

Plain English, Readability, and 10-K Filings

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Abstract: We examine readability of company disclosures by applying three different measures to a sample of 42,357 10-Ks during 1994-2007. Although all three measures find that better written documents have stronger announcement effects around the filing date, only one measure indicates an upward trend in readability over the sample period. Our readability measure, derived from SEC documentation surrounding the plain English initiative, appears to better capture text informativeness when compared with traditional measures that were originally designed to identify textbook grade levels. Our results indicate that the use of syllable counts in traditional readability measures does not translate well into business applications. We find significant relations between improved 10-K readability and increased small investor trading, the likelihood of seasoned equity issuance, and better corporate governance.

Key words: Readability; disclosure; Fog; Flesch; textual analysis.

Data Availability: From publicly available data sets.

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We examine the SEC's plain English rule of October 1998 in the general context of readability measures, using a broad sample of 42,357 10-K filings over 1994-2007. The plain English rule is an attempt to make firm disclosures easier to read and understand. The idea is that investors, brokers, advisers, and others in the financial services industry will be more able to assess and more likely to invest in companies whose financial disclosures are not buried in legal jargon and obtuse language. The SEC recognizes that all consumers of firm disclosures should benefit from better writing, however they emphasize that clear writing will most benefit a firm's "least sophisticated investors (*A Plain English Handbook*, 1998)." Although the rule is restricted to prospectuses, SEC documents clearly encourage firms to adopt the principles in all their filings and communications with shareholders.¹

We first consider whether or not the plain English rule did indeed make reports more readable. To accomplish this, we initially discuss what "readability" means in the context of firm disclosures and compare our measure of plain English with traditional readability measures. We then examine whether the dimensions of readability encouraged by the rule lead to different behavior by investors and managers. Specifically, we consider whether improved 10-K readability is related to increased trading by "average" investors or the likelihood of issuing seasoned equity. We also examine whether firms whose governance emphasizes shareholder rights are more likely to write more accessible documents. We argue that both investors and firms benefit from improvements in writing style, to the extent that increased readability impacts the response of stock returns to a firm's disclosure.

¹ See page 4 of *A Plain English Handbook* (1998) and page 68 of SEC Release #34-38164.

To evaluate the readability of 10-Ks, we use three different measures: the Fog Index (Fog), the Flesch Reading Ease Score (Flesch), and a measure derived from SEC documentation surrounding the plain English initiative. There are hundreds of potential readability measures evolving from the early development of these formulas in the 1930s (see Dubay, 2007). We chose Fog and Flesch as two that have long been dominate in general usage and also have appeared in prior accounting literature (see Li, 2008 or Jones and Shoemaker, 1994).

The Fog measure is defined as a linear combination of average sentence length and proportion of complex words (words with three or more syllables) whose scale provides an estimate of grade level. Flesch uses the same two components, except instead of the binary classification of complex words, an explicit count of syllables is included. The Flesch measure is opposite in scale than Fog, with higher scores indicating greater ease in reading.² For both the Fog and Flesch measures, a longer average sentence length or a higher proportion of multi-syllable words indicates that the text is less readable.

Our readability measure, Plain English, is a standardized statistic that uses a series of six writing components specifically identified by the SEC. Plain English incorporates sentence length, word length, legalese, personal pronouns, and other style directives from the SEC documentation to serve as a measure of 10-K readability. Through a series of tests, we provide evidence that the traditional readability formulas, derived primarily in the context of grade-leveling kindergarten through high school texts, are measured with substantial noise. Our results suggest that the Plain English measure provides a more robust measure of readability, which should reduce measurement error and, in turn, attenuation bias when using such measures in regression tests.

² The Flesch-Kincaid readability measure rescales the Flesch Reading Ease Score to produce grade scores. We use the Reading Ease Score simply because it appears to be more common in application.

While the Fog and Flesch measures indicate no change in 10-K readability during the 1994-2007 time period, we find that our measure of plain English does notably improve after the regulation is enacted. By definition, Fog and Flesch indicate that an increase in the average number of syllables decreases readability, with this factor accounting for half of each measure's inputs. However, business text commonly contains multi-syllable words used to describe operations. Words like *corporation*, *company*, *directors*, and *executive* are multi-syllable, yet are presumably easy to comprehend for anyone we consider as "average" investors. One of the longest words occurring with reasonable frequency is *telecommunications*.

We show that, based on frequency of occurrence, all of the top quartile of multi-syllable words would likely be known to a typical investor reading a 10-K. Our evidence suggests that syllable counts are not a robust measure of readability in the context of firm disclosures. Instead of using readability measures created outside of the business domain, we advocate the use of multidimensional measures, such as Plain English, to document readability in business and financial documents.

Importantly, all three readability measures are linked to investor responses around the 10-K filing date. That is, better written documents are more informative to investors. We measure information content as the absolute value of the average market-adjusted returns for days 0-3 around the filing date.

When we use period-to-period differences to control for market structure changes occurring over the time period, we find the plain English rule appears to have its intended effect of encouraging engagement by "average" investors. That is, there is a clear positive relation between the improvement in a firm's plain English measure and increases in the proportion of 100-share trades.

We then apply the three readability measures to a logit model predicting seasoned equity offerings (SEOs). Only the plain English variable is significantly linked to equity issuance. We find that firms showing a higher year-to-year change in plain English usage are more likely to issue seasoned equity in the following year.

The SEO results indicate that managers value the improved transparency of more readable documents as measured by the plain English variable when issuing additional shares. When we link the 10-K data to the Gompers, Ishii, and Metrick (2003) corporate governance index, we find that firms with shareholder-friendly governance structures are more likely to file 10-Ks that score high on the plain English measure or Flesch Score.

Our paper makes several contributions. First, we show that words matter. All three readability measures report a significant linkage with investor response. Better written 10-Ks are more informative to the market. Second, the debate over improved 10-K readability depends on the measure. In the time series, neither the Fog Index nor Flesch Score show any improvement. The plain English measure, however, reports a significant improvement in 10-K readability after the initiative's enactment in 1998. Thus, it appears that the SEC was successful in encouraging firms to improve 10-K readability.

We show that business text has a high proportion of multi-syllable words which lower the readability values of the traditional readability measures. Yet, the most frequently occurring 10-K complex words should be simple for the typical reader to comprehend.

Finally, 10-K readability is related to the behavior of both managers and investors. Managers improve the readability of the 10-Ks prior to issuing seasoned equity. Small investors trade a higher proportion of shares when the 10-K is better written. Companies that are more shareholder friendly produce more readable documents.

I. The Plain English Rule

The plain English rule became effective October 1, 1998. Arthur Levitt as the Chairman of the SEC championed the cause of improving disclosure documents:

Investors need to read and understand disclosure documents to benefit fully from the protections offered by our federal securities laws. Because many investors are neither lawyers, accountants, nor investment bankers, we need to start writing disclosure documents in a language investors can understand: plain English (*A Plain English Handbook*, p. 3).

The SEC Staff Legal Bulletin No. 7 provides a summary of the rule and corresponding amendments:

“Companies filing registration statements under the Securities Act of 1933 must:

- write the forepart of these registration statements in plain English;
- write the remaining portions of these registration statements in a clear, understandable manner; and
- design these registration statements to be visually inviting and easy to read.”

Rule 421(d) specifically requires that issuers must:

“Substantially comply with these plain English principles:

- short sentences;
- definite, concrete everyday language;
- active voice;
- tabular presentation of complex information;
- no legal jargon; and
- no multiple negatives.”

The regulation was later amended, prescribing stylistic approaches to avoid, such as “legal and highly technical business terminology,” or “legalistic or overly complex presentations that make the substance of the disclosure difficult to understand.”

Although the plain English rule is mandated only for prospectuses, in documentation surrounding the rule’s release the SEC clearly encourages firms’ conformance in all filings.

Arthur Levitt, then-Chairman of the SEC, in his foreword to *A Plain English Handbook*,

concludes with: “I urge you—in long and short documents, in prospectuses and shareholder reports—to speak to investors in words they can understand” (p. 4). The SEC in its proposed rules document states: “Our ultimate goal is to have all disclosure documents written in plain English” (release #34-38164, p. 24), and later in the document: “We also encourage you to use these techniques for drafting your other disclosure documents.”

Other papers have used textual analysis to study newspaper articles, company press releases, and message board postings. The best known of these papers is Tetlock (2007), who links the content of the popular “Abreast of the Market” column with the following day’s stock returns. He finds that higher pessimism in the newspaper column predicts lower following day stock returns.

Our paper is not the only research examining the overall readability of 10-K reports.³ Li (2008), using a comparable sized sample to ours, finds that annual reports with lower earnings are more difficult to read. He uses a Fog Index to gauge changes in readability and reports that the mean and median index increases (i.e., 10-K readability declines) over the 1994-2004 sample period. Unlike our paper, his main focus is on linking 10-K readability with current firm earnings and earnings persistence.

