** (2.45)
Constant	0.6043*** (15.32)	0.5923*** (14.70)	0.5943*** (14.82)
Year FE	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes
Observations	1,554	1,554	1,554
Adjusted R ²	0.231	0.232	0.231

Table 7
Options Trading vs. Market Reaction to Annual Report Modifications

This table examines the impact of options trading on the market reaction to annual report modifications. Panel A replicates the paper's main empirical tests using the option subsample, while Panel B replicates Panel A while replacing the similarity score measures with similarity score residuals from Table 6 ($\varepsilon_{\text{raw_simscore}}$) with option to stock trading volume ratios measured over the one, two, and four quarters immediately preceding the filing of the annual report, respectively. Across all panels, the dependent variables are $|\text{CAR3}|$ and $\text{Ln}|\text{CAR3}|$. $\text{Ln}|\text{CAR3}|$ is the logarithm transformed $|\text{CAR3}|$, where $|\text{CAR3}|$ is the absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Other control variable definitions are provided in Table 3 and Appendix A. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. t-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Active Option Sample

	(1)	(2)	(3)	(4)
	$ \text{CAR3} $	$\text{Ln} \text{CAR3} $	$ \text{CAR3} $	$\text{Ln} \text{CAR3} $
raw_simscore	-0.0146** (-2.08)	-0.0141** (-2.10)		
adj_simscore			-0.0154** (-2.19)	-0.0149** (-2.20)
Ln(Size)	-0.0031*** (-4.24)	-0.0029*** (-4.28)	-0.0031*** (-4.27)	-0.0030*** (-4.31)
filelate	-0.0031 (-0.58)	-0.0029 (-0.54)	-0.0036 (-0.66)	-0.0033 (-0.62)
newitems	0.0000 (0.39)	0.0000 (0.38)	0.0000 (0.38)	0.0000 (0.37)
$ \text{CAR}^{\text{EA}} $	0.1782*** (2.82)	0.1660*** (2.89)	0.1785*** (2.82)	0.1663*** (2.90)
IO	0.0019 (0.52)	0.0019 (0.52)	0.0019 (0.52)	0.0018 (0.52)
Volatility of IO	0.0145 (1.42)	0.0138 (1.42)	0.0143 (1.40)	0.0136 (1.40)
Constant	0.0682*** (5.87)	0.0656*** (5.96)	0.0594*** (5.87)	0.0572*** (5.98)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	1,314	1,314	1,314	1,314
Adjusted R ²	0.148	0.150	0.148	0.150

Panel B: [Similarity Residual Analysis](#)

	(1) Previous Quarter		(3) Previous 2 Quarters		(6) Previous 4 Quarters	
	CAR3	Ln CAR3	CAR3	Ln CAR3	CAR3	Ln CAR3
$\mathcal{E}_{raw_simscore}$	-0.0138** (-1.97)	-0.0134** (-1.99)	-0.0137* (-1.96)	-0.0132** (-1.97)	-0.0134* (-1.92)	-0.0130* (-1.93)
Ln(Size)	-0.0031*** (-4.26)	-0.0030*** (-4.30)	-0.0031*** (-4.25)	-0.0029*** (-4.30)	-0.0031*** (-4.25)	-0.0029*** (-4.29)
filelate	-0.0010 (-0.19)	-0.0008 (-0.16)	-0.0010 (-0.19)	-0.0008 (-0.16)	-0.0010 (-0.19)	-0.0008 (-0.16)
newitems	0.0000 (0.45)	0.0000 (0.44)	0.0000 (0.45)	0.0000 (0.44)	0.0000 (0.45)	0.0000 (0.44)
CAR ^{EA}	0.1748*** (2.76)	0.1627*** (2.83)	0.1748*** (2.76)	0.1627*** (2.83)	0.1748*** (2.76)	0.1627*** (2.83)
IO	0.0018 (0.49)	0.0018 (0.49)	0.0018 (0.49)	0.0017 (0.49)	0.0018 (0.48)	0.0017 (0.48)
Volatility of IO	0.0145 (1.42)	0.0138 (1.43)	0.0146 (1.42)	0.0138 (1.43)	0.0146 (1.42)	0.0138 (1.43)
Constant	0.0585*** (5.83)	0.0562*** (5.94)	0.0584*** (5.83)	0.0562*** (5.94)	0.0584*** (5.83)	0.0562*** (5.94)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,314	1,314	1,314	1,314	1,314	1,314
Adjusted R ²	0.150	0.152	0.148	0.149	0.147	0.149

