IT PAYS TO WRITE WELL

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We quantify the effects of easy-to-read disclosure documents on firm value by analyzing shareholder reports of closed-end investment companies in which the company's value can be estimated separately from the value of the company's underlying assets. Using a copy-editing software application that counts the pervasiveness of the most important 'writing faults' that make a document harder to read, our analysis provides evidence that issuing financial disclosure documents with low readability causes firms to trade at significant discounts relative to the value of their fundamentals. Our estimates suggest that a one-standard-deviation decrease in readability decreases firm value by a full 2.5%. In situations in which investors are more likely to rely on annual reports, the readability effect on firm value increases to 3.3%.

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1. Introduction

The question of how corporate disclosure affects investor perceptions and firm outcome variables has motivated a significant body of research (Core, 2001; Fields, Lys, and Vincent, 2001; Healy and Palepu, 2001; Beyer, Cohen, Lys, and Walther, 2010). Corporate disclosure comes in the form of accounting numbers framed or accompanied by a substantial amount of text. While earlier academic work has (somewhat narrowly) focused on the informativeness of the accounting numbers, more recent work has begun to extend such analyses to the informativeness of the text and the ease with which the text in corporate disclosure documents can be processed (e.g., Miller, 2010; Lehavy, Li, and Merkley, 2011; Lawrence, 2013; Loughran and McDonald, 2014). These studies use readability proxies such as number of sentences, average sentence length, fraction of complex words, and size of the annual report to tie readability to firm outcome variables such as stock return volatility, analyst dispersion, analyst forecast accuracy, and trading volume. Our paper contributes to this relatively new literature stream by examining the readability of annual reports of equity closed-end investment companies (CEFs) and by using a measure of readability that is probably more refined than readability measures based on document length or sentence length.

CEFs are publicly traded companies. Rather than using the proceeds from an initial public offering (IPO) and subsequent seasoned equity offerings (SEOs) to invest in real assets, these companies acquire portfolios of equity securities. Like all publicly traded corporations, CEFs file annual reports with the Securities and Exchange Commission (SEC) and their shareholders.

Studying CEFs appears interesting for several reasons: CEFs tend to be small by market capitalization, they are not covered by analysts, they do not stage earnings conference calls, and their managers rarely appear in the news. Annual reports therefore represent the primary channel through which CEFs communicate with current and potential investors. This feature likely increases the power of our analysis.

More importantly, because a CEF itself is traded on a stock exchange, we can compare the market value of the fund against the market value of the fund's underlying assets and assess whether the "discount" between these two figures is tied to the readability of its annual report. That is, we can shed light on the

actual value implications of having more difficult-to-read documents and determine the degree to which the recent emphasis on the structure of the text is warranted by fundamentals.

If lower readability undermines investors' belief that a source can be trusted, lowers investors' assessment of a firm and its managers, or subconsciously causes investors to evaluate the firm less favorably (e.g., McGlone and Tofighbakhsh, 2000; Oppenheimer, 2006; Alter and Oppenheimer, 2008), then we expect to see a negative association between readability and the discount between the fund's market value and the market value of the fund's underlying assets. On the other hand, if the readability of a CEF's annual report does not influence investor demand for the CEF's shares, then we should observe no association between readability and CEF discount.

Our measure of readability draws on the *Plain English Handbook* (1998) of the SEC, which was developed to help firms make their disclosure documents easier to read. In the *Handbook*, the SEC discusses eight language-related factors that make a document less readable.[1] We save each annual report as a Word document. We then apply copy-editing software to each document and count the number of times these factors appear in the text. We are able to do so for five of the eight factors and we use their (scaled) pervasiveness as our measure of readability.

To assess the validity of our measure, we randomly assign undergraduate business students annual reports that, as per our measure, earn "high readability" scores and annual reports that, as per our measure, earn "low readability" scores. We find that students largely agree with the output generated by our readability measure, as they perceive reports with high readability scores to be significantly easier to read than those with low readability scores. When sorting annual reports by readability measures employed in prior studies (Fog Index and Flesch-Kincaid Index) and assigning these reports to students, we find that students generally agree to a lesser extent with the results than with our measure.

[1] We describe these factors in detail in Section 3.2: (1) passive voice, (2) weak/hidden verbs, (3) superfluous words, (4) legal and financial jargon, (5) numerous defined terms, (6) abstract words, (7) unnecessary details, (8) long sentences, and (9) unreadable design and layout.

Results from additional experiments show that annual reports with high readability scores (as per our measure) are associated with more positive moods than annual reports with low readability scores. We also find hints in the data that higher readability generates more trust and higher perceived managerial skill.

When relating the readability of annual reports to CEF discounts within a regression framework, we find that CEFs with less easily readable annual reports trade at greater discounts relative to CEFs with more easily readable annual reports. In line with the results from our experimental setting, the association between readability and CEF discounts is much stronger for our measure of readability than for the Fog Index or the Flesch-Kincaid Index. Our results easily survive the inclusion of various controls and are robust to research design choices. Our results are also economically meaningful. In particular, our estimates suggest that a one-standard-deviation increase in readability leads to a 2.48% decrease in the CEF discount.

To gauge whether it is readability per se that generates our patterns, we examine whether our effect is stronger in situations in which investors are more likely to rely on the fund's annual report. The primary alternative to annual reports as an information source is the fund's past performance. We conjecture that investors rely less on past performance and, consequently, more on annual reports when the CEF has a relatively new manager, when the CEF is relatively young, and when past performance has been very volatile. Our results strongly corroborate these hypotheses.

In a second attempt to provide evidence of causality, we use the Plain Writing Act (PWA) of October 2010 as a positive shock to the readability of CEF disclosure documents. The PWA was designed to make documents produced by the government or government agencies easier to read by the general public (Public Law 111–274, 111th Congress, October 13, 2010). Its passage marks the first time that plain writing was legislated at the federal level in the United States. We conjecture that the PWA had an incremental positive impact on the readability of documents filed with the SEC.

We find that the PWA disproportionately affected the readability of funds that, previously, had earned low readability scores. In particular, after the PWA took effect, funds with previously low readability experienced sudden and lasting improvements in their readability scores relative to funds with high readability. Our results show that the disproportionate rise in readability is accompanied by an abnormal

and lasting drop in CEF discounts. We find no such patterns around one hundred randomly drawn placebo events.

In our final analysis, we examine whether our findings extend to regular publicly traded corporations. We randomly draw one hundred firms from the Center for Research in Security Prices (CRSP) and Compustat universe and assess how the readability of their annual reports relates to their Tobin's *Q*. Our analysis reveals that higher readability is associated with higher valuation ratios even among regular publicly traded corporations. However, the effect is weaker than that found for CEFs. One reason for the weaker effect could be that the strong CEF results are a chance event. Alternatively, it could be that the information environment is much richer for regular publicly traded corporations than for CEFs. Consequently, for regular publicly traded corporations, fewer people rely on annual reports and whatever uncertainty that may arise from poor readability can easily be clarified through alternate information sources, such as earnings conference calls, financial analyst reports, and press releases. Viewed from this angle, the weaker results for regular publicly traded corporations only help build confidence in the validity of our exercise. Finally, since "*CEF shares and CEF holdings are securities that trade contemporaneously on exchanges, […] calculation of a CEF's Tobin's Q is straightforward*" (Cherkes, 2012). The calculation is less straightforward for a regular publicly traded corporation as the fundamental value of the firm's assets can be approximated only via the book value of assets. This likely lowers the power of our analysis.

Overall, both our experimental and regression-based evidence support the notion that firms—in relatively opaque information environments—can meaningfully increase their market value by increasing the readability of their annual reports. Thus, while there are no official sanctions or fines associated with writing disclosure documents that are hard to read, there are strong positive outcomes associated with producing documents that are easy to read by the general investor population. Put bluntly, yes, it pays to write well and, yes, the greater emphasis on the structure of disclosure documents is warranted.

The rest of the paper is organized as follows. Section 2 describes the literature and the laboratory and develops our predictions. Section 3 describes our data. Section 4 presents experiment-based evidence

and Section 5 presents regression-based evidence. Section 6 examines whether our observations generalize to regular publicly traded corporations. Section 7 concludes.

2. Background, laboratory, and hypothesis development

2.1. Literature on textual analysis of corporate disclosure

Firms communicate with stakeholders not only through numeric information but also through a large volume of textual information in corporate disclosure documents. Regulators demonstrate increasing interest in understanding how the structure of such textual information pertains to the corresponding financial data and how it relates to investor perception and firm outcome variables.

The abovementioned *Plain English Handbook* provides both language-related and formatting suggestions intended to increase the readability of disclosures, and the SEC encourages firms to adopt its suggestions in all of their written correspondence (SEC, 1998). Subsequent regulations extended the plain English rules to mutual fund prospectuses (SEC, 2009) and brochures issued by SEC-registered investment advisers (SEC, 2010).

The recent emphasis on the readability of disclosure documents has been accompanied by a surge in research efforts seeking to understand whether readability affects investors and firms. Miller (2010) finds that greater readability of 10-K documents is associated with more active trading and less disagreement among small investors. Lawrence (2013) provides evidence that retail investors are more likely to invest in firms that have more easily readable disclosure documents. Rennekamp (2012) finds, in an experimental setting, that readability positively affects how strongly small investors rely on disclosure information. Miller's, Lawrence's, and Rennekamp's findings suggest that greater readability facilitates small investors' access to information and helps level the playing field.

The effect of readability may not, however, be restricted to small investors. Lehavy, Li, and Merkley (2011) provide evidence that having less easily readable 10-K documents is associated with greater disagreement and lower forecast accuracy among professional sell-side analysts. You and Zhang (2009) suggest that lower readability slows the overall stock market's reaction to value-relevant information in 10-

K filings. Loughran and McDonald (2014) find evidence that firms with less easily readable 10-K documents are linked to higher stock return volatility, greater analyst dispersion, and larger absolute earnings surprises.

Overall, the literature provides valuable evidence of the effect of readability. At the same time, while it is interesting to note that readability affects firm outcome variables such as forecast dispersion, stock return volatility and trading volume, ultimately, we would like to know how readability affects firm value and the degree to which having less easily readable annual reports lowers a firm's market value compared with its fundamental value. Unfortunately, this is a difficult question to tackle empirically, as we generally lack a good estimate of a firm's true fundamental value against which its market value may be compared.

Another challenge facing the literature is that the readability of a document is intimately linked with the structural complexity of the entity it is intended to describe, in this case a company (e.g., Bloomfield, 2008; Loughran and McDonald, 2014, 2016). Common measures of readability include word count, average sentence length, fraction of complex words, and file size (Li, 2008; You and Zhang, 2009; Lehavy, Li, and Merkley, 2011; Lawrence, 2013; Loughran and McDonald, 2014). Firms with complex operations likely need to offer more detailed explanations, which translates to longer documents and, perhaps, longer sentences with more "complex" words. At the same time, firm complexity affects how investors process information. For instance, growth firms likely need to use more "complex" words to describe their future investment opportunities. Investors also treat growth firms differently from their more mature counterparts *independent of* the readability of the annual report. Thus, whether it is truly the readability of the annual reports that generates the above results is unclear.

The issue of firm complexity as an omitted variable is of particular relevance since firms typically have multiple channels through which they can communicate with investors. That is, if annual reports are difficult to read, why don't investors try to clarify their content by interviewing chief executive officers (CEOs) and asking questions during earnings conference calls? Given this, can we plausibly argue that it is

the readability of annual reports per se that generates the aforementioned differences in investor behavior and firm outcome variables, or is it something else?

2.2. Laboratory

In this study, we propose a laboratory that, while far from perfect, helps address some of the aforementioned challenges. Our study focuses on investment companies, in particular CEFs. CEFs are publicly traded companies. As noted above, rather than using the proceeds from IPOs and subsequent SEOs to invest in real assets, these companies use the proceeds to invest in stocks. Like all regular publicly traded corporations, investment companies must file annual reports with the SEC and shareholders. In particular, investment companies have to file Form N-CSR, which is the equivalent of Form 10-K that regular publicly traded corporations file. The filing requirements are covered under Section 30 of the Investment Company Act of 1940 and Sections 13 and 15(d) of the Securities Exchange Act of 1934. Form N-CSR must be signed and filed electronically and it consists of the following components: a report to the firm's shareholders, an investment review, an investment outlook, various pieces of information regarding the firm's officers, directors, and voting policies, a financial statement, and the firm's security holdings.