In a contemporaneous paper, Miller (2008) examines how small and large investor trading behavior is affected by 10-K length and readability. He finds that only small investors are affected by readability and document length. Longer 10-Ks reduce small investor trading volume. Miller (2008) presents evidence that less readable 10-Ks actually increase small investor trading. He states that this finding might be caused by increased disagreement among traders. Like Li (2008), Miller (2008) uses the Fog Index as his measure of readability.

³ Several earlier papers addressed readability concerns with relatively small sample sizes (see Lebar, 1982, Smith and Smith, 1971, and Soper and Dolphin, 1964).

Although we share a similar time period, Miller (2008) has only 13,249 observations available for primary analysis compared to our sample of 42,357. Our sample is much larger even though we remove firms with stock price less than \$5 while Miller (2008) has a \$1 price screen. Although both papers obtain 10-K filings from EDGAR, Miller's initial sample before additional screens are implemented is less than half of our final sample.

II. Data

10-K Sample

Although electronic filing was not required by the SEC until May 1996, a significant number of documents are available on EDGAR beginning in 1994. The initial 10-K sample (including both 10-K and 10-K405 forms) covering 1994-2007 contains 113,196 documents. We exclude amended documents, 10-K/A or 10-K405/A, from the sample. For our tests we link the 10-K sample to three databases: the Center for Research in Security Prices (CRSP), Compustat, and the NYSE Trade and Quote (TAQ) databases.

Parsing 10-K Documents

To parse the 10-K filings we need to download the filings from the EDGAR web site, clean extraneous coding from the document (HTML, embedded jpg's, etc.), and parse the document into words and sentences. Palmer (2000) provides a useful discussion from the natural language processing literature on the challenges of this process and emphasizes a simple but important theme that is common throughout the natural language processing literature—"an algorithm that performs very well on a specific corpus may not be successful on another corpus." The formatting and structure of 10-K documents are far more complex than those of a traditional novel, which is why we design custom software to parse the documents. A detailed discussion of

the parsing process is provided in the appendix.

Sample Composition

Table 1 documents the sample formation process. We start with a total of 113,196 10-K firm-year observations. Requiring the 10-K to be present on CRSP and to be an ordinary common equity firm (CRSP share type code of 10 or 11) substantially reduces the original sample of 10-Ks. For example, there were over 10,000 observations for asset-backed securities in the original 10-K sample, primarily attributable to filings for security offerings such as exchange traded funds. These funds were removed from the sample by applying the CRSP ID match and the ordinary common equity filter.

To minimize the effects of market microstructure bid-ask bounce, we eliminate firms with a stock price of less than \$5. This screen removes 13,518 mostly smaller market value firm-year observations. We further require the firm to have Compustat and TAQ data. These two requirements remove more than 5,000 observations. After applying these filters, the final sample totals 42,357 firm-year observations. In our initial regressions, following Tetlock (2007), we will examine the standardized change in readability. Thus, the final 10-K sample with differenced variables is 32,939.

In untabulated results, we find that approximately 58% of the 10-Ks are filed in the month of March. Most firms have December 31st fiscal year-ends and will wait to file until the latest possible date. On average, 67%, 80%, and 90% of the 10-Ks are filed by the end of the first, second, and third quarters, respectively. Because the sample size and composition is so heterogeneous across months, our unit of analysis for time series will be years. Throughout the

paper, “year” is the calendar year of the 10-K filing. So, Google’s December 31, 2004, 10-K which was filed on March 30, 2005, would be classified as a 2005 observation.⁴

III. Readability Measures

Readability is not a precisely defined construct. While some definitions refer only to the general notion of “ease of reading words and sentences (Hargis, *et. al*, 1998),” others note the problem of context. For example, McLaughlin (1969) defines readability as “the degree to which a given class of people find certain reading matter compelling and comprehensible,” acknowledging the notion of a targeted audience.

In a study of editing text to improve readability, Davison and Kantor (1982) emphasize that changes based on context, such as the “background knowledge assumed in the reader,” are more effective than “trying to make a text fit a level of readability defined by a formula.” Clearly the SEC’s intent in mandating improved readability of firm disclosures is not to make them accessible to everyone regardless of age or educational background. Measures primarily designed to grade-level precollege text books will not necessarily capture the components of clear business writing.

Lacking a precise definition of readability, we will assess the concept from an operational perspective in multiple dimensions. We will first consider the relation between readability measures and price impact of firm disclosures around the publication date. In this case we operationalize the definition of readability as the informativeness of the disclosure. Other things

⁴ We also initially considered separately testing the Management Discussion and Analysis (MD&A) segment of the 10-Ks. Parsing out the MD&A section is challenging because of inconsistencies in how it is identified. Also, in a sample subset, we found more than 20 percent of the MD&A segments indicated that the discussion was “incorporated by reference” to the annual report. Many times the text explaining where and why the discussion was incorporated by reference was relatively lengthy, making it difficult to programmatically exclude such instances. Our primary readability regressions in Table 4, when applied to the MD&A subset, found none of the readability measures significant in explaining event period absolute returns.

being equal, a clearly written document should communicate more information, thus causing greater price reaction. Once we establish that the plain English initiative affected writing style, which in turn affects market reaction, we consider how readability influences investor and firm actions.

Fog Index

First published in Gunning (1952), the Fog Index's popularity is primarily attributable to its ease of calculation and adaptability to computational measure. Unlike earlier measures, such as Dale and Chall (1948), that require parsing sentences for grammatical structure or comparing words with proprietary lists, the Fog Index is a simple function of two variables: 1) average sentence length (in words) and 2) complex words (defined as the number of words with three or more syllables). As is common with many readability measures, the two factors are combined in a manner that is intended to predict grade level:

$$\text{Fog} = 0.4 (\text{average \# of words per sentence} + \text{percent of complex words})$$

Flesch Reading Ease Score

Although many of the readability studies in the accounting literature have focused on the Fog Index, the Flesch Reading Ease Score is one of the most widely used (see Dubay, 2007). After publishing an initial formula that involved counting affixes, personal pronouns, and names, he subsequently simplified his measure to:

$$\begin{aligned} \text{Flesch} = & 206.835 - (1.015 * \text{average \# of words per sentence}) \\ & - (84.6 * \text{average number of syllables per word}) \end{aligned}$$

Higher scores indicate documents that are easier to read. Scores below 30 are considered appropriate for someone with an undergraduate degree.

Plain English

We create a new readability measure labeled Plain English that is anchored in specific examples provided by the SEC documentation surrounding the plain English initiative. To measure plain English we tabulate the following components for each document:

- **Sentence length:** The average number of words per sentence in the document. Rule 421(d) emphasizes this characteristic and sentence length is mentioned in specific examples in the Plain English handbook (e.g., pp. 28-29). Note that sentence length is also used in the Fog and Flesch measures of readability.
- **Average word length:** The SEC’s documentation emphasizes the use of “short, common words.” We count the character length of each word in the 10-K and average this across all words in the document.
- **Passive:** Pages 19-21 of the handbook emphasize the importance of avoiding passive voice. Passive voice can take many forms. We first identify auxiliary verb variants of “to be” including: “to be”, “to have”, “will be”, “has been”, “have been”, “had been”, “will have been”, “being”, “am”, “are”, “is”, “was”, and “were”. Auxiliary verbs followed by a word ending in “ed” or one of 158 tabulated irregular verbs are tabulated as passive.
- **Legalese:** A count of the words and phrases paralleling those identified in Staff Legal Bulletin No. 7 (<http://www.sec.gov/interps/legal/cfslb7a.htm>) as inappropriate legal jargon (e.g., “by such forward looking” or “hereinafter so surrendered”). We use a list of 12 phrases and 48 words.
- **Personal pronouns:** A count of personal pronouns, whose usage the handbook (p. 22) indicates will “dramatically” improve the clarity of writing. The handbook targets first-person plural and second-person singular personal pronouns. Counts are tabulated for “we”, “us”, “our”, “ours”, “you”, “your”, “yours”.
- **Other:** We combine categories identified in the Plain English handbook whose frequency of occurrence is relatively low. This includes negative phrases, superfluous words and the use of the word “respectively” (see pages 17-35 of the handbook). Specifically
 - **Negative phrases:** Is a count of 11 negative compound phrases identified on page 27 of the handbook (e.g., “does not have” or “not certain”).
 - **Superfluous -** A count of the eight phrases identified as superfluous on page 25 of the handbook (e.g., “because of the fact that” or “in order to”).
 - **Respectively -** A count of each occurrence of the word “respectively”.

We then need to combine the six groups described above into an aggregate measure of plain English. All word/phrase counts are expressed as a proportion relative to the total number of words occurring in the document. Because some of the variables are measured on different scales or their expected proportions might substantially differ, we standardize each of the six components into a mean zero, standard deviation one variable and sum. All of the components except personal pronouns are negatively signed in the summation. This process provides the variable we label plain English, where higher values represent documents that better conform to the writing standards promulgated by the SEC.