Table 8
Transparent vs. Non-Transparent REITs

This table employs panel regressions to examine whether a firm's informational transparency level influences the market reaction to annual report modifications. Panel A and Panel C report the results for more informationally opaque REITs, while Panel B and Panel D present the results for more informationally transparent REITs. The metrics for measuring information opacity are based on bid-ask spreads or residuals of bid-ask spreads over the previous quarter, where the residuals of bid-ask spreads are estimated based on the model presented in Danielsen and Harrison (2000). Across all the panels, the dependent variables are $|CAR3|$ and $\text{Log } |CAR3|$. $\text{Ln}|CAR3|$ is the logarithm transformed $|CAR3|$, where $|CAR3|$ is the absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date. $\varepsilon_{\text{raw_simscore}}$ and $\varepsilon_{\text{adj_simscore}}$ are similarity score residuals from Panels A and B of Table 6, respectively, with option to stock trading volume ratios measured over the four quarters immediately preceding the filing of the annual report. Debt ratio is the firm's total debt as a percentage of the market value of its assets. Vol is the REIT's trading volume during the past quarter. Other control variable definitions are provided in Table 3, with detailed descriptions available in Appendix A. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Non-Transparent (High Bid-Ask Spread)

	(1)	(2)	(3)	(4)
	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $
$\varepsilon_{\text{raw_simscore}}$	-0.0200** (-2.13)	-0.0195** (-2.17)		
$\varepsilon_{\text{adj_simscore}}$			-0.0206** (-2.14)	-0.0201** (-2.17)
$\text{Ln}(\text{Size})$	-0.0047* (-1.86)	-0.0044* (-1.86)	-0.0047* (-1.85)	-0.0044* (-1.85)
filelate	0.0062 (0.81)	0.0065 (0.88)	0.0063 (0.82)	0.0065 (0.89)
newitems	0.0000 (0.13)	0.0000 (0.11)	0.0000 (0.17)	0.0000 (0.15)
$ CAR^{\text{EA}} $	0.1603* (1.68)	0.1462* (1.71)	0.1601* (1.68)	0.1460* (1.71)
IO	0.0087 (1.65)	0.0083* (1.65)	0.0087 (1.64)	0.0083* (1.65)
Volatility of IO	0.0098 (0.75)	0.0090 (0.73)	0.0099 (0.76)	0.0090 (0.73)
Debt Ratio	0.0078 (0.69)	0.0071 (0.67)	0.0071 (0.63)	0.0065 (0.61)
$\text{Ln}(\text{Vol})$	-0.0007 (-0.42)	-0.0007 (-0.44)	-0.0008 (-0.49)	-0.0008 (-0.52)
Constant	0.0886*** (4.52)	0.0847*** (4.58)	0.0904*** (4.57)	0.0864*** (4.64)
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	654	654	654	654
Adjusted R ²	0.129	0.130	0.129	0.130

Panel B: Transparent (Low Bid-Ask Spread)