The primary advantage in using CEF annual reports is that they report their security holdings on a quarterly basis, which allows us to directly observe a CEF's underlying assets—something that cannot be done with regular publicly traded corporations. Because the financial securities held by CEFs are themselves traded on stock exchanges, we can also directly observe the market value of a CEF's underlying assets against which the market value of the CEF can be compared. In other words, we can estimate the effect of readability on the market value of the firm relative to the value of the firm's underlying assets.

Another advantage is that CEF annual reports represent perhaps the most important channel through which information is disseminated to current and potential investors. This likely increases the power of our analysis and helps alleviate concerns about omitted variable bias. Moreover, because investors know which securities each CEF holds along with the market value of these securities, there is relatively little variation

in firm complexity across CEFs. Whatever variation in firm complexity remains can be parceled out in a regression setting by controlling for the types of stocks held by the CEFs.

One disadvantage of studying CEFs is that a CEF's premium/discount is co-determined by a host of other forces, such as liquidity, managerial skill, and investor sentiment. Readability may be correlated with some of these factors, creating a different form of omitted variable bias. In order to draw reliable inferences, it is therefore vital that we adequately control for these factors — Section 5 describes our attempts in this regard.

2.3. Hypothesis development

Building on prior studies that suggest that low readability weakens investors' beliefs that a source can be trusted (McGlone and Tofighbakhsh, 2000; Alter and Oppenheimer, 2008), we conjecture that investors shun funds whose disclosure documents are difficult-to-read and evoke feelings of distrust and uncertainty, and that the associated reduction in investor demand causes these funds to trade at greater discounts.

The inability to express ideas clearly may also reflect poorly on the quality of the firm and its managers. In addition, the literature provides evidence that low readability causes subjects to evaluate a source less favorably without their being aware of it (e.g., McGlone and Tofighbakhsh, 2000; Oppenheimer, 2006; Alter and Oppenheimer, 2008). Low investor assessment of manager quality and negative sentiment towards the firm provide further reasons to believe that companies suffering from poor readability should trade at greater discounts.[2]

Hypothesis: *CEFs whose annual reports have lower readability trade at greater discounts than their counterparts with more easily readable reports.*

[2] For evidence on how negative sentiment can affect stock prices, please see Baker and Wurgler (2006), Lemmon and Portniaguina (2006), Hong and Kacperczyk (2009), and Hwang (2011), among others.

3. Data and key variables

3.1. Closed-end funds

This analysis focuses on CEFs that maintain the necessary data to construct the CEF discount, our measure of readability, and various control variables. We extract a list of CEFs from the Center for Research in Security Prices (CRSP) by selecting securities with a share code ending in 4. We exclude securities with share codes 74 (Depository Units, Units of Beneficial Interest, etc.) and 24 (Certificates). CRSP provides, among other services, data on monthly CEF prices. Compustat provides monthly data on the market value of a fund's underlying assets on a per-share basis, also referred to as Net-Asset Value (NAV). We merge these two data sets via PERMNO, which is a security identifier used by both CRSP and Compustat. We manually screen the data for obvious data entry errors.[3]

Our focus in this study is on *equity* closed-end funds. We obtain data on equity holdings from Thomson-Reuters. We merge our CRSP data with our Thomson-Reuters data via each CEF's name. When the name match is dubious due to the use of acronyms, we search the Internet to find the full CEF name. The final sample contains 92 CEFs from 2003 through 2013. The sample period is determined by the availability of CEF annual reports in HTML/TXT format in the SEC Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system.

Monthly CEF premia (discounts) are calculated using closing prices and NAV:

$$Y_{i,t} = \frac{Price_{i,t} - NAV_{i,t}}{NAV_{i,t}}. \quad (1)$$

Consider a fund with a price of \$9 and an NAV of \$10. This fund could be described as having a premium of -10%. Alternatively, we could describe the fund as having a discount of +10%. In this study, we describe our results in terms of discounts.

[3] We manually correct two errors in the CRSP/Compustat data: in June 2006, PERMNO 89336 had a 100-times-higher NAV than in the surrounding months; in 2009 March, PERMNO 90075 had a 10-times-higher NAV than in the surrounding months. Following Chan, Jain, and Xia (2008), we exclude data for the first six months after a fund's IPO and for the month preceding the announcement of liquidation or open-ending to "*avoid distortions associated with the flotation and winding up of closed-end funds*" (p. 383). This exclusion has, however, very limited consequences for our results.

Table 1 illustrates a few initial features of our data. In total, we have 6,507 CEF/year-month observations. We report, for each of our dependent and independent variables, the pooled mean, the pooled standard deviation, and various pooled percentiles across these 6,507 observations. We find that the average CEF discount in our sample is 5.1%; the standard deviation is 10.3%. The mean and standard deviation of the CEF discount in this study are similar to those reported in other CEF studies (e.g., Bodurtha, Kim, and Lee, 1995; Klibanoff, Lamont, and Wizman, 1998; Chan, Jain, and Xia, 2008; Hwang, 2011).

3.2. Readability

To evaluate the effects of the readability of financial disclosure documents on firm value, we download, for each CEF in our sample, its annual shareholder report (Form N-CSR) from 2003 through 2013. We exert great effort to clean the reports, as detailed in Appendix A. Each annual report is saved as a separate Microsoft Word document, based on which we compute our readability measure. Motivated by Miller (2010), we use a program called StyleWriter. StyleWriter is a manuscript editor that, once installed on a computer, searches Word documents for "writing faults."

In the *Plain English Handbook* (1998), the SEC lists the following nine writing faults that make a document harder to read: (1) long sentences, (2) passive voice, (3) weak verbs, (4) superfluous words, (5) legal and financial jargon, (6) numerous defined terms, (7) abstract words, (8) unnecessary details, and (9) unreadable design and layout. Of these, eight are language-related and one is formatting-related.

The appealing feature of StyleWriter is that it produces measures that capture the degree to which a document suffers from six out of the eight factors that are language-related:

SEC Plain English Problems	Corresponding StyleWriter Plain English Measure
Long sentences	N/A
Passive voice	Passive verbs
Weak verbs	Hidden verbs
Legal and financial jargon	Legal words
Unnecessary details	Overwriting
Superfluous words	Wordy phrases
Abstract words	Abstract words

Numerous defined terms	N/A
Unreadable design and layout	N/A

The disadvantage of using StyleWriter is that it was created to help writers improve their writing in individual documents. Applying StyleWriter to a large number of documents is therefore very labor-intensive.[4]

Here, we provide examples of the writing faults that we are able to capture:

- An example of a sentence that uses passive verbs is: "*We must consider how our resources will be used to deliver quality services.*" (Possible correction: "*We must consider how to use our resources to deliver quality services.*")
- A hidden verb is a verb used as a noun. It is often hooked to an extra (weak) verb. An example of a sentence that uses hidden verbs is: "*This means we must undertake the calculation of new figures for the congressional hearing.*" (Possible correction: "*This means calculating new figures for the congressional hearing.*")
- Examples of legal words include: "*forthwith, herewith, in said agreement, any part thereof.*" Our legal words list is distinct from word lists that aim to capture litigation risk and that include terms such as "*felony, jury, trial*" (Loughran and McDonald, 2011).
- Overwriting refers to the use of superfluous qualifying words such as: "*It is completely unnecessary.*" (Possible correction: "*It is unnecessary.*")
- Examples of wordy phrases include: "*an appreciable number of, has a requirement for*" (Possible correction: "*many, requires*")

StyleWriter also counts the occurrence of abstract words. However, while words categorized by StyleWriter as "abstract" may convey little meaning to some in the general public, we do not believe that

[4] Miller (2010) uses StyleWriter to create *READ_PE*, which counts the use of passive verbs, hidden verbs, legal words, overwriting, and tautologies, and correlates *READ_PE* with trading volume. Our StyleWriter version no longer outputs the number of tautologies; tautologies are also not part of the *SEC Plain English Handbook*. Miller does not consider wordy phrases or abstract words.

they meaningfully confuse CEF investors.[5] The argument is similar to that made by Loughran and McDonald (2011), who point out that while word lists such as the Harvard IV-4 Dictionary are valuable in many contexts, they should not be blindly adopted for annual reports. We therefore exclude the occurrence of abstract words, although, for robustness, we later also report results when including abstract words.

Our baseline readability measure, *Readability (baseline)*, is defined as:

$$Readability\ (baseline) = \frac{\frac{(\#Passive\ verbs + \#Hidden\ verbs + \#Legal\ words + \#Overwriting}{\#Sentences}}{\frac{+\#Wordy\ phrases)}{\#Sentences} \times 10 \times (-1)}. \quad (2)$$

Multiplying by ten later helps interpret the coefficient estimates. We multiply by negative one so that higher *Readability (baseline)* scores imply more easily readable documents. That is, because we multiply by negative one, having a document with many writing faults translates into a very negative *Readability (baseline)* score. Having fewer writing faults translates into a less negative score.

We scale by the number of sentences, as we conjecture that one sentence filled with four writing faults is more challenging to process than four sentences with one writing fault each. Moreover, while our measure does not directly count the number of "long sentences" in a document (given that we lack an objective definition of what constitutes a long sentence), scaling by the number of sentences indirectly captures sentence length. This is because, holding document length constant, the number of sentences is inversely related to sentence length, as one can write either one long sentence or break it into two or three shorter sentences.[6] Long sentences therefore lower the number of sentences in the denominator and translate into more negative *Readability (baseline)* scores.

Table 1 shows that there is great variation in our readability measure. The 10th and 90th percentiles for *Readability (baseline)* are -5.296 and -2.848; the mean and the standard deviation are -4.284 and 0.920. The mean of -4.284 implies that, on average, each sentence suffers from 0.43 writing faults. For reference,

[5] Stylewriter's abstract word list consists of the following terms: "*activity, amenity, aspect, concept, element, facility, factor, function, functional, inflow, input, mode, operation, outflow, output, process, resource, sector, situation, structure, system, utilities, variables*."

[6] In the data, we also detect a negative correlation between number of sentences and sentence length.

the *Readability (baseline)* score of this paper is -2.601, suggesting that this paper is easier to read than more than 90% of the CEF annual reports in our sample.

Table 1 reveals that most of the variation in *Readability (baseline)* comes from the use of passive verbs, which, with a mean of -2.867 and a standard deviation of 0.650, overpowers other components such as the use of hidden verbs, which has a mean of -0.508 and a standard deviation of 0.154 only. Motivated by this observation, in our tests, we experiment with two variants of *Readability (baseline)*: in *Readability (standardized)*, we first standardize each of the five components and then compute the equal-weighted average across the five standardized components; in *Readability (PCA)*, we take the first principal component of the five components.

Table 2 shows that *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)* are all highly positively correlated, with correlation coefficients ranging from 0.950 to 0.969. It should therefore come as no surprise that our later results are similar across the three readability measures we employ. The reason for the high positive correlation between *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)* is that, together, the five components that make up the readability score are all positively correlated with each other. That is, a report that suffers severely from the use of passive verbs also tends to suffer severely from the use of hidden verbs. Our choice of the weighting scheme for each of the five components therefore does not materially alter our key finding.

In Appendix B, we assess whether the readability of an annual report is tied to characteristics of the CEF's CEO and chief financial officer (CFO). We presume that CEOs and CFOs personally write sections of annual reports (such as investment reviews and investment outlooks).[7] At the very least, CEOs and CFOs should be heavily involved in the construction of the annual report, which raises the question of whether the readability of an annual report is tied to some CEO or CFO characteristic one could plausibly associate with good writing skills. The characteristics we examine consist of having received an MBA degree, having received an advanced degree (M.D., J.D., LL.M., Ph.D., etc.), having attended an Ivy League

[7] Conversations with four actual CEF managers support this conjecture.

institution, being female, and CEO/CFO tenure as of year *t*. Since most CEFs are small- or micro-cap firms, we are able to gather reliable data on executive education, gender, and tenure for only 26 CEFs out of the 92 CEFs in our sample.