Li (2008) uses Fog and document length as his measures of readability. As emphasized on page 11 of *A Plain English Handbook*, however, the goal of the regulation “is clarity, not brevity” and “writing a disclosure in plain English can sometimes increase the length of particular sections ...” Therefore we use document length as a control variable (measured as the natural log of the number of words) in our regressions but do not include it in our plain English measure.

Time Series Patterns in Readability Measures

The mean values of the three readability measures are reported by year in Figure 1. Both the Fog Index and the Flesch Reading Ease Score have fairly stable values throughout the time period. The Flesch Score varies only slightly in a tight band around 32 which would be considered a difficult to very difficult style according to Flesch (1949). The Fog Index stays just below 20 during the period. Li (2008) reports an average Fog Index range for 10-Ks of about 19.05 to 19.57 during 1994-2004. Our range is almost identical, 19.24 to 19.57. Generally, a Fog value greater than 18 is considered to be unreadable text.

Unlike the other readability measures, plain English varies widely. Plain English is fairly flat initially with a range of -0.86 to -0.99 during 1994 to 1998. After implementation in 1998, there is a continuing positive trend in the plain English measure through 2007. This result indicates that in the 10-K sample, the plain English rule had a substantial impact on textual presentation. In our subsequent presentation of sample statistics we will see that all of the components of Plain English, except word length, improve over this period.

The three different measures of readability paint a conflicting picture on the impact of the SEC's directive. Fog and Flesch report no substantial trend in 10-K readability. This is consistent with the evidence in both Li (2008) and Miller (2008). In his Figure 1A, Li (2008) finds that readability declines from 1998 to 2001 and then increases, however the changes only range from about 19.0 to 19.6. Miller (2008) finds a slight decrease in 10-K readability during 1995-2006. Later in the paper we will highlight potential problems in the use of traditional two dimensional reading measures to measure readability in financial documents like 10-Ks.

IV. Descriptive Statistics

Summary Statistics

Summary statistics for the sample variables are reported in Table 2. The sample is divided into two periods: before the October 1, 1998, plain English rule [column (1)] and after [column (2)]. The last column of the table lists the summary statistics for the entire period. The average event period abnormal return is close to zero for both subperiods (-0.028% and -0.227%). As was shown in Figure 1, the plain English measure reports substantially higher values during the second period while Fog and Flesch show little change.

Consistent with the evidence in Li (2008), we find that the 10-K filings have become more verbose. In untabulated results, we find that the median number of words rises from 21,500 in 1997, the first full year of mandatory electronic filing, to over 33,600 in the final sample year of 2007. As the number of words in a 10-K has increased, Table 2 reports a decrease in the average words per sentence. The average number of complex words (three or more syllables), syllables per word, and word length are all slightly higher in the second period.

For the individual components of plain English, all report the trend advocated by the SEC with the exception of word length. For example, the percent of legalese in the average 10-K document drops from 0.491% to 0.349%. The largest change between the periods is in the increased use of personal pronouns (0.193% versus 1.163%).

The average size of the sample firm is \$3.3 billion with average share price of over \$26. Due to our Compustat data requirement and the \$5 price screen, the sample is tilted towards larger market capitalization firms. Table 2 also reports a slightly higher percentage of the sample universe listing their shares on the Nasdaq exchange, versus the Amex or the NYSE in the later period. The occurrence of seasoned equity issuance increased from 4.1% to 5.7%.

The Gompers, Ishii, and Metrick (2003) Governance Index is a measure of shareholder rights for 8,747 firms during our sample period. The index, as defined, can range from 1 to 24—democratic to dictatorship, respectively, using the terminology of the authors—and averages approximately 9 in each period.

From the TAQ data, we tabulate the proportion of trades between 1 and 100 shares. We tabulate this proportion for the period beginning with the document filing date and for the subsequent 20 days, creating a 21-day sample window. Firms must have at least one day of trading in the 21-day window to be included in the sample. For 1994 through September 1998,

17.0% of all trades were between 1 and 100 shares. In the second period (October 1998 to 2007), that proportion jumped to 46.5%.

As the NYSE, Amex, and Nasdaq have moved toward quoting stock prices in decimals, the quoted depth has dropped in size. Investors received better prices (i.e., closer to the mid-point) while simultaneously being able to trade fewer shares at the improved price.⁵ Following decimalization and the advent of electronic communication networks (ECNs), investors increasingly split up their orders for trade execution (see Werner, 2003 and Chung, Chuwonganant, and McCormick, 2004). Rather than submit an order to buy 5,000 shares of Microsoft, investors might break the order into 50 different segments of 100 shares.

Also, when retail investors submit market orders, the brokerage house might execute trades at prices that differ by one penny. These factors are the major drivers in the increase in 100-share trades observed over the sample interval. In our subsequent regressions, we use a differencing method to control for this overall shift in trades.

Industry Results

Does the plain English measure vary across industries? Figure 2 documents the variability of our plain English measure across the Fama and French (1997) 48 industries. Firms are classified into the 48 categories based on SIC codes taken from the 10-K filings (self-reported by the firms). The worst industries in terms of the plain English measure are Aircraft, Precious Metals, Textiles, and Tobacco Products. The four industries with the highest values of Plain English are Pharmaceutical Products, Medical Equipment, Alcoholic Beverages, and Entertainment. There appears to be a slight pattern of industries that are more consumer oriented (versus traditional manufacturing) having better Plain English values.

⁵ Starting January 29, 2001, all NYSE-listed stocks could be priced in decimals. For Nasdaq, all listed firms could be priced in decimals by April 9, 2001.

To control for the year-to-year changes in plain English documented in Figure 1 and the large differences in plain English across industries, our subsequent regressions will include year and Fama-French industry dummies.

Benchmarking the Traditional Readability Measures across Diverse Documents

To provide the reader with insights into the readability scores, Table 3 reports a comparison of the traditional readability measures across a variety of different text. The Fog and Flesch values are reported along with the average words per sentence, percent of complex words, syllables per word, and word length. Since the plain English measure was initiated by the SEC specifically for business documents and contains components we would never see in some of the benchmarks, we did not include it in the comparison.

The documents are sorted from low to high by the Fog Index (low Fog values indicate the text is easier to read). The table provides a sense of scale, highlights how the measures' two components impact the numerical estimate, and show how the measures, in spite of their similarity, can indicate different levels of readability.

As one should expect, Dr. Seuss' *Green Eggs and Ham* has a considerably lower Fog Index (2.9) than either Adam Smith's classic *The Wealth of Nations* (18.3) or Charles Darwin's *On the Origin of Species* (20.6).⁶ Table 3 reports that the children's book *Green Eggs and Ham* has both a low number of words per sentence (6.0) and few complex words (only 1.3%). *On the Origin of Species* has the highest Fog Index with an average of 38.4 words per sentence and over 13% of all words being complex.

For Flesch, higher values indicate more readable text. Since Fog and Flesch have different components, their relative ranking of the text is not identical. Notice that *Nature*

⁶ As noted in the appendix, we do not include single letter words in our counts. This will cause our measures to report texts as slightly less readable. The effect is more apparent for the children's level books.

magazine and *On the Origin of Species* have almost identical Flesch Scores (40.3 versus 40.8). The two documents, however, have considerably different Fog Indexes (15.2 versus 20.6). Although the two common readability measures are correlated, they can differ dramatically between documents.

Historically, readability measures have been used primarily to place textbooks into grade level categories. Other applications include measuring readability of loan applications, insurance contracts, military documentation, and technical manuals. There is some evidence that traditional readability measures do a poor job gauging the text of technical material (see Redish and Selzer, 1985 and Redish, 2000). The results in Table 3 support this contention.

Table 3 reports that a number of documents, including *The Wealth of Nations*, *Harvard Law Review*, *The Accounting Review (TAR)*, and 10-Ks have a Fog Index above 18 and hence would be considered unreadable. Yet this is inaccurate. Both the 10-K sample and articles in *The Accounting Review* use technical language to explain concepts. More than 20% of the words contained in 10-K or *TAR* articles are complex.

In both *TAR* and the 10-Ks, the authors are writing to the educational backgrounds of their respective audiences. People with only a high school degree are very unlikely to read *TAR*. Survey results indicate that individuals with only a high school degree are also unlikely to have a motive for reading 10-Ks. According to the *Federal Reserve Bulletin* survey of consumer finances (February 2009), less than 10% of households headed by individuals with only a high school diploma even hold any stocks. Over 30% of households with college graduates own individual stocks. For money managers, the typical educational background is quite high. Chevalier and Ellison (1999) find that 60% of mutual fund managers have an MBA degree. Just

because the average 10-K has a poor Fog or Flesch readability score does not indicate that the typical reader cannot understand it.