	(1)	(2)	(3)	(4)
	CAR3	Ln CAR3	CAR3	Ln CAR3
$\mathcal{E}_{\text{raw_simscore}}$	0.0057 (0.75)	0.0055 (0.74)		
$\mathcal{E}_{\text{adj_simscore}}$			0.0041 (0.54)	0.0039 (0.53)
Ln(Size)	-0.0008 (-0.61)	-0.0007 (-0.63)	-0.0008 (-0.64)	-0.0008 (-0.65)
filelate	-0.0118 (-1.34)	-0.0114 (-1.35)	-0.0119 (-1.35)	-0.0115 (-1.37)
newitems	0.0000 (0.67)	0.0000 (0.69)	0.0000 (0.69)	0.0000 (0.70)
CAR ^{EA}	0.1959*** (2.70)	0.1856*** (2.70)	0.1958*** (2.70)	0.1855*** (2.69)
IO	-0.0003 (-0.08)	-0.0003 (-0.08)	-0.0002 (-0.06)	-0.0002 (-0.06)
Volatility of IO	0.0114 (0.89)	0.0112 (0.90)	0.0114 (0.89)	0.0111 (0.90)
Debt Ratio	0.0079 (0.96)	0.0075 (0.94)	0.0080 (0.97)	0.0075 (0.95)
Ln(Vol)	0.0004 (0.29)	0.0004 (0.28)	0.0004 (0.31)	0.0004 (0.30)
Constant	0.0173 (0.90)	0.0172 (0.94)	0.0172 (0.89)	0.0172 (0.93)
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	660	660	660	660
Adjusted R ²	0.159	0.160	0.159	0.160

Panel C: Non-Transparent (High Bid-Ask Spread Residuals)

	(1)	(2)	(3)	(4)
	CAR3	Ln CAR3	CAR3	Ln CAR3
$\mathcal{E}_{\text{raw_simscore}}$	-0.0164* (-1.81)	-0.0161* (-1.85)		
$\mathcal{E}_{\text{adj_simscore}}$			-0.0167* (-1.79)	-0.0163* (-1.83)
Ln(Size)	-0.0015 (-1.05)	-0.0015 (-1.10)	-0.0014 (-1.03)	-0.0014 (-1.08)
filelate	-0.0040 (-0.80)	-0.0033 (-0.70)	-0.0039 (-0.77)	-0.0031 (-0.67)
newitems	-0.0000 (-0.32)	-0.0000 (-0.30)	-0.0000 (-0.32)	-0.0000 (-0.30)
CAR ^{EA}	0.2136* (1.83)	0.1951* (1.87)	0.2135* (1.83)	0.1950* (1.87)
IO	0.0005 (0.11)	0.0005 (0.11)	0.0005 (0.09)	0.0004 (0.10)
Volatility of IO	0.0070 (0.44)	0.0060 (0.40)	0.0069 (0.43)	0.0059 (0.39)
Debt Ratio	0.0237 (1.59)	0.0216 (1.57)	0.0235 (1.57)	0.0214 (1.56)
Ln(Vol)	-0.0030* (-1.73)	-0.0027* (-1.70)	-0.0031* (-1.79)	-0.0028* (-1.76)
Constant	0.0903*** (3.88)	0.0856*** (3.94)	0.0916*** (3.92)	0.0869*** (3.99)
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	697	697	697	697
Adjusted R ²	0.197	0.197	0.197	0.197

Panel D: Transparent (Low Bid-Ask Spread Residuals)

	(1)	(2)	(3)	(4)
	CAR3	Ln CAR3	CAR3	Ln CAR3
$\mathcal{E}_{\text{raw_simscore}}$	-0.0013 (-0.14)	-0.0014 (-0.16)		
$\mathcal{E}_{\text{adj_simscore}}$			-0.0042 (-0.46)	-0.0042 (-0.48)
Ln(Size)	-0.0032** (-2.17)	-0.0031** (-2.17)	-0.0033** (-2.19)	-0.0031** (-2.19)
filelate	0.0004 (0.06)	0.0005 (0.08)	0.0004 (0.06)	0.0005 (0.08)
newitems	0.0000 (0.75)	0.0000 (0.74)	0.0000 (0.74)	0.0000 (0.74)
CAR ^{EA}	0.1317** (2.37)	0.1247** (2.36)	0.1314** (2.37)	0.1245** (2.35)
IO	0.0054 (0.95)	0.0051 (0.94)	0.0056 (0.98)	0.0053 (0.97)
Volatility of IO	0.0080 (0.64)	0.0077 (0.65)	0.0077 (0.62)	0.0075 (0.63)
Debt Ratio	0.0045 (0.54)	0.0043 (0.53)	0.0042 (0.50)	0.0039 (0.49)
Ln(Vol)	0.0009 (0.58)	0.0009 (0.58)	0.0009 (0.55)	0.0009 (0.55)
Constant	0.0367* (1.81)	0.0359* (1.85)	0.0379* (1.86)	0.0370* (1.89)
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	617	617	617	617
Adjusted R ²	0.121	0.123	0.121	0.123