As shown in Appendix B, having a female CFO is mildly positively correlated with readability (unfortunately, there are no female CEOs in our sample.). Education and tenure do not yield any consistent correlations. None of the correlations is statistically significant. In the end, we are unable to establish any strong links between the readability of annual reports and executive characteristics, suggesting that, within a sample of college-educated individuals, there are no personal characteristics that cleanly predict whether an individual is a good writer.[8]

We also present descriptive statistics for two readability measures that have been widely used in prior studies, the Fog Index and the Flesch-Kincaid Index. The Fog Index is used by Li (2008), Lehavy, Li, and Merkley (2011), and Lawrence (2013), among others; the Flesch-Kincaid Index is used by Li (2008) and Lehavy, Li, and Merkley (2011), among others. In a recent speech, former SEC Chairman Christopher Cox conjectures that "*Just as the Black–Scholes model is commonplace when it comes to compliance with the stock option compensation rules, we may soon be looking to the Gunning–Fog and Flesch–Kincaid models to judge the level of compliance with the plain English rules*."[9] The Fog Index is 0.4 × (Average Number of Words per Sentence + Fraction of Complex Words × 100). The Flesch-Kincaid Index is 0.39 × (Total Number of Words / Total Number of Sentences) + 11.8 × (Total Number of Syllables / Total Number of Words) - 15.59 (Kincaid, Fishburne, Rogers, and Chissom, 1975).

Table 1 shows that the average Fog Index for CEFs in our sample is 17.52, which compares well with those reported by prior studies: Li (2008) observes a mean Fog Index of 18.23 and Miller (2010) observes a mean Fog Index of 19.90.[10] These numbers suggest that, in terms of the Fog Index, CEF annual

[8] Perhaps the strongest determinant of language task performance found in the relevant literature is that of gender. In particular, studies in writing research find that language performance is noticeably better among young girls than among young boys (e.g., Burman, Bitan, and Booth, 2008). However, the evidence also indicates that the female advantage erodes as subjects reach adulthood (e.g., Undheim and Nordvik, 1992; Parsons, Rizzo, van der Zaag, McGee, and Buckwalter, 2005).

[9] Speech by SEC Chairman: "Closing Remarks to the Second Annual Corporate Governance Summit," March 23, 2007.

[10] The Fog Index and the Flesch-Kincaid Index are designed to gauge the number of years of formal education needed to comprehend a text on a first reading.

reports are not materially different from annual reports of regular publicly traded corporations. The Flesch-Kincaid Index for CEFs is also similar to that of regular publicly traded corporations: the average Flesch-Kincaid Index across CEFs in our sample is 13.06; the average Flesch-Kincaid Index across all Compustat firms over our sample period is 14.36. Table 2 shows that our primary measures of readability are all positively correlated with the Fog Index and the Flesch-Kincaid Index, with correlation coefficient estimates ranging from 0.676 to 0.760.

4. Experimental evidence on the validity and effect of our readability measure

Before assessing how the readability of annual reports relates to firm value (Section 5), we pause to assess the validity of our readability measure within an experimental setting (Section 4.1). We also attempt to shed light on which components of the readability measure matter the most to investors (Section 4.2) and how readability of annual reports influences investors' mood and investors' perception of the underlying firm (Section 4.3).

4.1. How good is our readability measure?

In our first study (Study 1), we sort annual reports based on *Readability (baseline)* and we randomly select 20 annual reports from the top quartile ("high readability reports") and 20 annual reports from the bottom quartile ("low readability reports"). Our survey participants consist of juniors and seniors from Cornell University's undergraduate business program. While we would like to have queried actual investors, CEFs are predominantly held by retail investors. The readability perceptions of our survey participants may thus correlate reasonably well with those of actual CEF investors. In Study 1, we ask a total of eight students to answer the following question after reading each annual report: "*How easy to read was the annual report? The scales are 7 ("Very") to 1 ("Not at all").*" Each of the 20 high readability reports and each of the 20 low readability reports is read and rated by four students, yielding a total of 80 observations in each of the two cells.

Appendix C, Panel A reports the average readability score produced by the students. Reports that are in the top quartile based on *Readability (baseline)* receive an average score of 5.53. In comparison, reports that are in the bottom quartile receive an average score of 4.90. The difference is +0.63 (*t*-statistic = 2.19). Since students generally stayed away from the extremes and mostly assigned scores of four, five, or six, the difference of +0.63 is economically meaningful.

In our second study (Study 2), we expand our experiment to a pool of 30 subjects. Of the 30 subjects, three participated in our first study, but we ensure that none of the annual reports used in the first study is used in the second study. We now sort annual reports separately based on *Readability (baseline)*, *Readability (standardized)*, *Readability (PCA)*, *Fog Index* $\times(-1)$, and *Flesch-Kincaid Index* $\times(-1)$, respectively. After each of the five sorts, we randomly select ten annual reports from the top quartile ("high readability reports") and ten annual reports from the bottom quartile ("low readability reports"). In the end, we have ten cells with ten annual reports each, yielding a total of one hundred annual reports. We assign these one hundred annual reports to our subjects and ask: "*How easy to read was the annual report? The scales are 7 ("Very") to 1 ("Not at all").*" Each report is read by three students, yielding a total of 30 observations in each of the ten cells.

Appendix C, Panel B reports the results that come from this follow-up study. In line with Study 1, subjects generally agree with the outputs produced by the various readability measures. The agreement is strongest for *Readability (standardized)*, for which the difference in the average readability score between high- and low-readability reports is +0.74 (*t*-statistic = 2.06). The corresponding numbers for *Readability (baseline)* and *Readability (PCA)* are +0.46 (*t*-statistic = 1.61) and +0.64 (*t*-statistic = 1.93), respectively. When aggregating the scores for the annual reports sorted based on *Readability (baseline)* from Study 1 and Study 2, we obtain a difference of +0.55 (*t*-statistic = 2.67).

Students agree less with the outputs generated by either the Fog Index or the Flesch-Kincaid Index. For the former, the difference in the average readability score between high- and low-readability reports is only +0.36 (*t*-statistic = 0.99); for the latter, the difference in the average readability score between high- and low-readability reports is only +0.24 (*t*-statistic = 0.64).

In the end, the relatively strong agreement of survey participants with the outputs generated by our primary readability measures helps build confidence in the validity of our readability measures. The weaker agreement with the Fog Index and the Flesch-Kincaid Index is consistent with our suspicion that, while the Fog Index and the Flesch-Kincaid Index both deserve their places in the literature, they are less direct measures of readability than the primary readability measure we use to process CEF annual reports.

4.2. Where do perceived differences in readability come from?

Our experimental evidence raises the question as to which of the five components that make up our primary readability measure contributes the most to the observed differences in perceived readability. As a reminder, the five components are: passive verbs, hidden verbs, legal words, overwriting and wordy phrases. The fact that annual reports that suffer severely from one particular writing fault also tend to suffer severely from the other writing faults complicates the empirical assessment of this question. We nevertheless are able to provide some suggestive evidence on this matter.

Specifically, in our third study (Study 3) we find, for each of the five components, annual reports that are in the bottom quartile with respect to one component but not in the bottom quartile for any of the remaining four components. From each of the five pools of annual reports, we randomly select ten annual reports, yielding a total of 50 annual reports whereby each annual report suffers badly from only one particular writing fault. As a counterfactual, we also randomly select ten annual reports from a pool of annual reports that are not in the bottom quartile with respect to any of the five components. In total, we have 60 annual reports across six cells. We assign these annual reports to ten students and ask: "*How easy to read was the annual report? The scales are 7 ("Very") to 1 ("Not at all").*" Each report is read by three students, yielding a total of 30 observations in each of the six cells.

Appendix D reports the average readability scores given by the students for each of the six cells. We find that reports that suffer badly from wordy phrases receive the lowest readability scores (average readability score = 4.55), followed by reports suffering badly from legal words (4.73), followed by overwriting (4.94), passive verbs (5.09), and hidden verbs (5.11). The counterfactual, consisting of reports

that do not suffer badly from any of the writing faults, receives the highest average readability score (5.34). These results suggest that an annual report's readability is particularly harmed by the use of wordy phrases, such as "*an appreciable number of*" or "*has a requirement for*" and the use of legal words. The use of passive voice and hidden verbs appears, on the other hand, to do less damage. None of the differences in readability scores (e.g., the average readability score of reports suffering badly from wordy phrases versus the average readability score of reports suffering badly from legal words) is statistically significant, however, and our results should therefore be interpreted with caution.

4.3. What are the effects of perceived differences in readability?

Our final experimental study explores the effects that the above-noted differences in perceived readability have on subjects' trust, manager assessments, and moods. For the annual reports sorted based on *Readability (baseline)* and used in Study 2, we ask the following questions (in addition to the question of "*How easy to read was the annual report?*"):

- "*How trustworthy does the information provided by the company seem to you? The scales are 7 ("Very") to 1 ("Not at all").*"
- "*How skilled does the fund manager seem to you after reading the annual report? The scales are 7 ("Very") to 1 ("Not at all").*"
- "*How do you feel right now (1/2)? The scales are 7 ("Calm") to 1 ("Bothered").*"
- "*How do you feel right now (2/2)? The scales are 7 ("Relaxed") to 1 ("Tense").*"

The first question is meant to gauge the effect of readability on participants' perceptions of the trustworthiness of the information provided in the annual report; the second question is meant to gauge the effect of readability on participants' perceptions of manager skill; the third and fourth questions are meant to gauge the effect of readability on participants' moods. In total, we have ten annual reports of high readability and ten annual reports of low readability. Again, each report is read by three students, yielding a total of 30 observations in each of the two cells.

Appendix E reports the average score given by the students for high-readability annual reports and low-readability annual reports. We find that, in our setting, annual reports of lower readability are primarily associated with worse moods, as subjects felt more "bothered" and "tense" when reading annual reports of low readability than when reading annual reports of high readability. For the first sentiment-related question, the average scores given for high- and low-readability annual reports are 4.97 and 4.43, respectively (Δ = 0.54, *t*-statistic = 1.88). For the second sentiment-related question, the average scores given for high- and low-readability annual reports are 5.09 and 4.61, respectively (Δ = 0.48, *t*-statistic = 1.71). Firms with highly readable annual reports are also perceived to be more trustworthy and more skilled, even though, here, the differences are smaller.

In the end, while the results reported in Section 4 should be interpreted with some caution given the relatively small sample sizes, we find reasonably strong evidence that our primary measures of readability are useful. We find suggestive evidence that readers particularly dislike wordy phrases and legal words. We also find hints in the data that the readability of a text alters how subjects view both the text itself and the source of the text, a conclusion that is shared by many studies in psychology and linguistics[11].

5. Evidence pertaining to the effect of readability on firm value

To quantify the effect of readability on firm value, we follow the system generalized method of moments (GMM) procedure of Blundell and Bond (1998):

$$Y_{i,t} = \alpha_i + \gamma Y_{i,t\text{-}1} + \beta\, Readability_{i,t} + X\delta + \varepsilon_{i,t}. \qquad (3)$$

The dependent variable is the monthly CEF discount (Eq. (1)). α_i represents CEF fixed effects. To the extent that CEF discounts are persistent over time, including a lagged dependent variable alleviates model misspecification concerns. In this setting, OLS estimates with CEF fixed effects are biased, however, because the fixed effects and the lagged dependent variable are correlated by construction (Nickell, 1981). The system GMM approach solves this problem and produces consistent coefficient estimates by estimating

[11] Alter and Oppenheimer (2008) provide for a survey of the relevant literature.

a two-equation system using lagged levels and first-differenced variables as instruments.[12] Standard errors are adjusted for heteroskedasticity, as well as cross- and serial correlation.

Our interest centers on $Readability_{i,t}$, which is the readability measure for the CEF's most recent annual report. Our primary readability measures are *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)*. For completeness, we also experiment with *Fog Index* $\times (-1)$ and *Flesch-Kincaid Index* $\times (-1)$.

That the price of a fund generally differs from the NAV, i.e., that the CEF discount is generally nonzero, has attracted much attention from researchers and practitioners alike. Some theories cite unrealized capital gains and tax overhang to explain the discrepancy (Malkiel, 1977); others cite leverage (Cherkes, Sagi, and Stanton 2009), liquidity (Cherkes, Sagi, and Stanton, 2009), fees (Ross, 2005), and managerial skill (Berk and Stanton, 2007); still others follow a behavioral approach (Lee, Shleifer, and Thaler, 1991). Readability may be correlated with some of these constructs and Table 3, which reports the correlation coefficients across our independent variables, provides some evidence in this regard. If we wish to alleviate omitted variable bias concerns, it is therefore vital that we adequately control for these determinants of the CEF discount in our regression equation.