V. Regression Results

Readability Measures and the Information Content of 10-Ks

The price response of stocks to 10-K releases is not substantial. In a pre-EDGAR sample, Easton and Zmijewski (1993) find only weak evidence of a market reaction to 10-K filings. Griffin (2003) shows a statistically significant reaction to 10-Ks using an EDGAR sample, which is consistent with Christensen, *et. al* (2007) who find that the impact is only discernable post-EDGAR. Our initial tests relate the market reaction of 10-K releases to the various measures of readability.

More readable 10-Ks should be more revealing for investors. The use of plain English should make documents more informative for all readers, whether the reader is an average retail investor or a professional money manager. We measure information content as the absolute value of the cumulative market-adjusted returns from the filing date to three days following the filing date. The event window is based on the results reported in Griffin's (2003) Table 2. The CRSP value-weighted index is used as the market adjustment.

In Table 4 we first consider a regression of the information content measure with the three measures of readability. Each regression contains 32,939 firm-year observations. The first column reports the results with only the control variables. The firm specific control variables are: 1) Log(Words) - the log of the 10-K's word count; 2) Log(Size) – the log of market capitalization on the day before the file date (day t-1); 3) Log(Price) – the log of the firm's stock price on day t-1; 4) Intensity – the proportion of total 10-K filings occurring on a firm's file date;

5) Pre-alpha – the alpha from a market model regression of daily data from the year prior to the filing date using the CRSP value-weighted market index as the market proxy and excluding the five days prior to the file date; 6) Pre-rmse – the root mean-square-error from the prior market model regression; 7) Book-to-market – the book-to-market ratio taken from data reported within the prior year and as defined in Fama and French (2001); and 8) Nasdaq dummy – a dummy variable set equal to one for firms trading on the Nasdaq stock exchange.⁷

All regressions also include an intercept, year dummies, and industry dummies. The readability measures are based on normalized changes, as in Tetlock (2007) and Tetlock, Saar-Tsechansky, and Macskassy (2008). The change is normalized based on the mean and standard deviation of data from the same Fama-French 48 industry category in the past year. In column (2), the variable of interest is the Fog Index. In column (3), the readability measure is the Flesch score while the last column focuses on plain English.

For the results in column (1), where we only consider the control variables, Log(Words) has an insignificant coefficient, indicating that longer documents do not affect information impact. The fact that Log(Words) is at best only marginally significant in any of the regressions supports the SEC's contention that brevity is not the same as clarity.

Log(size) is significantly negative, indicating that smaller firms' 10-Ks have a greater influence on the underlying stock. This evidence is consistent with Griffin's (2003) finding that investor response is much stronger for small firms during the 1996-2001 time period. Older firms have a lower response while firms with higher pre-filing volatility (measured by Pre-rmse) have a stronger response.

⁷ Price and number of shares must be available within the prior 22 days and there must be at least 60 observations for the market model regressions to be included in the sample. In our initial tests we also included measures of earnings and unexpected earnings, however including these variables reduced the sample size and had no impact on the reported results.

If readability matters, improvements in the three measures should lead to higher market responses. This is exactly what we find in the last three regressions of Table 4. In the second column, the year-to-year change in the Fog Index leads to higher filing date announcement returns. Recall that lower values of the Fog Index indicate better readability. Both the Flesch Score and the plain English variable have positive and statistically significant coefficients. Thus, improved 10-K readability has a positive and significant impact on the information content measure.

Bloomfield (2008) notes that there are potentially many explanations for why firms might produce longer and more complex documents. While in some cases the intent might be to somehow diffuse bad news (“obfuscation,” “attribution”, or “misdirection”), some firm events could simply require longer and more detailed explanation. While our results cannot discern why some documents are poorly written, they do indicate that well-written documents are more informative to investors. These results are consistent with Bloomfield’s (2002) incomplete revelation hypothesis, which is a logical extension of Grossman and Stiglitz (1980), that “markets under-react (or at least react slowly) to information that is made obscure.”⁸

The Components of the Readability Measures

While the two traditional readability measures consist of one identical component (words per sentence) and one very similar component (syllable count versus “complex words”), Plain English is more of an omnibus measure. As previously defined, the plain English measure includes the six components based on items encouraged by the SEC. Table 4 has shown that there is a relationship between the three readability measures and the market’s reaction around to

⁸ In our sample we do not find that the correlations between the daily event period returns and readability decay in a manner that is consistent with a slow reaction for less readable disclosures.

the 10-K filing. Which of the various components have the strongest linkage with announcement returns?

Table 5 reports regression results using the event period absolute returns as the dependent variable. The independent variables are the components of each readability measure (expressed as normalized differences). As before, each regression includes an intercept, year and industry dummies. The control variables from Table 4 are also included in the regressions.

The intent of Table 5 is to provide some insights into the importance of the components in each measure. However the results are qualified by the impact of multicollinearity attributable to the relatively high levels of correlations between the components, especially for the Plain English measure. That many of the component measures are highly correlated is an intentional artifact of their design. Columns (1) and (2) include the two respective components of the Fog Index and Flesch Score as the explanatory variables. In both the first two columns, the average words per sentence has a negative and significant coefficient. So as the number of words per sentence increase, the abnormal return on the filing date is lower.

Yet, in both of the first two columns, the second component of the readability measures is not significant. In column (1), the average number of complex words has an insignificant coefficient. The same is true for the average number of syllables per word in column (2). Hence, although the Fog Index and Flesch have two components, the relationship between it and filing date returns appears to be driven largely by the average words per sentence. The last column of Table 5 breaks up the Plain English measure into its components. Individually, none of the plain English components is significantly linked to filing date returns. Thus, it does not appear that the measure is dominated by any single component. Notice that the R-squared values are almost identical across the three regressions.

Why does the complexity of words used in a 10-K have no significant affect on filing date returns? Table 6 reports the first quartile of the most frequent complex words (three or more syllables) for the 10-K sample. The words *company*, *agreement*, and *financial* account for almost 7% of all words with three or more syllables. None of the most frequent complex words would cause readers any difficulty in determining their meaning. The frequent 10-K usage of words like *business*, *corporation*, *management*, or *employee* is not going to confuse the reader. These are commonly known words used to describe business operations.

In untabulated results, we also examined the most frequent multi-syllable words contained in 10-Ks. *Telecommunication* and *telecommunications* account for 75% of all seven syllable word usage. The words *consolidated*, *approximately*, *subsidiaries*, *subsidiary*, and *liabilities* make up 25% of all 5 syllable words. Table 6 highlights the reason why the complexity of 10-K words has no significant effect on the document's filing date. The most frequent multi-syllable words contained in a 10-K are easily understood by the reader.

The list in Table 6 also highlights the challenge of measuring readability in business documents. Although syllabication is an important discriminator in separating a first grade from six grade text book, it does not measure clarity in business writing. These results suggest that the Fog and Flesch measures may not be appropriate when applied to business writing. Although our Plain English measure contains word length which is highly correlated with number of syllables, this is only one of six components used to gauge readability.

Plain English and the Average Investor

Because of decimalization and the increasing role of ECNs, we expect the proportion of 100-share trades to increase for all firms over the sample period. Note we use "100-share" to refer to trades of 100 shares or less. We focus on the change in Plain English relative to the

change in the proportion of 100-share trades, pre- and post-regulation. We do not use the other readability measures because the table partitions the data relative to the plain English implementation date.

We first partition firms into deciles according to the difference between their average pre- and average post-plain English value. The corresponding average change in 100-share trades for each plain English decile is plotted in Figure 3. Although all firms reflect the proportional increase in 100-share trades primarily attributable to decimalization, the magnitude of increase is clearly related to the plain English measure.

We test this relation at the level of individual firms in the regressions reported in Table 7. For each firm we regress the difference in the average value of plain English between the pre- and post-regulatory period on the same difference for the 100-share trades. Firms must have one observation in each period to be included in the sample.

Since we have collapsed the sample on firms, there are now only 3,572 observations. For control variables, we use the average post-regulatory period for the non-dummy variables. That is, the size variable is the average value of market value during the post-October 1, 1998 time period. The dummy variables take the value of the most recent observation. So if the firm is listed on Nasdaq in 2007, the Nasdaq dummy takes a value of one in the regressions.

The coefficient on “Pre and Post 1998 Change in Plain English” in row (1) reflects the impact of the change in the average level of plain English on the change in the average proportion of 100-share trades across the pre- and post-regulatory period, after accounting for the control variables. We first consider the change variable by itself in column (1). We then also include our control variables in column (2), and finally in column (3) we add the industry

dummies. The signs and significance of the variables remain stable across the three regressions, so we focus on the results of the full specification in column (3).

A number of the control variables are significant. For example, older firms experienced less of an increase in 100-share trades. The higher is the pre-filing volatility (pre-rmse), the lower is the change in the proportion of small trades. Because ECNs historically have played a much larger role on Nasdaq than on the NYSE, 100-share trades are more predominant for Nasdaq-listed firms.