Table 9
Annual Report Innovations and Option Introduction³¹

This table presents the results of panel regression analysis examining the relation between option introductions and the level of year-over-year REIT annual report similarity, where the dependent variable is either raw similarity score or adjusted similarity score. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. Option Intro is an indicator that equals 1 during the year options trading was first available for the REIT, and zero otherwise. Size is the market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. |CAR^{EA}| is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	raw_simscore	adj_simscore	raw_simscore	adj_simscore
Option Intro	-0.0222** (-2.02)	-0.0271** (-2.29)	-0.0190* (-1.72)	-0.0232* (-1.96)
Ln(Size)	-0.0035** (-2.13)	-0.0083*** (-4.70)	-0.0092*** (-4.42)	-0.0128*** (-5.90)
filelate	-0.0770*** (-3.06)	-0.0863*** (-3.21)	-0.0800*** (-3.19)	-0.0898*** (-3.33)
newitems	-0.0000 (-1.17)	-0.0000 (-1.32)	-0.0000 (-1.05)	-0.0000 (-1.25)
CAR ^{EA}	0.0965 (0.91)	0.0905 (0.81)	0.0931 (0.88)	0.0818 (0.74)
IO			0.0518*** (4.22)	0.0402*** (3.31)
Volatility of IO			-0.0908** (-2.52)	-0.1263*** (-3.36)
Constant	0.5371*** (15.36)	-0.0255 (-0.68)	0.5850*** (16.27)	0.0134 (0.35)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910
Adjusted R ²	0.382	0.276	0.389	0.283

³¹ A univariate comparison was performed on annual report innovations before and after option introductions. The results of these comparisons are in line with the multivariate analysis, which indicates a greater number of annual report modifications after option introductions compared to the level observed before options trading was readily available.

Table 10
Option Market Reaction to Annual Report Modifications

This table presents the results of examining the option market reaction to annual report modifications, where the dependent variable is cumulative five-day market-adjusted stock returns calculated over the five days beginning with the 10-k filing date. Raw_simscore is the raw similarity score measuring the extent to which two documents are similar. Adj_simscore is the similarity score measuring the extent to which two documents are similar after adjusting for document length. Ln(OPVOL) is logarithm transformed option trading volume of the REIT over the five days beginning with the 10-k filing date. Ln(Size) is the logarithm transformed market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. |CAR^{EA}| is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) CAR5	(2) Ln CAR5	(3) CAR5	(4) Ln CAR5
raw_simscore	-0.0382*** (-2.74)	-0.0364*** (-2.78)		
Ln(OPVOL)* raw_simscore	0.0036** (2.16)	0.0035** (2.20)		
adj_simscore			-0.0394*** (-2.77)	-0.0376*** (-2.82)
Ln(OPVOL) * adj_simscore			0.0036** (2.05)	0.0035** (2.09)
Ln(OPVOL)	-0.0014 (-1.09)	-0.0013 (-1.12)	0.0010*** (3.60)	0.0009*** (3.65)
Ln(Size)	-0.0065*** (-5.30)	-0.0061*** (-5.44)	-0.0065*** (-5.30)	-0.0062*** (-5.44)
filelate	0.0006 (0.09)	0.0010 (0.17)	-0.0002 (-0.04)	0.0002 (0.03)
newitems	-0.0000 (-0.64)	-0.0000 (-0.64)	-0.0000 (-0.66)	-0.0000 (-0.66)
CAR ^{EA}	0.1120 (1.57)	0.1014 (1.56)	0.1122 (1.58)	0.1015 (1.57)
IO	0.0063 (1.36)	0.0059 (1.35)	0.0064 (1.37)	0.0060 (1.36)
Volatility of IO	-0.0037 (-0.35)	-0.0035 (-0.35)	-0.0042 (-0.40)	-0.0041 (-0.41)
Constant	0.1304*** (6.76)	0.1242*** (6.99)	0.1064*** (6.41)	0.1014*** (6.64)
Year FE	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes
Observations	1,330	1,330	1,330	1,330
Adjusted R ²	0.188	0.190	0.188	0.190