To keep our presentation focused, we defer a full discussion of our control variables to Appendix F. In short, we control for (1) tax overhang via hand-collected data from annual reports, (2) leverage via data from Capital IQ, (3) security-specific liquidity via trading volume and bid–ask spreads for both the CEFs' and the CEFs' underlying assets, (4) systematic liquidity via the Pastor and Stambaugh (2003) liquidity factor and term spread, (5) fees and managerial skill via expense ratio, payout ratio, and the CEF's alpha, and (6) investor sentiment and limits to arbitrage via consumer confidence, inverse share price,

[12] We treat readability as a predetermined variable satisfying the sequential exogeneity condition. In other words, while a shock to CEF discounts can affect readability in the future, it cannot affect readability in the past. For the dependent variable, we allow a maximum number of two lags for instrumentation; for the readability measure, we allow a maximum number of three lags. All other variables are assumed to be exogenous and included in the instrument set as a first-differenced form. In untabulated robustness tests, we find very similar results when treating our other independent variables as predetermined variables. Increasing the maximum number of lags also does not materially alter our findings, yet dramatically increases the time needed to estimate our regression coefficients.

dividend yield, and retail holdings. We also construct control variables to capture potential differences in firm characteristics across the stocks held by CEFs.[13]

We present our regression results in Table 4. The coefficient estimates for *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)* are 0.027 (*t*-statistic = 3.37), 0.006 (*t*-statistic = 3.60), and 0.012 (*t*-statistic = 3.27), respectively. The estimates are very similar when including abstract words in our readability measure, which corroborates our suspicion that StyleWriter's abstract word list does not add much explanatory power in our setting.[14] To put our coefficient estimates in perspective, our regression analysis indicates that, holding all else equal, a one-standard-deviation increase in readability leads to a 2.48%, 2.06%, or 1.96% decrease in the CEF discount, depending on the readability measure we employ. The coefficient estimates for *Fog Index* $\times (-1)$ and *Flesch-Kincaid Index* $\times (-1)$ are 0.006 (*t*-statistic = 1.55) and 0.005 (*t*-statistic = 1.61), respectively. The weaker results for the Fog Index and the Flesch-Kincaid Index are in line with our conjecture and the experimental evidence that our primary readability measures are more refined than either the Fog Index or the Flesch-Kincaid Index.

In regressing the monthly CEF discount on the readability of the most recent annual report along with monthly controls, our regression is similar to those of Fama and MacBeth (1973) and Fama and French (1992), who regress monthly returns on data from a company's most recent annual report such as the market-to-book ratio. The intuition is that prospective investors only have the most recent annual report to turn to. Any potential readability effect should therefore be priced not only in the month of the filing, but also in the ensuing months. To this end, Fig. 1 plots the change in the monthly CEF discount when the newly filed annual report has a higher *Readability (baseline)* score than its preceding annual report, along with the change in the monthly CEF discount when the newly filed annual report has a lower *Readability (baseline)* score than its preceding annual report. We find that changes in readability start becoming priced

[13] In additional tests, we experiment with other characteristics of a CEF's underlying assets and find that our results are robust (results are tabulated in Online Appendix A).

[14] For instance, the estimate on *Readability (baseline)* turns to 0.022 (*t*-statistic = 3.01).

one month after the filing, but are not fully factored into the price until three months after the filing. The results are similar when using *Readability (standardized)* and *Readability (PCA)*.

In additional tests, we explore whether the readability effect is linear or nonlinear. Conceptually, we have no strong prior: perhaps an increase in the average number of writing faults from one to two is perceived to be just as bad as an equivalent increase from four to five. Or perhaps all annual reports with more than three writing faults per sentence are considered equally illegible. Or perhaps investors become sensitive about an annual report's readability only once the average number of writing faults hits a certain threshold.

As noted before, the average number of writing faults per sentence (*WF*) in our sample is 0.43. The 10^{th} percentile is 0.28; the 90^{th} percentile is 0.53. Motivated by these percentiles, we create three indicator variables: the first indicator variable equals one if *WF* is between 0.3 and 0.4, and zero otherwise; the second indicator variable equals one if *WF* is between 0.4 and 0.5, and zero otherwise; and the third indicator variable equals one if *WF* is greater than 0.5, and zero otherwise. The counterfactuals are observations for which *WF* is below 0.3. We re-estimate regression Eq. (3), but replace our readability measure with the above indicator variables. We find that the coefficient estimates for the indicator variables are -0.040 (*t*-statistic = -3.01), -0.068 (*t*-statistic = -3.39), and -0.080 (*t*-statistic = -2.93), respectively. These estimates suggest that the marginal punishment for writing faults decreases somewhat with the number of writing faults. Overall, however, there is no clear evidence of strong nonlinearity. We make similar observations when we form quartile indicator variables based on the distribution of the average number of writing faults and re-estimate our regression equation (results are available upon request).

So far we have emphasized that, by writing clear annual reports, funds help build trust and improve investor perception and investor mood. Funds with well-written annual reports therefore *trade at a lesser discount*. However, if the writing in a report is so good that it creates strong positive sentiment, funds with well-written annual reports may even trade at a premium. To this end, we note that while most funds trade at a discount, when sorting observations based on *Readability (baseline)*, we find that the average discount across top-decile observations is -0.35%. In other words, funds with high readability trade at a slight

premium of +0.35%. On a related note, when we re-estimate regression Eq. (3) using the subset of observations where funds trade at a premium, we find that the readability effect is present even in the subsample of premia.

The coefficient estimates of the control variables in Table 4 are generally in line with expectations. To give some examples, the estimate of *Alpha* is positive, consistent with the presence of managerial skill reducing the CEF discount. The estimates of *Inverse price* are all statistically significant and economically meaningful, suggesting that high arbitrage costs due to high transaction costs increase the spread between the price of the CEF and the value of the CEF's underlying assets (Pontiff, 1996). *Payout ratio* is negatively associated with the CEF discount, which is consistent with dividends playing a disciplining role as they shift resources away from managers (Jensen, 1986; Cherkes, Sagi, and Wang, 2014); the positive estimate also suggests that high dividends act as a credible signal of high managerial quality (Johnson, Lin, and Song, 2006). The positive estimate of *Relative trading volume* is consistent with the liquidity-based theory of CEFs that investors are willing to pay a premium for a CEF if the CEF has higher liquidity than its underlying assets (Cherkes, Sagi, and Stanton, 2009). The positive coefficient estimate of *Leverage* is consistent with Cherkes, Sagi, and Stanton's (2009) argument that CEF leverage is appealing to many CEF investors (i.e., small investors) who cannot buy on margin or can do so only at a relatively high cost.

Our dynamic panel model includes fund fixed effects, which capture time-invariant fund characteristics such as fund styles (we collect data on each CEF's official style category and find that no CEF in our sample changes its style). Because some of our control variables exhibit only time-series variation (*PS liquidity factor*, *Term spread*, *Consumer confidence*), we cannot include time fixed effects in our regression equation. In additional tests, we replace *PS liquidity factor*, *Term spread*, *Consumer confidence* with year-month fixed effects and we find that our results are very similar (results are available upon request).

5.1. Components of readability

In Table 5, we separate *Readability* into its various components and examine the degree to which each component adds to the significant estimate of *Readability*. As the components are positively correlated with each other, some of them highly so, we re-estimate regression (3) separately for each component. That is, we estimate five separate regressions of the CEF discount on *#Passive verbs*, *#Hidden verbs*, *#Overwriting*, *#Legal words*, and *#Wordy phrases*, respectively.

We find that the coefficient estimates for *#Passive verbs*, *#Legal words*, and #*Wordy phrases* are the most reliable, with estimates of 0.028 (*t*-statistic = 2.99), 0.058 (*t*-statistic = 2.84), 0.173 (*t*-statistic = 2.97), respectively. The estimates for *#Hidden verbs* and *#Overwriting* are 0.067 (*t*-statistic = 2.13) and 0.057 (*t*-statistic = 2.17), respectively. When multiplying the coefficient estimate with a one-standard-deviation increase in the underlying component to gauge the economic significance, we obtain the same ranking. Except for *#Passive verbs*, this ranking is strikingly similar to that produced by our experiment:

Experiment-based evidence	Regression-based evidence
#Wordy phrases [strongest effect]	*#Passive verbs* [strongest effect]
#Legal words	*#Wordy phrases*
#Overwriting	*#Legal words*
#Passive verbs	*#Hidden verbs*
#Hidden verbs [weakest effect]	*#Overwriting* [weakest effect]

In the end, our results suggest that all components of our readability measure contribute to its explanatory power. That is, if we were to omit any of the five components from our score, our results would become weaker, more so for some than others. The components with the strongest effect appear to be wordy phrases and legal words; the components with the weakest effect appear to be overwriting and hidden verbs; the evidence on the effect of passive verbs is mixed.

5.2. Moderating factors and natural experiment

Our evidence to this point, while highly suggestive, is not free of alternative interpretations. In particular, one could argue that managerial skill affects the ability to write (and, as such, the readability of an annual report). Managerial skill also affects the CEF discount. In addition, one could argue that CEF

investors do not need to read an annual report to infer the lack of skill. Under these assumptions, readability becomes a correlated by-product of managerial skill.

Moreover, if one makes the assumptions that poorly managed firms try to hide failure with obscure writing, that highly intelligent CEF investors are not affected by readability, and that they can spot bad news before the bad news itself is reflected in the NAV, then one may argue that readability is a correlated by-product of management's *unsuccessful* attempt to hide failure.

5.2.1. The roles of fund age, manager tenure, and volatility in past performance

Our first attempt to establish that it is truly readability per se that generates at least parts of our findings builds on the following premise: if our theory is accurate, then our findings should be stronger in situations in which investors are more likely to rely on an annual report. As mentioned in the introduction and the hypothesis development section, the information environment for CEFs is relatively opaque and the primary alternative to annual reports as an information source is past performance. We conjecture that investors are less likely to rely on past performance, and, as a result, *more* likely to study annual reports, if the current manager's tenure is relatively short, if the fund is relatively young, and if past performance has been volatile. Consequently, we expect the readability effect to be stronger for funds with managers of relatively short tenure, young funds, and funds with volatile past performance.

To test our conjecture, we re-estimate regression Eq. (3), but now include a fund/manager characteristic along with an interaction term between our readability measure and the fund/manager characteristic. To keep the presentation focused, we tabulate results for *Readability (baseline)* only. The results are very similar for *Readability (standardized)* and *Readability (PCA)* (available upon request). The variables related to fund/manager characteristics are: (1) *New CEO*, which equals one if the CEF's CEO (=the portfolio manager) has tenure of less than one year (≈ bottom quartile of its distribution), and zero otherwise. (2) *New CEF*, which equals one if the CEF's age is less than five years (≈ bottom quartile of its distribution), and zero otherwise. (3) *High volatility*, which equals one if the CEF's weekly return standard deviation over the previous year is in the top quartile of its distribution, and zero otherwise.

The results presented in Table 6 show that the readability effect is, indeed, substantially stronger for (1) funds whose managers have been managing their funds for less than a year, (2) funds that have operated for less than five years, and (3) funds whose past performance has been highly volatile. The economic significance of the interaction effects is substantial: Our estimates imply that for funds with a relatively new CEO, a one-standard-deviation increase in readability leads to a 3.3% decrease in the CEF discount; for funds with more seasoned CEOs, the CEF discount only drops by 2.0%. The corresponding numbers for relatively young versus more seasoned CEFs are 3.0% and 1.9% and the corresponding numbers for relatively volatile versus less volatile CEFs are 3.3% and 1.8%.

In a tangential yet related vein, prior work provides evidence that retail investors are particularly prone to being influenced by the poor readability of disclosure documents (e.g., Miller, 2010; Rennekamp, 2012; Lawrence, 2013). Retail investors are also more prone to being influenced by trustworthiness and sentiment (Baker and Wurgler, 2006; Rennekamp, 2012). Accordingly, one may posit that CEFs with a strong retail investor presence among their shareholders are particularly sensitive to the readability of their annual reports.

In untabulated analyses, we attempt to test this conjecture. Unfortunately, we have very limited variation in retail holdings in our sample, as the 10th percentile and the 90th percentile of *Retail holdings* are 75.4% and 100%, respectively. We do find that when retail holdings are low, i.e., when retail holdings are below 75.4% (= 10th percentile), the coefficient estimate on *Readability (baseline)* is 0.004 (*t*-statistic = 1.09); when retail holdings are high, i.e., when retail holdings are above 75.4%, the coefficient estimate increases to 0.028 (*t*-statistic = 3.10). However, given the very limited distribution in retail holdings in our sample, it is difficult to draw reliable conclusions regarding the moderating role of retail holdings.