In all cases, the results show a positive and significant relation between the change in plain English and the change in 100-share trades. Thus, although firms on average experienced a substantial increase in 100-share trades, those with greater improvement in writing style experienced even greater growth in small trades. The coefficient on the change in plain English variable is 0.013 with a t-statistic of 10.46. As there is little reason to expect large institutional traders to be breaking up trades for any reason related to a firm's writing style, the results indicate that small investor trading increases with positive changes in writing style. Increased trading by "average" investors was a central objective of the plain English regulation.

Our trading results are in sharp contrast to Miller (2008). He finds little support that readability had an effect on the trading behavior of investors. The two papers differ in sample sizes, time window used to measure small investor trading (our 21 days versus Miller's 5), definitions of small investors (Miller uses dollar amounts less than or equal to \$5,000), and most importantly, readability measures. Miller uses the Fog Index as the measure of readability while we focus on plain English. We have already highlighted potential limitations when Fog is applied to business text.

Readability Measures and Seasoned Equity Offerings

If managers view the 10-K as a vehicle to enhance firm transparency, one should see improvements in writing style prior to equity issuance. That is, managers might be expected to use clearer writing in an attempt to reduce information asymmetries between managers and outsider investors. If managers did not care about clearly communicating with their shareholders, one would not expect to see any improvement in the three readability measures.

Healy and Palepu (2001) link voluntary disclosure with the motive of equity issuance. Clearly, managers have the incentive to reduce their cost of capital by providing voluntary disclosure. We view the writing style of the 10-K as one way for managers to strategically disclose information in anticipation of subsequently issuing equity to the public.

About 5% of our sample had a seasoned equity offering (SEO) in the year after the 10-K filing date. We use the Thomson Financial Securities Data (also known as Securities Data Co.) to identify all firms issuing seasoned equity during our sample period. Table 8 reports logit regressions examining the relation between the three readability measures and equity issuance. The dependent variable, equity issuance dummy, takes the value of one if the firm issued seasoned equity in the year following the 10-K filing; otherwise it takes a value of zero.

The key control variable when examining SEOs is prior stock performance. Korajczyk, Lucas, and McDonald (1990) show that stock performance in the prior year is a highly significant determinant of the likelihood of equity issuance. Loughran and Ritter (1995) report that their SEO sample had average raw returns of over 72% in the year prior to offering. In CFO

survey results, Graham and Harvey (2001) find that recent stock price performance is the third-most important factor in determining firms' equity issuance decisions.⁹

The independent variables are the normalized changes in each of the three readability measures (Fog, Flesch, and Plain English), our control variables, and dummies for Fama-French industry and calendar year. The first three columns include all firms, while columns (4), (5), and (6) report results when the sample is restricted to only firms that issued equity at least once in the sample period.

Columns (1) and (2) report that changes in either the Fog Index or the Flesch Score are not related to the probability of issuing new equity. Li (2008) examines the relationship between the Fog index and seasoned equity activity. He finds only a weak positive linkage (t-statistic of 1.69) between having an SEO and improved readability as measured by the Fog Index.

Unlike the other readability measures, the coefficient on the year-to-year change in plain English is positive and statistically significant at conventional levels. In column (3), the coefficient is 0.236 with a z-statistic of 8.66. The odds ratio for this coefficient is 1.266. This odds ratio implies that when the change in plain English variable increases by one standard deviation, the odds that equity is issued in the next year increase by 26.6%. The evidence using plain English as a readability measure is consistent with the Healy and Palepu (1993, 1995) hypothesis that managers who expect to issue equity can use voluntary disclosure to influence investors' perceptions of the firm.

As expected, the coefficient on the pre-alpha variable is positive and highly significant across all of the regressions. The higher the prior abnormal performance, the more likely the firm

⁹ An argument could also be made for including the absolute value of the file date returns in the SEO logit regression. We tried this in subsequent robustness tests and the variable was not significant in any of the specifications.

will issue equity. As one would expect, younger firms and companies with lower book-to-market ratios (i.e., growth firms) also are substantially more likely to have an SEO.

The last three columns of Table 8 restrict the sample to firms issuing seasoned equity at least once during the sample period. This introduces a look-ahead bias. That is, in 1996, one could not know which firms would subsequently issue equity over the next decade. Yet, even in this restricted sample, the year-to-year change in plain English is positively and significantly related to equity issuance. The untabulated odds ratio implies a one standard deviation increase in the change in plain English raises the odds of a subsequent SEO by 10.1%.

Both the Fog and Flesch measures of readability are not related to the probability of having a seasoned offering. The plain English evidence in Table 8 is consistent with the idea that managers are attempting to reduce information asymmetries with outside investors. As the overall writing quality of the 10-K improves as measured by plain English, so do the odds of issuing equity even after controlling for other factors. The table also highlights that the plain English measure may be better than Fog or Flesch at capturing the strategic disclosure behavior of managers.

Readability Measures and Corporate Governance

The Gompers, Ishii, and Metrick (2003) Corporate Governance Index is a widely-used proxy for shareholder rights. If our plain English measure does capture 10-K readability, one might expect firms with strong shareholder rights to produce more readable 10-Ks. In Table 9, we report regression results using our plain English measure (column 1), Fog Index (column 2), and Flesch Score (column 3) as the dependent variables. Because our focus is on the level and not change in writing style, in Table 9 we use levels of the readability measures. The

independent variables are the Gompers, Ishii, and Metrick (2003) Corporate Governance Index, our control variables, and dummies for the calendar year and Fama-French industry.

We obtain the Gompers, Ishii, and Metrick (2003) Corporate Governance Index from <http://finance.wharton.upenn.edu/~metrick/data>. The authors use 24 different governance rules to assign scores ranging from 1 to 24. Data are available only for the years 1995, 1998, 2000, 2002, 2004, and 2006. The higher the governance index, the more dictatorial are the firm's policies (and the weaker shareholder rights). The lower the index, the more democratic the company's policies are. In the Table 9 regressions, the sample is reduced to 8,747 observations due to data availability of the Governance Index.

The coefficient on the Governance Index variable is negative and statistically significant in the first regression, which implies that the higher the index (the more dictatorial the firm), the lower the plain English measure. Firms with more shareholder rights have significantly better measures of 10-K readability. The first column also reports that firms listed on Nasdaq, younger firms, and 10-Ks with fewer words have better plain English values after controlling for size, industry, and calendar year.

In the last two columns, the signs on the Governance Index are as expected for the Fog and Flesch readability scores. The coefficient on the Governance Index is positive (but not significant) when the Fog Index is the dependent variable. Firms with more democratic policies have better 10-K readability according to the Flesch Score. The signs on the three coefficients on the Governance Index imply that firms with better governance policies make the effort to produce documents with better readability.

The Plain English measure appears to better capture this relation in the regressions. This suggests that the plain English measure is better at capturing the governance intentions of public companies than either Fog or Flesch.

VI. Conclusion

Our textual analysis of a sample of 42,357 10-Ks over 1994-2007 provides evidence that words matter. We examine the effect of the SEC's plain English rule of October 1998 by considering three questions. The first relates to whether the rule improved 10-K readability. If the measure is the SEC inspired statistic, then the answer is yes. Using a plain English measure, firms have measurably improved the writing in their 10-Ks. If the measure is the Fog Index or the Flesh Score, however, no improvement is documented. We highlight the potential limitation in using readability measures created outside of the business field.

The second question addresses whether the enhanced readability in 10-Ks led to different behavior by investors and managers. In this setting, we find strong evidence that behavior changed. Improved readability affected the trading patterns of "average" investors and the probability of managers issuing seasoned equity. We find a one standard deviation increase in the change of plain English increases the odds of issuing equity in the next year by 26.6%. Of the three readability measures, only plain English captures the intentions of managers who subsequently issue equity.

Managers appear to be reducing the information differences between themselves and outside investors through the writing of their 10-K documents as measured by plain English. Further, companies with more democratic corporate governance policies have much higher plain English measures than companies with weaker governance policies. Firms whose management is

shareholder-friendly also create 10-Ks that are more readable. In sum, our results indicate that the plain English rule has produced a measurable impact on the behavior of investors and managers.

A final question is whether investors and firms who improved their writing style are better off. In untabulated results we consider regressions similar to those in Table 4 using the post-period market model alpha as the dependent variable, to test if better writing style produces higher abnormal returns. None of the readability measures are significant in these regressions. This is not surprising. Although aspects of readability appear to have pervasive effects on some of the firm and individual characteristics we consider in this paper, we do not expect them to be the next factor to predict the cross-section of stock returns.

From our tests we cannot discern whether “average” investors are better off because they trade more in stocks with more transparent disclosures. Improved writing style does not cause firms to have better corporate governance, but is an interesting artifact of shareholder-centric companies. However, our results on 10-K file-date returns imply that well written disclosures appear to be more informative. To the extent that share prices now better reflect information contained in financial disclosures, both investors and firms are better off.

Finally, traditional readability measures overestimate the impact of common multi-syllable words on a reader’s ability to comprehend financial disclosures. Although all three of the readability measures we test are significantly linked to investor responses around the filing date, evidence is presented that the multidimensional SEC inspired metric more precisely captures the relevant components of managements’ writing styles.