Appendix A Variable Definitions

Variables:	Definitions:
CAR3	The absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date.
Raw_simscore	Measures the extent to which two documents are similar.
Adj_simscore	Measures the extent to which two documents are similar, after adjusting for document length through a Taylor expansion at zero.
Re	Implied cost of equity capital, measured as of the annual report filing date. This estimate represents the average cost of equity derived from four commonly used estimation procedures, the Fama-French 3-factor plus momentum factor model based implied cost of equity, or the Danielsen, Harrison, Van Ness, and Warr (2014) based cost of equity capital measure. The detailed calculation procedures for each for these alternative metrics are provided in the “Empirical Results” section of the current manuscript.
Δ re	Absolute difference in the implied cost of equity capital (re) measured before and after the annual report filing date.
Size (in \$1,000s)	Market capitalization as of the 10-k filing date.
Filelate	An indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise.
Newitems	The number of non-missing and nonzero Compustat items (data1-data399) for the event year. This method is based on Brown and Tucker (2011), however, due to the variable updates in current Compustat data, some of their variables are no longer available. As such, we look into 350 data items out of the range of data1 to data399.
CAR ^{EA}	The three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm’s most recent earnings announcement date.
Ln(OS_q)	Log transformed option trading volume scaled by stock trading volume up to 90 days before the 10-k filing date, where option contracts have 5 to 35 trading days remaining to expiration.
Ln(OS_2q)	Log transformed option trading volume scaled by stock trading volume up to 180 days before the 10-k filing date, where option contracts have 5 to 35 trading days remaining to expiration.
Ln(OS_4q)	Log transformed option trading volume scaled by stock trading volume up to 360 days before the 10-k filing date, where option contracts have 5 to 35 trading days remaining to expiration.

IO	Institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding, where the number of shares owned by institutional investors is based on the most recent SEC form 13f filings before the firm's 10-k filing.
Volatility of IO	The standard deviation of IO over the past 20 quarters (i.e., five years).
LM_litigious	The number of Loughran and McDonald (2011) Financial-Litigious words in the document divided by the total number of words in the document that occur in the master dictionary.
LM_negative	The number of Loughran and McDonald (2011) Financial-Negative words in the document divided by the total number of words in the document that occur in the master dictionary.
LM_positive	The number of Loughran and McDonald (2011) Financial-Positive words in the document divided by the total number of words in the document that occur in the master dictionary.
LM_uncertainty	The number of Loughran and McDonald (2011) Financial-Uncertainty words in the document divided by the total number of words in the document that occur in the master dictionary.
chg_debt due	The absolute value of the difference between the current and previous year's debt due within one year, scaled by total assets.
chg_lev	The absolute value of the difference between the current and previous fiscal year's total liabilities, scaled by total assets.
chg_ffo	The absolute value of the difference between the current and previous fiscal year's funds from operations (FFO), scaled by total assets from the previous year.
chg_stdret	The absolute value of the difference between the volatility of daily equity returns in the current and previous fiscal years.
LCR	The mean decile ranking of chg_debt due , chg_lev , and chg_ffo .
Acquire	An indicator variable set equal to 1 if the firm's total assets grew by 1/3 or more during the current fiscal year, and 0 otherwise.
Downsize	An indicator variable set equal to 1 if the firm's total assets decreased by 1/3 or more during the current fiscal year, and 0 otherwise.
Assets	Total assets as of the end of the fiscal year.
Ln(OPVOL)	logarithm transformed option trading volume of the REIT over the five days beginning with the 10-k filing date.