5.2.2. The Plain Writing Act of 2010

Our second attempt to establish that it is truly readability per se that generates at least parts of our findings is a difference-in-difference analysis around the Plain Writing Act (PWA) of 2010. The PWA of 2010 was designed to make documents produced by the government or government agencies easier for the

general public to read. Although the SEC implemented its Plain English Initiative in October 1998 (which, unfortunately, pre-dates our sample period), we conjecture that the PWA had an incremental positive impact on the readability of financial disclosure documents. The appealing feature of the PWA for our purposes is that it was not motivated by or primarily designed for making financial disclosure documents easier to read but rather represents the result of broader efforts to make government more transparent (Cheek, 2011). Thus any change in the readability of financial disclosure documents that can be tied to the PWA can be thought of as a relatively clean shock to readability.

Our empirical strategy is to contrast changes in discount levels around the PWA of (1) CEFs with low readability prior to the signing of the PWA (the "treatment group") to those of (2) CEFs with high readability prior to the signing of the PWA (the "control group"). The intuition behind our experiment is that while the PWA had an incremental positive impact on the readability of financial disclosure documents, it did so particularly for treatment-group funds and less so for control-group funds, which already had easy-to-read disclosure documents. Based on our hypothesis that the readability of disclosure documents affects discount levels, treatment-group observations should therefore exhibit a disproportionate decline in discount levels relative to those of their control-group counterparts.

To assess the validity of our experiment, we first test whether CEFs with low readability were, indeed, more evidently affected by the law than CEFs with high readability. A CEF falls into the treatment group ("Low readability group") if its readability measure in the pre-PWA period is in the bottom quartile of its distribution. In the analysis presented here, we use *Readability (baseline)*, but we note that our results are very similar when using *Readability (standardized)* or *Readability (PCA)* (results are available upon request). Each treatment-group observation is matched with a CEF whose readability measure in the pre-PWA period is in the top quartile of its distribution ("High readability group") but yet, based on Mahalanobis-metric matching, is similar to the treatment-group observation by reference to a host of CEF characteristics.[15]

[15] The CEF characteristics are: *Alpha, Expense ratio, Payout ratio, Relative trading volume, Relative bid-ask spread, Retail holdings, Unrealized capital gains, Leverage, Underlying Fog Index, Underlying file size, Underlying Flesch-Kincaid Index,*

For each treatment- and control-group observation, we take the first annual report whose fiscal year end falls after the passage of the PWA ("After the Plain Writing Act of 2010"), and we compare it with the first annual report that was written prior to the passage of the PWA ("Before the Plain Writing Act of 2010").

We estimate the following regression equation on the sample of treatment-group and control-group observations before and after the PWA:

$$Y_{i,t} = \gamma Y_{i,t-1} + \beta\, TreatGroup_i * PostPlainWritingAct_t + X\delta + \varepsilon_{i,t}. \quad (4)$$

For low-readability-group firms, we set the realization of $TreatGroup_i$ at one; for high-readability-group firms, we set the realization of $TreatGroup_i$ at zero. If an observation covers the post-PWA period, its realization of $PostPlainWritingAct_t$ is set at one; for pre-PWA period observations, we set the realization at zero. X includes $TreatGroup_i$ and $PostPlainWritingAct_t$, and also the set of control variables that we use in regression Eq. (3).[16]

Panel A of Table 7 shows that the estimate for *TreatGroup* is -2.688. That is, prior to the passage of the PWA, treatment firms have -2.688 lower readability. This is by construction. More importantly, the interaction term estimate of +0.203 (*t*-statistic = 2.21) reveals that, after the passage of the PWA, this readability gap narrows substantially, which is in line with our conjecture. Panel B of Table 7 shows that the improvement we find comes from all components of the readability score. In particular, the occurrence of every writing fault that is discussed in the *Plain English Handbook* and that we are able to capture (passive verbs, hidden verbs, overwriting, legal words, and wordy phrases) decreases after the PWA.

Does this disproportionate improvement in readability lead to an abnormal change in the discount? The results presented in Table 7 answer in the affirmative. Prior to the passage of the PWA, treatment-group firms trade at a higher discount relative to their control-group counterparts: the estimate for $TreatGroup_i$ equals -0.020 (*t*-statistic = -2.22). This corroborates our main result that a fund's market value

Underlying market cap, Underlying BM, and *Underlying volatility*. We do Mahalanobis-metric matching rather than propensity-score matching because the former has been found to be more robust to sampling bias (Zhao, 2004). We find that for some of the abovementioned firm characteristics, treatment firms and control firms differ statistically significantly from each other; however, in all cases the difference is economically negligible (results are available upon request).

[16] Including the full set of controls can help improve the precision of our analysis by soaking up residual variation (Gormley, 2015). Consistent with this view, we find that adding the controls has only a limited effect on the coefficient estimates on our key variables.

tends to be further below the market value of its underlying assets when its annual report is poorly written. After the PWA, this gap in the discount narrows noticeably. The coefficient estimate of the interaction term between $TreatGroup_i$ and $PostPlainWritingAct_t$ is +0.013 (*t*-statistic = 2.99).

In the end, our difference-in-difference analysis reveals that funds that, prior to the PWA, had low-readability annual reports experienced a sudden and disproportionate decrease in the number of writing faults following the PWA. This sudden and disproportionate decrease in the number of writing faults is accompanied by a sudden and disproportionate decrease in CEF discounts. One likely explanation for these patterns is that: (1) the readability of annual reports improved around the PWA, (2) investors read annual reports and, consequently, (3) the improved readability of annual reports affected investors' perceptions of the fund and altered prices.

The alternative to the above explanation is that our results are simply an artifact of mean-reversion in our primary variables of interest. Since we include the lagged value of readability as an independent variable, our regression equation already accounts for the simplest form of mean-reversion. Table 7 also reports the results of a placebo test: We re-run our difference-in-difference analysis, but we do so around one hundred randomly drawn placebo events; we require the placebo event to occur prior to October 2010 to avoid overlap with the PWA. Panel C of Table 7 reports the average coefficient estimate and the average *t*-statistic across the one hundred simulations. When the dependent variable is readability, we find that, prior to the placebo event, treatment firms have -2.193 lower readability. Again, this is by construction. However, in contrast to our results around the PWA and in contrast to what mean-reversion theory predicts, the estimate for the interaction term is neither economically meaningful nor statistically significant: the average coefficient estimate for the interaction term and the average *t*-statistic are 0.166 and 0.72, respectively.

Similarly, when the dependent variable is the CEF discount, we find that treatment firms, which, by construction, have lower readability, trade at an incremental discount relative to their control firms prior to the placebo event (coefficient estimate = -0.010, average *t*-statistic = -2.90). This is consistent with the proposition that readability affects firm value. However, consistent with the previous finding that the level

of readability does not change around placebo events, the level of the incremental discount also is not altered by the placebo event: the average coefficient estimate for the interaction term and the average *t*-statistic are only -0.003 and -0.23, respectively; in fact, across the one hundred randomly drawn placebo events, none produces a more reliable interaction term than the one we observe around the PWA.

6. Evidence pertaining to the effect of readability on firm value: The case of regular publicly traded corporations

The evidence to this point suggests that readability can positively affect firm value and, consequently, that CEFs filing more readable annual reports have higher market values relative to their fundamentals than CEFs filing less readable annual reports. Our final test examines the degree to which this observation generalizes to regular publicly traded corporations.

We randomly sample one hundred publicly traded corporations from the CRSP/Compustat universe with proportionate sampling weights for each industry (Global Industry Classification Standard (GICS) Industry Sector). We download, for each firm, its annual shareholder reports through the SEC EDGAR system. We again exert great effort to manually clean the reports. Of the one hundred firms, five drop out because they do not have annual reports in HTML/TXT format in the SEC EDGAR system. In the end, our sample period runs from 2000 through 2015 and our final sample contains 95 firms and 10,813 firm-year observations.[17]

Our dependent variable is Tobin's *Q*, which is the market value of total assets divided by the book value of total assets, where the market value of assets is calculated as the sum of the market value of common shares and the book value of debt minus deferred taxes. Our independent variables of primary interest are *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)*.

Table 8 provides the descriptive statistics. We find that regular publicly traded corporations have, on average, a slightly higher number of writing faults in their annual reports than CEFs (-5.486 for regular

[17] While CEF annual reports started becoming available in HTML/TXT format only in the SEC EDGAR system from 2003, regular publicly traded corporations' annual reports are available from 2000, hence the difference in sample period.

publicly traded corporations versus -4.284 for CEFs). The average Tobin's *Q* in our sample is 1.892, which is similar to the average reported by prior studies that analyze the full CRSP/Compustat universe (e.g., Bertrand and Schoar, 2003). This similarity in Tobin's *Q* suggests that we succeed in constructing a representative subset of the population.

Our regression framework is identical to that applied to CEFs, but, following prior literature (e.g., Morck, Shleifer, and Vishny, 1988, Yermack, 1996, Coles, Daniel, and Naveen, 2008), we now control for *ROA*, *ROA(t-1)*, *ROA(t-2)*, *Research & development*, *Intangible assets*, *Leverage*, *Capex*, *Number of segments*, *Free cash flow*, *Retail holdings*, and *Risk*. These variables are all described in Table 8.

The results presented in Table 9 show that higher readability comes with higher Tobin's *Q*. The coefficient estimates for *Readability (baseline)*, *Readability (standardized)*, and *Readability (PCA)* are 0.133 (*t*-statistic = 1.85), 0.029 (*t*-statistic = 2.07), and 0.059 (*t*-statistic = 2.08), respectively.

The coefficient estimates of the control variables generally have the expected signs. For instance, consistent with prior work (Chan, Martin, and Kensinger, 1990; Pakes, 1985), we find that Tobin's *Q* increases with *Research and development*, suggesting that Tobin's *Q* increases with growth opportunities. The negative coefficient estimate for *Number of segments* is consistent with the "diversification discount" noted by prior studies (Jensen, 1986; Lang and Stulz, 1994).

While the estimate of *Readability* is economically meaningful and statistically significant, it is noticeably weaker for regular publicly traded corporations than for CEFs. There are three interpretations for the weaker results. The first is that the strong findings for CEFs are a chance event and do not accurately reflect the true effects of readability on firm value. The second possibility is that the information environment is much richer for publicly traded corporations than for CEFs. For instance, when there is ambiguity in the annual report of regular publicly traded corporations, investors can easily seek clarification from management during earnings conference calls, a possibility that does not exist for CEFs. For regular publicly traded corporations, an increase in the readability of an annual report, which is just one out of many information sources, therefore does not materially affect the firm's valuation ratio. Viewed from this angle, the weaker patterns for regular publicly traded corporations only increase confidence in the validity

of our overall exercise. A third possibility is that since "*CEF shares and CEF holdings are securities that trade contemporaneously on exchanges, […] calculation of a CEF's Tobin's Q is straightforward*" (Cherkes, 2012). The calculation is less straightforward for a publicly traded corporation as the fundamental value of the firm's assets can be approximated only via the *book value* of assets. This likely lowers the power of our analysis and, since measurement error in the dependent variable increases standard errors, helps, in part, to explain the lower statistical significance.

7. Conclusion

Both academics and practitioners are putting greater emphasis on how firms communicate with stakeholders, not only through numeric information but also through textual information. Our study suggests that this increase in attention to the structure of textual information is warranted.

On the investors' side, our evidence suggests that, in relatively opaque information environments, annual reports constitute a primary source of information and investors pay close attention to them. When a firm's annual report becomes difficult to read, investors become suspicious, perceive the firm and its managers to be of lower quality, or subconsciously develop negative sentiments. This causes a firm with a poorly written annual report to trade at a discount.

On the firm's side, we observe considerable variation in readability, with some reports reading rather well while others suffer from wordy phrases, legal jargon, and even occasional typos and spelling mistakes. That is, despite regulators' emphasis on the ease with which the content of corporate disclosure documents can be processed, not all firms pay heed. Some managers may be overconfident (e.g., Malmendier and Tate, 2005) and erroneously believe their writing to be superb. Others may remain unconvinced of the incremental benefit of writing annual reports that are easier to read. Some managers may even take pride in their ability to construct complex phrases. Still others may try to hide unfavorable information through obscure writing, although our evidence suggests that any attempt to conceal unfavorable information through poor writing is made in vain as firms writing annual reports with low readability trade at substantial discounts. Whatever may be causing differences in readability, to the best of

our knowledge, ours is the first study to quantify the effect of readability on *firm value*. As maximizing shareholder value is the primary objective of managers, one may speculate that, in the future, managers will pay more attention to the ease with which the content of corporate disclosure documents can be processed.