Appendix

Downloading the 10-K Documents

We use the master.idx file from the SEC web site to identify filings from 1994-2007. We then programmatically download each 10-K or 10-K405 filing for subsequent parsing. Note that until 2003, a box on the front page of the 10-K form was to be check-marked if a “disclosure of delinquent filers pursuant to Item 405” was not included in the current filing, nor anticipated to be disclosed in statements incorporated by reference or amendments. If this box were checked, the form was filed as a 10-K405. In 2001, almost one-third of 10-K filings were 10-K405 forms. According to the SEC, because there was confusion and inconsistency in making this choice, the 405 provision was eliminated after 2002. As this choice has no impact on the focus of our study, we included both 10-K and 10-K405 forms in our sample and make no distinction between the two throughout the analysis. We use the WRDS CIK file to link the SEC’s CIK identifier to a CRSP permanent ID (Permno). We then use CRSP ticker symbols to link to the TAQ database.

Parsing the 10-K Documents

Parsing is done using a series of VB.Net programs written by the authors. We use the following sequence to parse each 10-K:

1. Download text version of the 10-K filing and store as string variable.
2. Remove graphics – Increasingly through time the filings have ASCII encoded graphics embedded in the file. ASCII encoding of a graphic increases the size of a file by orders of magnitude. For example, the median file size for the year 2000 was approximately 270KB and the largest filing without graphics was 5.7MB. Texas Utilities’ year 2000 filing included graphics and was 20.4MB.
3. Extract SIC code from SEC header.
4. Remove SEC header.
5. Reencode – Convert HTML “&XXX” codes back to text, e.g., =space.
6. Remove tables – Remove all characters between <TABLE> and </TABLE>.
7. Remove HTML – The quantity of HTML contained in the documents increased substantially beginning in 2000. Many documents contain much more HTML than text.
8. Remove abbreviations – Counting words per sentence is important for the readability measures. This is typically done by removing abbreviations and then counting the number of sentence terminators and the number of words. For traditional text this is quite effective after eliminating a few common abbreviations. Parsing 10-Ks, however, is much more difficult because they contain a variety of abbreviations and use periods to delineate section identifiers or as spacers. Liberman and Church (1992) find that 47% of the periods occurring in the *Wall Street Journal* are associated with abbreviations. We created a program that is more exhaustive in identifying abbreviations than the routine used in the PERL Fathom package. Because the PERL Fathom package does not deeply parse for abbreviations, it will tend to report more sentences than actually contained in a 10-K, thus making the average number of words per sentence downward biased.
9. Convert lists to sentences – As in the Fathom package, our sentence count is based on the number of sentence terminators. One challenge in parsing 10-Ks into sentences is that

the documents often contain lists separated by semicolons or commas that should not be treated as a single sentence. Redish (2000) notes the problem of measuring readability in texts with extensive lists. Our program attempts to identify such lists based on punctuation and line spacing. Where the program determines a sequence of text is a list, commas or semicolons delineating the list items are replaced with periods. In addition, to avoid counting the periods in section headers (e.g., Section 1.2.), ellipses, or other cases where a period is likely not terminating a sentence, there must be at least 20 characters between two periods for both to be counted.

10. Creating word and phrase counts - The cleaned document is next divided into tokens based on word boundaries using a regular expression. Each token is compared with a master dictionary file to determine if the token is a word. Only tokens of two or more letters are counted as words, thus the words “I” and “a” are not counted. Excluding one letter words avoids identifying section headers as words, although it will also make the Fog and Flesch measures reflect slightly lower levels of readability. The words for each document are then loaded into a dictionary for that specific filing containing the words and their counts. Word counts are derived from this dictionary. Phrases (for the plain English measure) are identified by applying regular expressions to the cleaned document.

Syllabification

Both the Fog and Flesch readability measures require a count of word syllables. As noted in Jurafsky and Martin (2009, p. 223), “There is no completely agreed-upon definition of a syllable.” We created a wordlist of 15,000 words and manually identified the number of syllables based on pronunciation to test our syllabification algorithms. The method used in the PERL Fathom package is only about 75% accurate. We use a similar method documented in Talburt (1986) as the basis of our algorithm and include a series of rules that improve the accuracy to over 90%.

REFERENCES

- Bloomfield, R. 2002. The incomplete revelation hypothesis: Implications for financial reporting. *Accounting Horizons* 16: 233-244.
- Bloomfield, R. 2008. Discussion of annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics* 45: 248-252.
- Chevalier, J., and G. Ellison. 1999. Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance. *Journal of Finance* 54: 875-899.
- Christensen, T.E., W.G. Heninger, E.K. Stice, and D.R. Campbell. 2007. Assessing the impact of EDGAR: Factors associated with analysts' forecast revisions and price reactions around SEC filings. Working paper, Brigham Young University.
- Chung, K., C. Chuwonganant, and T. McCormick. 2004. Order preferencing and market quality on Nasdaq before and after decimalization. *Journal of Financial Economics* 71: 581-612.
- Dale, E. and J. Chall. 1948. A formula for predicting readability. *Educational Research Bulletin* 27: 11-20.
- Davison, A. and R. N. Kantor. 1982. On the failure of readability formulas to define readable texts: A case study from adaptations. *Reading Research Quarterly* 17: 187-209.
- Dubay, W. 2007. Unlocking language. Charleston, South Carolina, BookSurge Publishing.
- Easton, P. and M. Zmijewski. 1993. SEC Form 10K/10Q reports and annual reports to shareholders; Reporting lags and squared market model prediction errors, *Journal of Accounting Research* 31, 113-129.
- Fama, E., and K. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43: 153-193.
- Fama, E., and K. French. 2001. Disappearing dividends: Changing firm characteristics or lower propensity to pay? *Journal of Financial Economics* 60: 3-43.
- Federal Reserve Bulletin. 2009. Survey of consumer finances, <http://www.federalreserve.gov/pubs/bulletin/2009/pdf/scf09.pdf>.
- Flesch, R. 1949. The art of readable writing. New York, Harper.
- Gompers, P., J. Ishii, and A. Metrick. 2003. Corporate governance and equity prices. *Quarterly Journal of Economics* 118: 107-155.
- Graham, J., and C. Harvey. 2001. The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics* 60: 187-243.

- Griffin, P. 2003. Got information? Investor response to Form 10-K and Form 10-Q EDGAR filings. *Review of Accounting Studies* 8: 433-460.
- Grossman S., and J. Stiglitz. 1980. On the impossibility of informationally efficient markets. *The American Economic Review* 70: 393-408.
- Gunning, R. 1952. The technique of clear writing. New York, McGraw-Hill.
- Hargis, G., A. K. Hernandez, P. Hughes, J. Ramaker, S. Rouiller, and E. Wilde. 1998. *Developing quality technical information: A handbook for writers and editors*. Prentice Hall.
- Healy, P., and K. Palepu. 1993. The effect of firms' financial disclosure strategies on stock price. *Accounting Horizons* 7: 1-11.
- Healy, P., and K. Palepu. 1995. The challenges of investor communications: The case of CUC International Inc. *Journal of Financial Economics* 38: 111-141.
- Healy, P., and K. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31: 405-440.
- Jones, M.J. and P. A. Shoemaker. 1994. Accounting narratives: A review of empirical studies of content and readability. *Journal of Accounting Literature* 13: 142-184.
- Jurafsky, D. and J. H. Martin. 2009. Speech and language processing. Prentice Hall.
- Korajczyk, R., D. Lucas, and R. McDonald. 1990. Understanding stock price behavior around the time of equity issues, in R. Glenn Hubbard, Ed.: *Asymmetric Information, Corporate Finance, and Investment*, University of Chicago Press, Chicago.
- Lebar, M. A. 1982. A general semantics analysis of selected sections of the 10-K, the annual report to shareholders, and the financial press release. *The Accounting Review* 57: 176-189.
- Li, F. 2008. Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics* 45: 221-247.
- Liberman, M.Y. and Church, K.W. 1992. Speech and Language Processing. In Furui, S. and Sondhi, M. (Eds.), *Advances in Speech Signal Processing*, 791-832. Marcel Dekker.
- Loughran, T., and J. Ritter. 1995. The new issues puzzle. *Journal of Finance* 50: 23-51.
- McLaughlin, G. H. 1969. SMOG grading: A new readability formula. *Journal of Reading* 12: 639-646.