Appendix B

Adjusted Similarity Score Determinants

This table explores the determinants of the adjusted similarity scores of year-over-year REIT annual reports. Column 1 reports the results from using actual values of our similarity metrics, while columns 2 through 4 use quintile-based rankings of similarity metrics, respectively. Adj_simscore is the similarity score measuring the extent to which two documents are similar after adjusting for document length. For the readability/tone measures, they are all measured as the previous year's litigious word proportion (Lag_LM_litigious), negative word proportion (Lag_LM_negative), positive word proportion (Lag_LM_positive), and uncertainty word proportion (Lag_LM_uncertainty), respectively. |chg_debt due| is the absolute value of the change in the amount of debt due in the coming year, scaled by total assets. |chg_lev| is the absolute value of the change in total liabilities, scaled by total assets. |chg_ffo| is the absolute value of the difference between the current and previous fiscal year's funds from operations (FFO), scaled by total assets from the previous year. LCR is the mean decile ranking of |chg_debt due|, |chg_lev|, and |chg_ffo|. |chg_stdret| is the absolute value of the change in daily stock return volatility from the previous year to the current year. Acquire is an indicator variable set equal to 1 if total assets increased by more than one-third from the previous year, and zero otherwise. Downsize is an indicator variable set equal to 1 if total assets decreased by more than one-third from the previous year, and zero otherwise. Assets is defined as total assets as of the end of the fiscal year. IO is the level of institutional ownership, calculated as the number of shares owned by institutional investors scaled by total shares outstanding. Volatility of IO is defined as the standard deviation of IO over the past 20 quarters (i.e., five years). Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Measurement Scale of Explanatory Variables			
	Raw	Quintile	Quintile	Quintile
Lag_LM_litigious	0.9606* (1.68)	0.8932 (1.58)	0.8547 (1.52)	0.6420 (1.15)
Lag_LM_negative	-2.0727** (-2.42)	-1.8169** (-2.11)	-1.9288** (-2.29)	-1.7162** (-1.98)
Lag_LM_positive	2.4346 (1.42)	2.6152 (1.54)	3.1322* (1.88)	2.7405* (1.67)
Lag_LM_uncertainty	3.8507*** (4.94)	3.3928*** (4.34)	3.2999*** (4.30)	3.3882*** (4.52)
chg_debt due	-0.1802*** (-5.20)	-0.0139*** (-2.71)		-0.0072 (-1.37)
chg_lev	-0.1572*** (-3.04)	-0.0050*** (-2.99)		-0.0064*** (-3.92)
chg_ffo	0.0561** (2.16)	-0.0049*** (-3.07)		-0.0060*** (-3.92)
LCR			-0.0288*** (-9.00)	
chg_stdret	-0.6651 (-1.62)	-0.0025 (-1.52)	-0.0026 (-1.61)	-0.0023 (-1.47)
acquire	-0.0426*** (-5.74)	-0.0462*** (-6.19)	-0.0451*** (-6.29)	-0.0489*** (-6.76)
downsize	-0.1101** (-2.27)	-0.0613 (-1.18)	-0.0577 (-1.15)	-0.0833* (-1.72)
Assets				-0.0198*** (-10.48)
IO				0.0104*** (5.23)
Volatility of IO				-0.0068*** (-4.29)
Constant	-0.1099** (-2.11)	-0.0669 (-1.22)	-0.0513 (-0.97)	-0.0618 (-1.09)
Year Fixed Effects	Yes	Yes	Yes	Yes
Property Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,910	1,910	1,910	1,910
Adjusted R ²	0.294	0.296	0.315	0.343

Appendix C

More Results for Options Trading vs. Similarity Scores

This table presents the results of panel regression analysis into the relation between options trading and the level of year-over-year REIT annual report similarity, where the dependent variable is the adjusted similarity score. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. Ln(OS_4q) is the log transformed option trading volume scaled by stock trading volume over the four quarters immediately preceding the filing of the annual report. Ln(OS_2q) is the log transformed option trading volume scaled by stock trading volume over the two quarters immediately preceding the filing of the annual report. Ln(OS_q) is the log transformed option trading volume scaled by stock trading volume over the quarter immediately preceding the filing of the annual report. Size is the market capitalization of the REIT as of the 10-k filing date. Filelate is an indicator variable set equal to 1 if the 10-k filing date is more than 90 days after the fiscal year end, and 0 otherwise. Newitems is the number of non-missing and nonzero Compustat items for a given year. $|CAR^{EA}|$ is defined as the three-day, [-1,1], cumulative market-adjusted stock return surrounding the firm's most recent earnings announcement. Appendix A provides a detailed description and definition of each variable. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Ln(OS_q)	-0.0038*** (-2.86)		
Ln(OS_2q)		-0.0049*** (-3.24)	
Ln(OS_4q)			-0.0047*** (-3.04)
Ln(Size)	0.0012 (0.52)	0.0016 (0.72)	0.0014 (0.63)
filelate	-0.1635*** (-4.45)	-0.1607*** (-4.46)	-0.1629*** (-4.52)
newitems	-0.0001 (-1.25)	-0.0001 (-1.28)	-0.0001 (-1.25)
$ CAR^{EA} $	0.2743*** (2.61)	0.2873*** (2.73)	0.2910*** (2.76)
Constant	-0.0259 (-0.63)	-0.0405 (-0.96)	-0.0358 (-0.85)
Year FE	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes
Observations	1,554	1,554	1,554
Adjusted R ²	0.194	0.195	0.194