Appendix A. Form N-CSR cleaning efforts

For each CEF, we use a web crawler to collect all of its annual shareholder reports (Form N-CSR). We focus on annual reports rather than semi-annual reports as the former are more extensive in terms of information delivery to investors. Following prior studies, we exclude amendments posted after the original filing date of an annual report (Loughran and McDonald, 2014). On rare occasions, we collect two N-CSRs for the same year; in those cases we choose the N-CSR that has the higher word count.

Following Li (2008) and Miller (2010), we clean and eliminate non-informative sections from the downloaded N-CSRs:

A. We delete everything between the <SEC-HEADER> and the </SECHEADER> tags. Material contained between these two tags includes company name, company address, and fiscal year end.

B. Unlike Li (2008) and Miller (2010), we do *not* necessarily delete material contained between the <TABLE> and </TABLE> tags. Often, the <TABLE> tag is used as a formatting device in long paragraphs such as in a "Letter to Shareholders." We keep paragraphs that have at least two cases of a period (".") followed by a space (" ") followed by a capitalized character even if the paragraphs are embedded in <Table> tags. This reflects the assumption that every sentence ends with a period and is followed by a space, with the next sentence starting with a capitalized character.

C. As in Miller (2010), we eliminate all lines that contain <S> or <C> or the special characters <...> and <&>. We also eliminate lines that contain any of the following strings: <TEXT>, <DOCUMENT>, <PAGE>, <TYPE>, or /PRIVACYENHANCED/.

D. As in Miller (2010), we eliminate HTML tags and convert embedded HTML code into ASCII characters. All ".jpg," ".pdf," and ".gif" files are also eliminated.

E. We delete paragraphs in which more than 50% of the characters are non-alphabetic (i.e., tables with numerical information).

Appendix B. Readability and CEO and CFO characteristics

This table presents Pearson correlation coefficients between our primary readability measure, *Readability (baseline)*, and CEO and CFO characteristics. The sample includes 26 equity closed-end funds (CEF) from 2003 through 2013 for which we have data on various manager characteristics. The observations are on a fund/year level. Column 1 reports correlations between *Readability (baseline)* of fund *i* as of year *t* and characteristics of the CEO of fund *i* as of year *t*; Column 2 reports correlations between *Readability (baseline)* of fund *i* as of year *t* and characteristics of the CFO of fund *i* as of year *t*. None of the correlations is significant at the 5% level.

	(1) CEO	(2) CFO
MBA degree?	0.142	-0.225
Any advanced degree (M.D., J.D., LL.M., Ph.D.)?	0.034	-0.161
Ivy League education?	-0.034	0.208
Female?	---	0.486
Tenure?	-0.173	-0.095

Appendix C. Validity of readability measures

This table presents survey responses from undergraduate business students that are pertinent to the readability of annual reports. In our first study (Panel A), we conduct the following experiment: we sort annual reports based on *Readability (baseline)*. We randomly select 20 annual reports from the top quartile ("High readability") and 20 annual reports from the bottom quartile ("Low readability"). We assign these annual reports to eight undergraduate business students and ask: "How readable is the annual report?" The scale ranges from 7 ("Very") to 1 ("Not at all"). Each report is read by four students, yielding a total of 80 observations in each of the two cells. In our second study (Panel B), we conduct the following experiment: We sort annual reports based on *Readability (baseline)*, *Readability (standardized)*, *Readability (PCA)*, *Fog Index (multiplied by negative one)*, and *Flesch-Kincaid Index (multiplied by negative one)*, respectively. We randomly select ten annual reports from the top quartile ("High readability") and ten annual reports from the bottom quartile ("Low readability") for each of the five measures. We assign these annual reports to 30 undergraduate business students and ask: "How easy to read was the annual report?" The scale ranges from 7 ("Very") to 1 ("Not at all"). Each report is read by three students, yielding a total of 30 observations in each of the ten cells. We report the average readability score given by the students for the "High readability" annual reports and the "Low readability" annual reports. *T*-statistics, reported in parentheses, account for heteroskedasticity. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	High readability reports	Low readability reports	Δ High- and Low readability reports
Panel A: Study 1			
(1) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Readability (baseline)*	5.53	4.90	0.63** (2.19)
Panel B: Study 2			
(2) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Readability (baseline)*	5.12	4.66	0.46 (1.61)
(3) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Readability (standardized)*	5.51	4.77	0.74** (2.06)
(4) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Readability (PCA)*	5.16	4.52	0.64* (1.93)
(5) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Fog Index*	5.56	5.20	0.36 (0.99)
(6) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all") - Reports sorted by: *Flesch-Kincaid Index*	5.29	5.05	0.24 (0.64)
Panel C: Study 1 and Study 2 combined			
(1) and (2)	5.35	4.80	0.55*** (2.67)

Appendix D. Components of readability measure

This table presents survey responses from undergraduate business students that are pertinent to the readability of annual reports. We conduct the following experiment: for each of the five components that make up our primary readability measure, *Readability (baseline)*, we find annual reports that are in the bottom quartile with respect to one component but not in the bottom quartile for any of the remaining four components. From each of the five pools of annual reports, we randomly select ten annual reports, yielding a total of 50 annual reports whereby each annual report suffers badly from only one particular writing fault. As a counterfactual, we also randomly select ten annual reports from a pool of annual reports that are not in the bottom quartile with respect to any of the five components. We assign these annual reports to ten undergraduate business students and ask: "How easy to read was the annual report?" The scales range from 7 ("Very") to 1 ("Not at all"). Each report is read by three students, yielding a total of 30 observations in each of the six cells. We report the average readability score given by the students.

Annual report suffers badly from…	Average readability score
#Passive verbs	5.09
#Hidden verbs	5.11
#Overwriting	4.94
#Legal words	4.73
#Wordy phrases	4.55
None of the above writing faults	5.34

Appendix E. Effect of readability on trust, mood, and perceived manager skill

This table presents survey responses from undergraduate business students that are pertinent to the readability of annual reports. We conduct the following experiment: We sort annual reports based on *Readability (baseline)*. We randomly select ten annual reports from the top quartile ("High readability") and ten annual reports from the bottom quartile ("Low readability"). We assign these annual reports to six undergraduate business students and ask the following questions:

(1) "How easy to read was the annual report?" The scales range from 7 ("Very") to 1 ("Not at all").
(2) "How trustworthy does the information provided by the company seem to you?" The scales range from 7 ("Very") to 1 ("Not at all").
(3) "How skilled does the fund manager seem to you after reading the annual report?" The scales range from 7 ("Very") to 1 ("Not at all").
(4) "How do you feel right now (1/2)?" The scales range from 7 ("Calm") to 1 ("Bothered").
(5) "How do you feel right now (2/2)?" The scales range from 7 ("Relaxed") to 1 ("Tense").

Each report is read by three students, yielding a total of 30 observations in each of the two cells. We report the average score given by the students for the "High readability" annual reports and the "Low readability" annual reports. *T*-statistics, reported in parentheses, account for heteroskedasticity. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	High readability reports	Low readability reports	Δ High- and Low readability reports
(1) "How easy to read was the annual report?" - Scale: 7 ("Very") to 1 ("Not at all")	5.12	4.66	0.46 (1.61)
(2) "How trustworthy does the information provided by the company seem to you?" - Scale: 7 ("Very") to 1 ("Not at all")	5.16	4.98	0.18 (0.65)
(3) "How skilled does the fund manager seem to you after reading the annual report?" - Scale: 7 ("Very") to 1 ("Not at all")	4.67	4.26	0.41 (1.59)
(4) "How do you feel right now (1/2)?" - Scale: 7 ("Calm") to 1 ("Bothered")	4.97	4.43	0.54* (1.88)
(5) "How do you feel right now (2/2)?" - Scale: 7 ("Relaxed") to 1 ("Tense")	5.09	4.61	0.48* (1.71)

Appendix F. Description of control variables

Variable	Description
"Managerial skill and fees"	
Alpha	CEF's alpha based on the Fama-French three-factor model estimated over the previous 12 months using monthly return data.
Expense ratio	CEF's expense ratio.
Payout ratio	CEF's dividends-per-share divided by its earnings-per-share.
"Liquidity"	
Relative trading volume	CEF's trading volume minus the portfolio-weighted average trading volume across the stocks held by the CEF. Trading volume is number of monthly shares traded scaled by the number of shares outstanding.
Relative bid-ask spread	CEF's bid–ask spread minus the portfolio-weighted average bid–ask spread across the stocks held by the CEF. The bid–ask spread is computed as follows: On each day *t* for each CEF or stock *i*, we compute, for each quote that is matched with a trade, the *Percentage spread*, which is the difference between the offer price and the bid price, divided by the midpoint. We then calculate, for each day *t* and each CEF or firm *i*, the weighted average *Percentage spread*; the weight is the dollar value of the shares traded in the matched quote. Finally, we average across all daily observations in a given month.
PS liquidity factor	Pastor and Stambaugh (2003) liquidity factor.
Term spread	Yield spread between U.S. government issued bonds with maturities of 20 years and three months.
"Tax overhang"	
Unrealized capital gains	CEF's net unrealized appreciation (depreciation) on investment to total NAV.
"Leverage"	
Leverage	CEF's level of debt and preferred shares relative to its total NAV.
"Sentiment and limits to arbitrage"	
Consumer confidence	The *Consumer Confidence Index* constructed from monthly surveys conducted by The Conference Board.
Inverse price (premium) [(discount)]	One over the CEF's lagged month-end price if the CEF trades at a premium [discount], and zero otherwise.
Dividend yield (premium) [(discount)]	Dividends-per-share paid by the CEF over the previous 12 months scaled by the CEF's lagged price if the CEF trades at a premium [discount], and zero otherwise.
Retail holdings	Fraction of shares held by retail investors.

Appendix F. Description of control variables (Continued)

Variable	Description
"Characteristics of stocks held by CEF"	
Underlying Fog Index	Portfolio-weighted average Fog Index across the stocks held by the CEF. The Fog Index is 0.4 × (Average number of words per sentence + Fraction of complex words × 100).
Underlying Flesch-Kincaid Index	Portfolio-weighted average Flesch-Kincaid Index across the stocks held by the CEF. The Flesch-Kincaid Index is 0.39 × (Total number of words / Total number of sentences) + 11.8 × (Total number of syllables / Total number of words) - 15.59.
Underlying file size	Portfolio-weighted average file size of the annual report in megabytes across the stocks held by the CEF.
Underlying market cap	Portfolio-weighted average market capitalization across the stocks held by the CEF.
Underlying BM	Portfolio-weighted average book-to-market ratio across the stocks held by the CEF.
Underlying volatility	Portfolio-weighted average volatility across the stocks held by the CEF.

When a CEF trades at a discount, the dependent variable should be less negative for securities with low arbitrage costs. In other words, when a CEF trades at a discount, *(Price-NAV)*/*NAV* should be high (or less negative) for securities with low *Inverse price* and high *Dividend yield*. However, when a CEF trades at a premium, the dependent variable should be less positive for securities with low costs of arbitrage. In other words, when a CEF trades at a premium, *(Price-NAV)*/*NAV* should be low (or less positive) for securities with low *Inverse price* and high *Dividend yield*.

Given the differential predictions of *Inverse price* and *Dividend yield* based on whether a fund trades at a discount or at a premium, we separate *Inverse price* and *Dividend yield* into two variables each: *Inverse price (discount)* and *Dividend yield (discount)*, which equal *Inverse price* and *Dividend yield*, respectively, if a fund trades at a discount and zero otherwise; and *Inverse price (premium)* and *Dividend yield (premium)*, which equal *Inverse price* and *Dividend yield*, respectively, if a fund trades at a premium and zero otherwise.

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Fig. 1. Changes in equity closed-end fund (CEF) premia/(discounts) after changes in readability. This figure plots how CEF premia/(discounts) evolve in event months after a new annual report is filed. The dashed (dotted) line represents cases in which the *Readability* score of the newly filed annual report is higher (lower) than the *Readability* score of the preceding annual report. The columns represent the difference between the dashed line (≈ positive changes in readability) and the dotted line (≈ negative changes in readability).