- Miller, B. 2008. The effects of 10-K length and readability on small and large investor trading. Working paper, Indiana University.
- Palmer, David D. 2000. *Tokenisation and sentence segmentation*. In Dale, Robert, Moisl, Hermann and Somers, H. L., *Handbook of Natural Language Processing*, Taylor & Francis, 11-36.
- A Plain English Handbook: How to create clear SEC disclosure documents*. 1998. Office of Investor Education and Assistance, U.S. Securities and Exchange Commission, <http://www.sec.gov/pdf/handbook.pdf>.
- Redish, J. 2000. Readability formulas have even more limitations than Klare discusses. *ACM Journal of Computer Documentation* 24: 132-137.
- Redish, J. and J. Selzer. 1985. The place of readability formulas in technical communication. *Technical Communication* 32: 46-52.
- SEC Release #34-38164, <http://www.sec.gov/rules/proposed/34-38164.txt>.
- Smith, J. E., and N. P. Smith. 1971. Readability: A measure of the performance of the communication function of financial reporting. *The Accounting Review* 46: 552-561.
- Soper, F., and R. Dolphin, Jr. 1964. Readability and corporate annual reports. *The Accounting Review* 39: 358-362.
- Talbert, J. 1986. The Flesch index: An easily programmable readability analysis algorithm. In: Proceedings of the 4th annual international conference on systems documentation. ACM.
- Tetlock, P. C. 2007. Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance* 62: 1139-1168.
- Tetlock, P. C., M. Saar-Tsechansky, and S. Macskassy. 2008. More than words: Quantifying language to measure firms' fundamentals. *Journal of Finance* 63: 1437-1467.
- Werner, I. 2003. Execution quality for institutional orders routed to Nasdaq dealers before and after decimals. Working paper, Ohio State University.
- White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48: 817-838.

TABLE 1
Sample Creation

Sample Source / Screen	Sample
EDGAR 10-K 1994-2007 complete sample	113,196
<i>Minus</i>	
Firms without CRSP Permanent ID match	42,198
Firms' filings that are not the first in a given year	414
Firms' filings with another 10-K filing within 180 days	80
Firms with missing CRSP return information	883
Firms that are not ordinary common equity	4,727
Firms with stock price < \$5	13,518
Firms missing shares outstanding data	3,759
Firms missing COMPUSTAT data	4,887
Firms missing TAQ data	290
Firms with 10-K number of words < 2,000	83
Final 10-K firm-year sample	42,357
<i>Minus</i>	
Loss of observations due to differencing	9,418
Final 10-K firm-year sample with differenced variables	32,939

TABLE 2
Variable Means

Variable	(1)	(2)	(3)
	1994- Sept. 1998	Oct. 1998- 2007	1994-2007
Event period abnormal return	-0.028%	-0.227%	-0.167%
Absolute value of event period abnormal return	0.036	0.042	0.040
Plain English Measure	-0.924	0.404	0.002
Fog Index	19.299	19.219	19.243
Flesch Reading Ease Score	32.998	32.403	32.583
Average Words per Sentence	27.957	27.119	27.373
Average Percent of Complex Words	20.291	20.928	20.735
Average Syllables per Word	1.719	1.736	1.731
Average Word Length	5.367	5.414	5.400
Plain English - Passive	1.118%	1.085%	1.095%
Plain English - Legalese	0.494%	0.349%	0.392%
Plain English - Personal Pronouns	0.193%	1.163%	0.869%
Plain English - Other	0.204%	0.199%	0.201%
Number of Words	30,579.72	36,675.00	34,829.88
Size (in billions)	\$2.20	\$3.78	\$3.30
Price	\$26.50	\$25.89	\$26.08
Age (years)	28.995	22.044	24.149
Intensity	0.004	0.004	0.004
Pre-event market model alpha	0.050%	0.070%	0.064%
Pre-event market model root-mean-square-error	0.026	0.029	0.028
Book-to-Market	0.609	0.597	0.600
Nasdaq dummy	0.505	0.562	0.545
SEO dummy	0.041	0.057	0.052
Governance Index*	9.085	9.091	9.089
Percent of 100-Share Trades	17.036%	46.487%	37.572%
Sample size	12,822	29,535	42,357

*The number of observations for the Governance Index variable for columns 1-3 is 2,461, 6,286, and 8,747 respectively.

TABLE 3
A Comparison of Readability Measures

Source	Fog	Flesch	Average Words per Sentence	Average Percent Complex Words	Average Syllables per Word	Average Word Length
<i>Green Eggs and Ham</i>	2.9	113.9	6.0	1.3	1.0	3.5
<i>Alice in Wonderland</i>	7.3	86.9	15.2	3.1	1.2	4.1
<i>The Tale of Peter Rabbit</i>	8.6	81.2	17.8	3.8	1.3	4.2
<i>David Copperfield</i>	10.3	76.7	19.7	6.0	1.3	4.3
<i>Grimms Fairy Tales</i>	11.5	79.5	26.6	2.1	1.2	4.0
<i>Time</i> *	14.1	55.7	22.0	13.3	1.5	4.9
<i>Nature</i> *	15.2	40.3	15.6	22.4	1.8	5.6
<i>Cell</i> *	17.1	36.4	21.3	21.4	1.8	5.6
<i>Harvard Law Review</i> *	18.2	38.3	26.8	18.7	1.7	5.2
<i>The Wealth of Nations</i>	18.3	47.9	34.0	11.7	1.5	4.7
<i>The Accounting Review</i> *	18.9	32.0	23.1	24.0	1.8	5.6
10-K Sample	19.2	32.6	27.4	20.7	1.7	5.4
<i>On the Origin of Species</i>	20.6	40.8	38.4	13.2	1.5	4.8

*Average of three articles.

TABLE 4
File Date Event Period Absolute Return Regressions for Readability Measures

Variable	(1)	(2)	(3)	(4)
ΔFog Index		-0.013 (-1.79)		
ΔFlesch Score			0.016 (2.17)	
ΔPlain English				0.015 (2.32)
<i>Control Variables</i>				
Log(Words)	0.008 (0.72)	0.021 (1.63)	0.020 (1.68)	0.008 (0.79)
Log(Size)	-0.029 (-4.82)	-0.030 (-4.96)	-0.029 (-4.85)	-0.029 (-4.86)
Log(Price)	-0.048 (-3.26)	-0.048 (-3.22)	-0.048 (-3.24)	-0.047 (-3.19)
Age (in years)	-0.002 (-2.99)	-0.002 (-2.97)	-0.002 (-3.01)	-0.001 (-2.81)
Intensity	2.608 (1.90)	2.615 (1.91)	2.618 (1.91)	2.618 (1.91)
Pre-alpha	-4.508 (-0.93)	-4.388 (-0.90)	-4.674 (-0.96)	-4.909 (-1.01)
Pre-rmse	18.777 (21.73)	18.708 (21.63)	18.724 (21.67)	18.624 (21.56)
Book-to-market	-0.058 (-2.77)	-0.059 (-2.83)	-0.058 (-2.79)	-0.056 (-2.67)
Nasdaq Dummy	0.010 (0.60)	0.010 (0.58)	0.010 (0.59)	0.008 (0.49)
Adjusted R2	11.94%	11.94%	11.95%	11.95%

Included in each regression but not tabulated are an intercept, year dummies, and industry dummies. The sample size for each regression is 32,939. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

TABLE 5
Event Period Absolute Return Regressions for Readability Measure Components

Variable	(1)	(2)	(3)
ΔAverage words per sentence	-0.006 (-3.38)	-0.007 (-3.35)	-0.002 (-0.33)
ΔAverage complex words	-0.006 (-0.77)		
ΔAverage number of syllables per word		-0.008 (-1.15)	
ΔAverage word length			-0.016 (-1.76)
ΔPlain English-Passive			0.001 (0.08)
ΔPlain English-Legal			-0.012 (-1.14)
ΔPlain English-Personal pronouns			0.008 (1.69)
ΔPlain English-Other			0.004 (0.61)
Adjusted R2	11.94%	11.94%	11.95%

Included in each regression but not tabulated are an intercept, year dummies, industry dummies and the control variables from Table 4. The sample size for the regressions is 32,929. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

TABLE 6
First Quartile of Most Frequently Occurring Complex Words

Word	% of Total Complex Words	Cumulative %	Word	% of Total Complex Words	Cumulative %
COMPANY	4.22%	4.22%	FOLLOWING	0.45%	18.02%
AGREEMENT	1.33%	5.55%	CAPITAL	0.44%	18.46%
FINANCIAL	1.32%	6.87%	OPERATING	0.43%	18.89%
INTEREST	1.05%	7.92%	MATERIAL	0.41%	19.30%
BUSINESS	0.81%	8.73%	BORROWER	0.39%	19.68%
CORPORATION	0.69%	9.43%	EXPENSES	0.37%	20.06%
SECURITIES	0.68%	10.11%	COMPENSATION	0.37%	20.43%
INCLUDING	0.65%	10.76%	OUTSTANDING	0.36%	20.80%
PERIOD	0.63%	11.39%	EFFECTIVE	0.36%	21.16%
OPERATIONS	0.62%	12.00%	ADDITIONAL	0.35%	21.50%
EXECUTIVE	0.57%	12.57%	OBLIGATIONS	0.35%	21.85%
RELATED	0.55%	13.12%	SUBSIDIARIES	0.35%	22.20%
MANAGEMENT	0.54%	13.66%	APPLICABLE	0.34%	22.54%
PROVIDED	0.53%	14.20%	PROPERTY	0.33%	22.87%
SERVICES	0.50%	14.70%	INSURANCE	0.33%	23.20%
INFORMATION	0.49%	15.19%	ACCORDANCE	0.32%	23.51%
DIRECTORS	0.49%	15.69%	BENEFIT	0.31%	23.83%
CONSOLIDATED	0.49%	16.18%	PROVISIONS	0.31%	24.14%
APPROXIMATELY	0.48%	16.66%	PRIMARILY	0.31%	24.45%
ACCOUNTING	0.47%	17.13%	PARTICIPANT	0.31%	24.76%
EMPLOYEE	0.45%	17.57%	RESPECTIVELY	0.31%	25.07%