Appendix D

More Results for Options Trading vs. Market Reaction to Annual Report Modifications

This table examines the impact of options trading on the market reaction to annual report modifications with similarity score residuals from Appendix C ($\epsilon_{adj_simscore}$) and option to stock trading volume ratios measured over the one, two, and four quarters immediately preceding the filing of the annual report, respectively. The dependent variables are $|CAR3|$ and $\text{Log } |CAR3|$. $\text{Ln}|CAR3|$ is the logarithm transformed $|CAR3|$, where $|CAR3|$ is the absolute value of the cumulative market-adjusted stock return over the three days beginning with the 10-k filing date. Adj_simscore is the similarity score measuring the extent to which two documents are similar, after adjusting for document length. Other control variable definitions are provided in Table 3 and Appendix A. All regressions control for a full set of year fixed effects and property type fixed effects. All standard errors are robust to autocorrelation and heteroscedasticity via clustering standard errors by both year and firm. T-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)	
	Previous Quarter		Previous 2 Quarters		Previous 2 Quarters		Previous 2 Quarters		Previous 4 Quarters		Previous 4 Quarters	
	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $	$ CAR3 $	$\text{Ln} CAR3 $
$\epsilon_{adj_simscore}$	-0.0143**	-0.0138**	-0.0142**	-0.0137**	-0.0139**	-0.0134**						
	(-2.04)	(-2.06)	(-2.03)	(-2.04)	(-1.98)	(-2.00)						
	-	-	-	-	-	-						
$\text{Ln}(\text{Size})$	0.0031***	0.0030***	0.0031***	0.0030**	0.0031**	0.0029**						
	(-4.25)	(-4.30)	(-4.25)	(-4.30)	(-4.25)	(-4.29)	*	*	*	*	*	*
filelate	-0.0011	-0.0008	-0.0011	-0.0009	-0.0011	-0.0009						
	(-0.20)	(-0.16)	(-0.20)	(-0.17)	(-0.20)	(-0.17)						
newitems	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
	(0.46)	(0.45)	(0.46)	(0.45)	(0.46)	(0.45)						
$ CAR^{EA} $	0.1743***	0.1622***	0.1743***	0.1623**	0.1744**	0.1623**						
	(2.75)	(2.82)	(2.75)	(2.82)	(2.75)	(2.82)	*	*	*	*	*	*
IO	0.0018	0.0017	0.0018	0.0017	0.0017	0.0017						
	(0.48)	(0.48)	(0.48)	(0.48)	(0.47)	(0.47)						
Volatility of IO	0.0144	0.0136	0.0144	0.0137	0.0144	0.0137						
	(1.40)	(1.41)	(1.40)	(1.41)	(1.40)	(1.41)						
Constant	0.0586***	0.0564***	0.0586***	0.0563**	0.0585**	0.0563**						
	(5.83)	(5.94)	(5.83)	(5.94)	(5.83)	(5.94)	*	*	*	*	*	*
Year FE	Yes	Yes	Yes	Yes	Yes	Yes						
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes						
Observations	1,314	1,314	1,314	1,314	1,314	1,314						
$\text{Adjusted } R^2$	0.151	0.152	0.148	0.149	0.148	0.149						