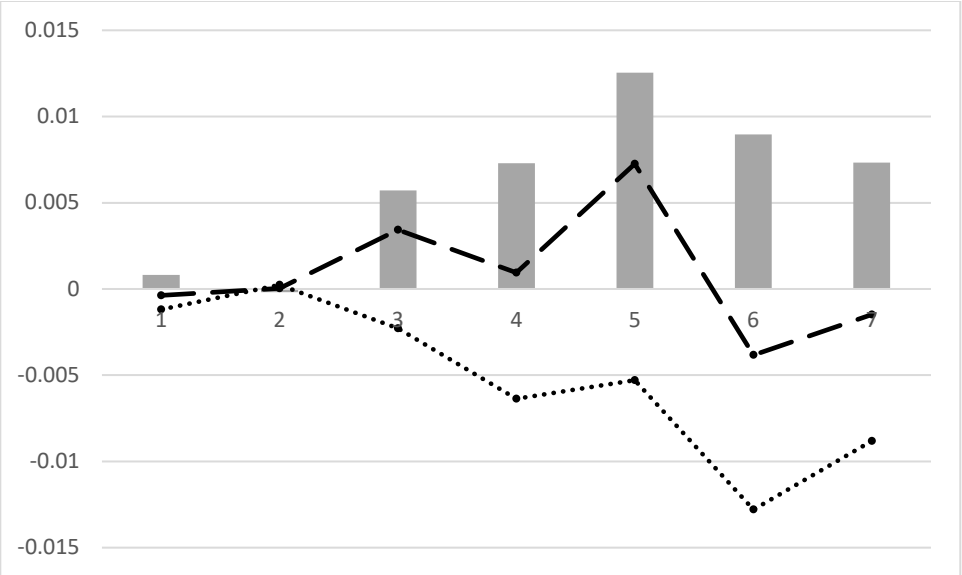

Table 1
Descriptive statistics for sample of closed-end funds.

This table presents summary statistics for our main variables. The sample includes 92 equity closed-end funds (CEFs) from 2003 through 2013. The observations are on a fund/year-month level. *Readability (baseline)* is defined as (#Passive verbs + #Hidden verbs + #Overwriting + #Legal words + #Wordy phrases) × 10 / Number of sentences, multiplied by negative one, for the corresponding CEF's most recent annual report. Low (i.e., more negative) values imply low readability; high (i.e., less negative) values imply high readability. To construct *Readability (standardized)* we count, for each of the five writing faults, the number of occurrences of that writing fault in a given report, scaled by the number of sentences. We standardize each component to have a mean of zero and a standard deviation of one and we add up the five standardized components. *Readability (PCA)* is the first principal component of the five components. The Fog Index is 0.4 × (Average number of words per sentence + Fraction of complex words × 100). The Flesch-Kincaid Index is 0.39 × (Total number of words / Total number of sentences) + 11.8 × (Total number of syllables / Total number of words) - 15.59. *CEF premium* is defined as (Price-NAV)/NAV. *Alpha* is the CEF's alpha based on the Fama-French three-factor model estimated over the previous twelve months. *Expense ratio* and *Payout ratio* are the expense ratio and the payout ratio of the CEF. *Relative trading volume* (*Relative bid-ask spread*) is the CEF's trading volume (bid-ask spread) minus the portfolio-weighted average trading volume (bid–ask spread) across the stocks held by the CEF. *PS liquidity factor* and *term spread* are the Pastor and Stambaugh (2003) liquidity factor and the yield spread between US government bonds of 20 years-to-maturity and those of 3 months-to-maturity. *Unrealized capital gains* is the CEF's net unrealized appreciation on investment relative to total NAV. *Leverage* is the CEF's level of debt and preferred shares relative to its total NAV. *Consumer confidence* is the *Consumer Confidence Index* as per The Conference Board. *Inverse price (premium)* [*(discount)*] is one over the CEF's lagged month-end price if the CEF trades at a premium [discount], and zero otherwise. *Dividend yield (premium)* [*(discount)*] is dividends-per-share paid by the CEF over the previous 12 months scaled by the CEF's lagged price if the CEF trades at a premium [discount], and zero otherwise. *Retail holdings* is the fraction of shares held by retail investors. *Underlying X* is the portfolio-weighted average *X* across the stocks held by the CEF (please see Appendix F).

	N	Mean	StDev	10th Percentile	Median	90th Percentile
Readability (baseline)	6,507	-4.284	0.920	-5.296	-4.485	-2.848
#Passive verbs	6,507	-2.867	0.650	-3.638	-2.986	-1.909
#Hidden verbs	6,507	-0.508	0.154	-0.711	-0.500	-0.313
#Overwriting	6,507	-0.236	0.116	-0.372	-0.206	-0.117
#Legal words	6,507	-0.399	0.196	-0.698	-0.356	-0.189
#Wordy phrases	6,507	-0.275	0.071	-0.364	-0.280	-0.182
Readability (standardized)	6,507	0.000	3.435	-4.046	-0.459	5.237
Readability (PCA)	6,507	0.000	1.631	-1.918	-0.186	2.456
Fog Index	6,507	17.524	1.498	15.712	17.483	19.572
Flesch-Kincaid Index	6,507	13.056	1.380	11.240	13.034	14.897
CEF premium	6,507	-0.051	0.102	-0.151	-0.068	0.071
Alpha	6,507	0.001	0.015	-0.017	0.002	0.018
Expense ratio	6,507	0.017	0.010	0.009	0.014	0.029
Payout ratio	6,507	1.172	0.892	0.270	0.996	2.180

Table 1 (Continued).

	N	Mean	StDev	10th Percentile	Median	90th Percentile
Relative trading volume	6,507	-0.088	0.106	-0.243	-0.088	0.057
Relative bid-ask spread	6,507	0.003	0.009	-0.001	0.002	0.005
PS liquidity factor	6,507	0.003	0.041	-0.046	0.002	0.052
Term spread	6,507	0.025	0.014	0.002	0.028	0.042
Unrealized capital gains	6,507	0.059	0.495	-0.254	0.038	0.406
Leverage	6,507	0.083	0.150	0.000	0.000	0.374
Consumer confidence	6,507	73.013	23.478	46.400	65.900	106.200
Inverse price (premium)	6,507	0.028	0.064	0.000	0.000	0.100
Inverse price (discount)	6,507	0.100	0.152	0.000	0.066	0.207
Dividend yield (premium)	6,507	0.002	0.008	0.000	0.000	0.008
Dividend yield (discount)	6,507	0.005	0.015	0.000	0.000	0.012
Retail holdings	6,507	0.885	0.110	0.754	0.906	1.000
Underlying Fog Index	6,507	20.211	0.417	19.528	20.226	20.768
Underlying Flesch-Kincaid Index	6,507	5.345	5.563	0.221	3.161	13.724
Underlying file size	6,507	2.769	5.489	0.043	0.650	9.261
Underlying market cap [in millions]	6,507	13,807	15,224	20.394	5,777	36,772
Underlying BM	6,507	0.429	0.281	0.000	0.415	0.892
Underlying volatility	6,507	0.019	0.023	0.001	0.012	0.048

Table 2
Correlation matrix: Measures of readability.

This table presents Pearson correlation coefficients across various CEF annual report readability measures. The sample includes 92 CEFs from 2003 through 2013. The variables capturing the readability of annual reports are such that low values imply low readability and high values imply high readability. The observations are on a fund/year-month level. Correlations that are significant at the 5% level are shown in bold. See Table 1 and Appendix F for variable definitions.

	(1)	(2)	(3)	(4)
(1) *Readability (baseline)*	1.000			
(2) *Readability (standardized)*	**0.950**	1.000		
(3) *Readability (PCA)*	**0.969**	**0.966**	1.000	
(4) *Fog Index* $\times (-\mathbf{1})$	**0.703**	**0.684**	**0.760**	1.000
(5) *Flesch-Kincaid Index* $\times (-\mathbf{1})$	**0.692**	**0.676**	**0.750**	**0.984**

Table 3
Correlation matrix: Readability and firm characteristics.

This table presents Pearson correlation coefficients across our main independent and dependent variables. The sample includes 92 CEFs from 2003 through 2013. The observations are on a fund/year-month level. Correlations that are significant at the 5% level are shown in bold. See Table 1 and Appendix F for variable definitions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) *Readability (baseline)*	1.000											
(2) *CEF premium*	**0.219**	1.000										
(3) *Alpha*	0.017	**0.299**	1.000									
(4) *Expense ratio*	-0.005	**0.191**	**-0.070**	1.000								
(5) *Payout ratio*	**-0.111**	**0.120**	**-0.066**	**-0.065**	1.000							
(6) *Relative trading volume*	**-0.220**	0.016	**-0.075**	**0.109**	**0.206**	1.000						
(7) *Relative bid–ask spread*	**-0.079**	-0.020	**-0.073**	**0.182**	**-0.098**	0.009	1.000					
(8) *PS liquidity factor*	0.019	**0.062**	**0.035**	0.019	-0.009	**-0.027**	**-0.063**	1.000				
(9) *Term spread*	**-0.120**	**-0.116**	**0.074**	0.007	**-0.097**	**-0.133**	**0.092**	**-0.089**	1.000			
(10) *Unrealized capital gains*	**-0.150**	**0.070**	**0.141**	**-0.262**	**0.072**	**-0.028**	**-0.093**	**0.042**	**-0.203**	1.000		
(11) *Leverage*	**0.192**	**0.234**	**0.093**	**0.332**	**-0.054**	**-0.034**	0.001	**-0.025**	**0.083**	**-0.143**	1.000	
(12) *Consumer confidence*	**0.155**	**0.165**	-0.000	**-0.033**	0.024	**0.115**	**-0.045**	**0.098**	**-0.803**	**0.233**	**-0.102**	1.000
(13) *Retail holdings*	**0.216**	**0.216**	-0.021	**0.104**	-0.011	**-0.095**	0.020	**0.047**	**-0.180**	**-0.106**	**0.072**	**0.208**

Table 4
Closed-end fund premia/(discounts) and readability.

This table presents coefficient estimates from system GMM regressions of monthly CEF premia/(discounts) on measures of readability of the corresponding CEFs' most recent annual reports. The sample includes 92 CEFs from 2003 through 2013. The variables capturing the readability of the annual reports are such that low *Readability* values imply low readability and high *Readability* values imply high readability. All variables are as described in Table 1 and Appendix F. *T*-statistics are reported in parentheses and are based on standard errors adjusted for heteroskedasticity and arbitrary forms of auto- and cross-correlation. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1) Readability (baseline)	(2) Readability (standardized)	(3) Readability (PCA)	(4) Fog Index $\times (-\mathbf{1})$	(5) Flesch-Kincaid Index $\times (-\mathbf{1})$
Readability	**0.027*** (3.37)**	**0.006*** (3.60)**	**0.012*** (3.27)**	**0.006 (1.55)**	**0.005 (1.61)**
Lagged premia/(discounts)	0.233*** (7.13)	0.240*** (7.11)	0.244*** (7.23)	0.246*** (7.36)	0.244*** (7.34)
Alpha	1.241*** (9.27)	1.413*** (9.17)	1.381*** (9.12)	1.147*** (9.64)	1.145*** (9.77)
Expense ratio	0.833* (1.91)	0.852** (2.02)	0.760* (1.93)	0.983** (2.28)	0.934** (2.21)
Payout ratio	0.004 (0.86)	0.007 (1.29)	0.007 (1.34)	0.004 (0.84)	0.004 (0.76)
Relative trading volume	0.029 (1.31)	0.020 (0.90)	0.021 (0.89)	0.029 (1.34)	0.029 (1.38)
Relative bid-ask spread	-0.009 (-0.13)	0.007 (0.09)	0.007 (0.09)	-0.033 (-0.56)	-0.025 (-0.41)
PS liquidity factor	0.036 (1.42)	0.026 (1.12)	0.025 (1.07)	0.027 (1.16)	0.028 (1.17)
Term spread	-0.475*** (-2.64)	-0.645** (-2.40)	-0.651** (-2.47)	-0.461*** (-2.78)	-0.462*** (-2.72)
Unrealized capital gains	-0.023*** (-3.51)	-0.023*** (-3.53)	-0.024*** (-3.50)	-0.026*** (-3.78)	-0.027*** (-3.81)
Leverage	0.019 (1.64)	0.030** (2.49)	0.026** (2.15)	0.024** (2.38)	0.027** (2.34)
Consumer confidence	-0.000 (-0.83)	-0.000 (-1.53)	-0.000 (-1.44)	-0.000 (-0.60)	-0.000 (-0.59)
Inverse price (premium)	0.179** (2.53)	0.177** (2.36)	0.189** (2.44)	0.192** (2.55)	0.191** (2.53)
Inverse price (discount)	-0.194*** (-7.78)	-0.202*** (-7.65)	-0.195*** (-7.39)	-0.198*** (-7.36)	-0.199*** (-7.41)
Dividend yield (premium)	0.417* (1.81)	0.442* (1.88)	0.446* (1.87)	0.447* (1.91)	0.452* (1.94)
Dividend yield (discount)	-0.012 (-0.22)	-0.015 (-0.27)	-0.015 (-0.28)	-0.020 (-0.36)	-0.021 (-0.38)
Retail holdings	0.050** (2.22)	0.055** (2.21)	0.064** (2.44)	0.102*** (3.64)	0.102*** (3.43)

Table 4 (Continued).

	(1) Readability (baseline)	(2) Readability (standardized)	(3) Readability (PCA)	(4) Fog Index $\times (-\mathbf{1})$	(5) Flesch-Kincaid Index $\times (-\mathbf{1})$
Underlying Fog Index	0.000	-0.003	-0.003	-0.003	-0.003
	(0.03)	(-0.39)	(-0.39)	(-0.35)	(-0.41)
Underlying Flesch-Kincaid Index	0.000	0.001	0.001	-0.001	-0.002
	(0.21)	(0.35)	(0.38)	(-0.73)	(-0.83)
Underlying file size	0.002**	0.000	0.001	0.002***	0.002***
	(2.17)	(0.50)	(0.63)	(2.82)	(2.94)
Underlying market cap	-0.001**	-0.000	-0.000	-0.001**	-0.001**
	(-2.22)	(-1.53)	(-1.53)	(-2.13)	(-2.30)
Underlying BM	0.010	0.005	0.008	0.003	0.001
	(1.06)	(0.54)	(0.96)	(0.33)	(0.15)
Underlying volatility	-0.013	-0.050	-0.016	0.024	0.026
	(-0.10)	(-0.38)	(-0.13)	(0.19)	(0.22)
Fund FE	Yes	Yes	Yes	Yes	Yes
Number of observations	6,507	6,507	6,507	6,507	6,507

Table 5
Closed-end fund premia/(discounts) and readability: Components of readability.

This table replicates Table 4 but now separates *Readability (baseline)* into its underlying components. Since the underlying components are highly positively correlated with each other, we estimate the system GMM regressions separately for each component. We do not report the coefficient estimates on the control variables. All variables are as described in Table 1 and Appendix F. *T*-statistics are reported in parentheses and are based on standard errors adjusted for heteroskedasticity and arbitrary forms of auto- and cross-correlation. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)
#Passive verbs	0.028*** (2.99)				
#Hidden verbs		0.067** (2.13)			
#Overwriting			0.057** (2.17)		
#Legal words				0.058*** (2.84)	
#Wordy phrases					0.173*** (2.97)
Fund FE	Yes	Yes	Yes	Yes	Yes
Number of observations	6,507	6,507	6,507	6,507	6,507

Table 6
Closed-end fund premia/(discounts) and readability: Moderating factors.

This table replicates Table 4 but now interacts *Readability (baseline)* with various manager and CEF characteristics. We do not report the coefficient estimates on the control variables. In Column (1), the characteristic is *New CEO*, which equals one if the tenure of the CEF's CEO (=the portfolio manager) is less than one year (≈ bottom quartile its distribution), and zero otherwise. In Column (2), the characteristic is *New CEF*, which equals one if the CEF's age is less than five years (≈ bottom quartile of its distribution), and zero otherwise. In Column (3), the characteristic is *High Volatility*, which equals one if the CEF's weekly return standard deviation over the previous year is in the top quartile of its distribution, and zero otherwise. All variables are as described in Table 1 and Appendix F. *T*-statistics are reported in parentheses and are based on standard errors adjusted for heteroskedasticity and arbitrary forms of auto- and cross-correlation. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1) New CEO	(2) New CEF	(3) High volatility
Readability (baseline)	**0.014****	**0.012***	**0.016****
× *Mgr. / Fund characteristic*	**(2.36)**	**(1.72)**	**(2.54)**
Readability (baseline)	0.022***	0.021***	0.020***
	(2.95)	(2.69)	(2.80)
Mgr. / Fund characteristic	0.063**	0.055*	0.064**
	(2.32)	(1.73)	(2.30)
Fund FE	Yes	Yes	Yes
Number of observations	6,507	6,507	6,507

Table 7
The Plain Writing Act of 2010, readability, and closed-end fund premia/(discounts).

This table presents coefficient estimates from regressions of readability measures and monthly CEF premia/(discounts) on an interaction term between a treatment-group indicator and a policy-intervention indicator. The policy intervention is the Plain Writing Act of 2010 (PWA), which was signed in October 2010. We take the first annual report whose fiscal year end falls after the passage of the PWA (*Post Plain Writing Act* = 1) and we compare it with the annual report that was written prior to the passage of the PWA (*Post Plain Writing Act* = 0). A CEF falls into the treatment group (*Treat group* = 1) if its readability measure prior to the PWA is in the bottom quartile of its distribution. Each low-readability-group observation is matched with a CEF whose readability measure prior to the PWA is in the top quartile of its distribution (*Treat group* = 0) but yet, based on Mahalanobis-metric matching, is similar to that of the treatment firm across various CEF characteristics. We include the same set of controls as in Table 4 (untabulated). In Panel C, we repeat the exercise around one hundred placebo events (before October 2010). The reported coefficient estimates are the average coefficient estimates across the one hundred simulations. *T*-statistics are reported in parentheses and are based on clustered standard errors by fund. In Panel C, the reported *t*-statistics are the average *t*-statistics across the one hundred simulations. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1) *Readability*	(2) *CEF premium*	(3) *#Passive verbs*	(4) *#Hidden verbs*	(5) *#Overwriting*	(6) *#Legal words*	(7) *#Wordy phrases*
Panel A: Changes in *Readability* and *CEF premium* around the Plain Writing Act (October 2010)							
Treat group	**0.203****	**0.013*****					
× *Post Plain Writing Act*	**(2.21)**	**(2.99)**					
Treat group	-2.688***	-0.020**					
	(-27.24)	(-2.22)					
Post Plain Writing Act	-0.064	0.001					
	(-0.94)	(0.19)					
Panel B: Changes in the components of *Readability* around the Plain Writing Act (October 2010)							
Treat group			**0.075**	**0.028**	**0.030**	**0.059*****	**0.010**
× *Post Plain Writing Act*			**(1.14)**	**(1.47)**	**(1.06)**	**(3.19)**	**(0.99)**
Treat group			-1.715***	-0.337***	-0.312***	-0.122***	-0.197***
			(-17.50)	(-16.97)	(-5.06)	(-4.33)	(-19.12)
Post Plain Writing Act			0.029	-0.026	-0.003	-0.065***	-0.000
			(0.51)	(-2.10)	(-0.09)	(-4.26)	(-0.02)

Table 7 (Continued).

Panel C: Changes in *Readability* and *CEF premium* around placebo events (bootstrapped sample)

Treat group	**0.166**	**-0.003**
× *Post placebo event*	**(0.72)**	**(-0.23)**
Treat group	-2.193***	-0.010***
	(-15.40)	(-2.90)
Post placebo event	-0.118	-0.001
	(-0.98)	(-0.07)

Table 8
Descriptive statistics for random sample of publicly traded corporations.

This table presents summary statistics for our main variables. The sample includes 95 publicly traded corporations drawn randomly from the CRSP/Compustat universe with the proportionate sampling weight of each industry (GICS Industry Sector). The sample period runs from 2000 through 2015. *Readability (baseline)* is defined as (#Passive verbs + #Hidden verbs + #Overwriting + #Legal words + #Wordy phrases) × 10 / Number of sentences, multiplied by negative one, for the corresponding corporation's most recent annual report. Low (i.e., more negative) values imply low readability; high (i.e., less negative) values imply high readability. To construct *Readability (standardized)*, we count, for each of the five writing faults, the number of occurrences of that writing fault in a given report, scaled by the number of sentences. We standardize each component to have a mean of zero and a standard deviation of one and we add the five standardized components. *Readability (PCA)* is the first principal component of the five components. *Tobin's Q* is the market value of total assets divided by the book value of total assets, where the market value of total assets is calculated as the sum of the market value of common shares and the book value of debt minus deferred taxes. Return-on-assets (*ROA*) is earnings before interest and taxes plus depreciation and amortization divided by the lagged book value of assets. *Research & development* is research and development expenses divided by the lagged book value of assets. *Intangible assets* is the book value of intangible assets divided by the lagged book value of assets. *Leverage* is the book value of debt divided by the lagged book value of assets. *Capex* is capital expenditures divided by the lagged book value of assets. *Number of segments* is the number of business segments in which a firm operates. *Free cash flow* is income after expenses plus deferred taxes divided by the lagged book value of assets. *Retail holdings* is the fraction of shares held by retail investors. *Risk* is the standard deviation of weekly stock returns over the past 18 months.

	N	Mean	StDev	10^{th} Percentile	Median	90^{th} Percentile
Readability (baseline)	10,813	-5.486	0.832	-6.529	-5.449	-4.548
Readability (standardized)	10,813	0.000	2.767	-3.276	0.239	3.274
Readability (PCA)	10,813	0.000	1.303	-1.511	0.073	1.575
Tobin's Q	10,813	1.892	1.644	0.952	1.381	3.152
ROA	10,813	0.024	0.251	-0.191	0.068	0.218
Research & development	10,813	0.066	0.177	0.000	0.000	0.207
Intangible assets	10,813	0.111	0.164	0.000	0.029	0.348
Leverage	10,813	0.543	0.282	0.173	0.517	0.915
Capex	10,813	0.042	0.050	0.001	0.025	0.111
Number of segments	10,813	4.661	3.770	1.000	4.000	10.000
Free cash flow	10,813	-0.026	0.270	-0.296	0.029	0.162
Retail holdings	10,813	0.441	0.390	0.000	0.388	0.929
Risk	10,813	0.089	0.124	0.031	0.061	0.134

Table 9
Tobin's *Q* and readability.

This table presents coefficient estimates from system GMM regressions of annual *Tobin's Q* on measures of readability of the corresponding firms' most recent annual reports. The sample includes 95 publicly traded corporations drawn randomly from the CRSP/Compustat universe with the proportionate sampling weight of each industry (GICS Industry Sector). The sample period runs from 2000 through 2015. The variables capturing the readability of annual reports are such that low *Readability* values imply low readability and high *Readability* values imply high readability. All variables are as described in Table 8. *T*-statistics are reported in parentheses and are based on standard errors adjusted for heteroskedasticity and arbitrary forms of auto- and cross-correlation. Statistical significance at the 10%, 5%, and 1% levels is denoted by *, **, and ***, respectively.

	(1) Readability (baseline)	(2) Readability (standardized)	(3) Readability (PCA)
Readability	**0.133*** **(1.85)**	**0.029**** **(2.07)**	**0.059**** **(2.08)**
Lagged Tobin's Q	0.798*** (21.42)	0.793*** (20.18)	0.793*** (20.13)
ROA	0.633 (1.08)	0.600 (0.97)	0.559 (0.90)
ROA(t-1)	-0.094 (-0.39)	-0.109 (-0.46)	-0.111 (-0.47)
ROA(t-2)	-0.002 (-0.01)	-0.028 (-0.14)	-0.029 (-0.15)
Research & development	1.526*** (3.39)	1.454*** (3.14)	1.449*** (3.24)
Intangible assets	0.332 (0.87)	0.159 (0.49)	0.097 (0.29)
Leverage	-0.434** (-2.03)	-0.491** (-2.01)	-0.494** (-2.04)
Capex	-0.468 (-0.46)	-0.635 (-0.55)	-0.585 (-0.50)
Number of segments	-0.030* (-1.77)	-0.031 (-1.57)	-0.029 (-1.46)
Free cash flow	0.074 (0.18)	0.123 (0.30)	0.128 (0.30)
Retail holdings	-0.137* (-1.89)	-0.118 (-1.41)	-0.110 (-1.37)
Risk	0.187 (0.33)	0.272 (0.50)	0.252 (0.45)
Fund FE	Yes	Yes	Yes
Number of observations	10,813	10,813	10,813