Table 7
Regressions with Change in Proportion of 100-Share Trades as the Dependent Variable

	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>
Pre/Post-1998 Change in Plain English	0.019 (12.23)	0.015 (11.60)	0.013 (10.46)
<i>Control Variables</i>			
Log(Words)		0.007 (1.65)	0.018 (4.06)
Log(Size)		-0.005 (-2.01)	-0.008 (-3.30)
Log(Price)		0.011 (2.02)	0.017 (2.98)
Age (in years)		-0.001 (-9.92)	-0.001 (-8.94)
Intensity		-2.999 (-7.07)	-2.307 (-5.19)
Pre-alpha		29.705 (18.94)	32.136 (19.50)
Pre-rmse		-4.599 (-21.53)	-5.354 (-20.61)
Book-to-market		-0.015 (-2.20)	-0.014 (-2.04)
Nasdaq Dummy		0.150 (28.84)	0.163 (29.64)
Intercept	Yes	Yes	Yes
Fama-French Industry Dummies	No	No	Yes
Sample Size	3,572	3,572	3,572
Adjusted R2	4.11%	37.79%	40.72%

The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Table 8
Logit Regression of the Probability of Issuing Seasoned Equity in the Subsequent Year

	Full Sample (N=32,915)			Firms Having at Least One SEO (N=9,654)		
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Fog	0.000 (0.02)			0.033 (0.89)		
Δ Flesch		0.007 (0.22)			0.002 (0.05)	
Δ Plain English			0.236 (8.66)			0.096 (3.36)
<i>Control Variables</i>						
Log(Words)	0.350 (6.60)	0.357 (6.82)	0.405 (8.96)	0.161 (2.54)	0.200 (3.50)	0.224 (4.62)
Log(Size)	0.073 (3.07)	0.072 (3.07)	0.065 (2.70)	-0.096 (-3.00)	-0.100 (-3.15)	-0.100 (-3.11)
Log(Price)	-0.063 (-1.06)	-0.062 (-1.06)	-0.045 (-0.76)	-0.026 (-0.37)	-0.023 (-0.31)	-0.024 (-0.33)
Age (in years)	-0.020 (-7.99)	-0.020 (-7.99)	-0.018 (-7.43)	-0.006 (-2.36)	-0.006 (-2.36)	-0.006 (-2.28)
Intensity	-5.382 (-0.97)	-5.377 (-0.97)	-5.122 (-0.92)	-10.498 (-1.73)	-10.554 (-1.74)	-10.481 (-1.73)
Pre-alpha	237.115 (12.54)	237.037 (12.54)	229.101 (12.08)	252.652 (12.15)	252.704 (12.15)	249.578 (11.98)
Pre-rmse	3.557 (1.32)	3.524 (1.31)	1.709 (0.64)	-2.589 (-0.73)	-2.834 (-0.80)	-3.761 (-1.07)
Book-to-market	-0.323 (-3.72)	-0.323 (-3.73)	-0.289 (-3.35)	-0.378 (-3.72)	-0.381 (-3.75)	-0.365 (-3.59)
Nasdaq Dummy	0.021 (0.31)	0.020 (0.30)	-0.019 (-0.28)	-0.012 (-0.15)	-0.013 (-0.17)	-0.032 (-0.42)

The z-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Table 9
Regressions of Readability Measures on the Gompers, Ishii, and
Metrick (2003) Corporate Governance Index and Other Variables

	Dependent Variable		
	Plain English	Fog	Flesch
Governance Index	-0.039 (-4.78)	0.009 (1.31)	-0.035 (-2.15)
<i>Control Variables</i>			
Log(Words)	-0.156 (-4.59)	2.313 (56.60)	-4.083 (-44.03)
Log(Size)	0.037 (1.83)	-0.234 (-12.96)	0.278 (6.54)
Log(Price)	-0.072 (-1.58)	0.134 (3.55)	-0.286 (-3.17)
Age (in years)	-0.006 (-4.15)	0.000 (0.22)	0.003 (0.97)
Intensity	0.849 (0.21)	-4.703 (-1.35)	5.325 (0.63)
Pre-alpha	16.638 (1.05)	21.086 (1.56)	12.723 (0.39)
Pre-rmse	24.012 (7.96)	-12.770 (-5.18)	16.688 (2.80)
Book-to-market	-0.155 (-2.37)	-0.282 (-5.02)	0.260 (1.96)
Nasdaq Dummy	0.358 (6.36)	-0.113 (-2.47)	0.094 (0.85)
Adjusted R2	20.93%	47.85%	36.17%

Included in each regression but not tabulated are an intercept, year dummies, and industry dummies. The sample size is 8,747 for each regression. The t-statistics (in parentheses) are based on standard errors calculated using White's (1980) heteroskedasticity-consistent methodology.

Figure 1
Means of Readability Measures by Year

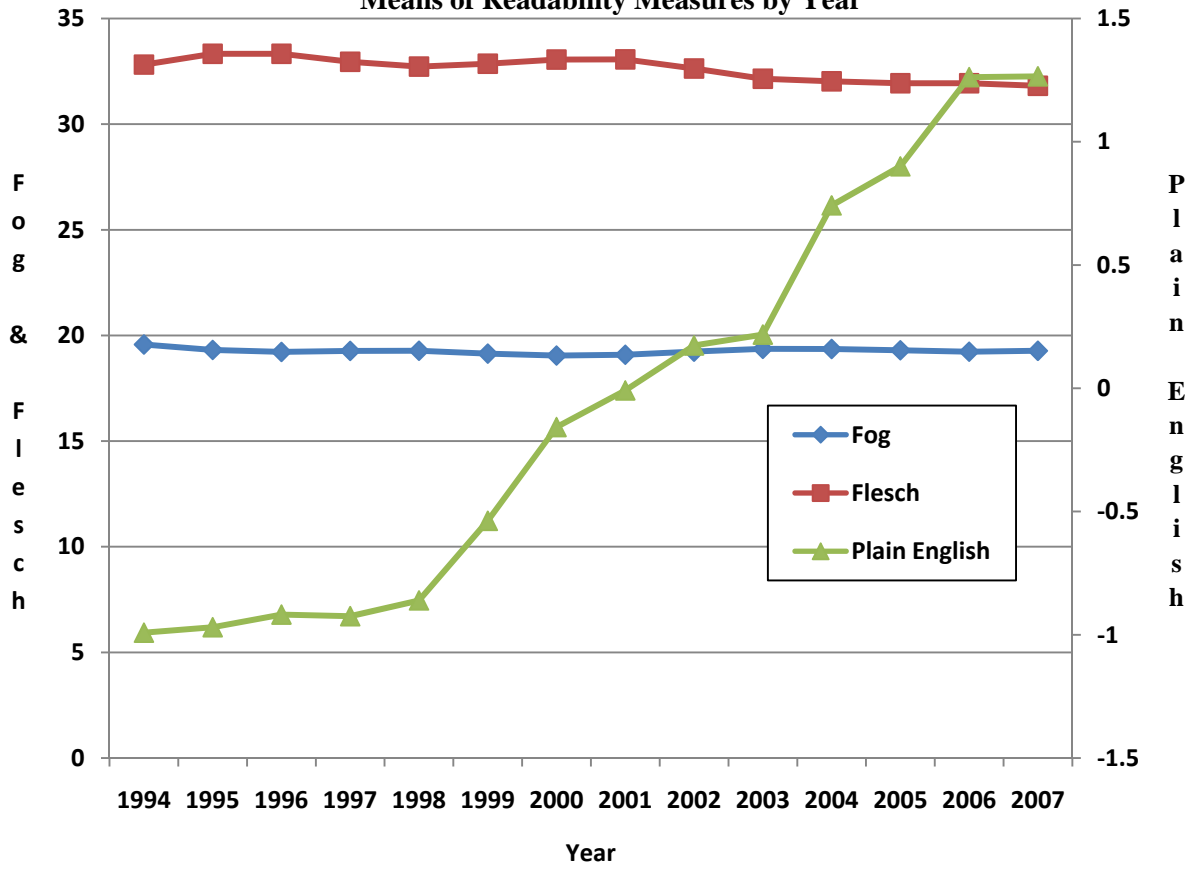


Figure 2
Plain English Measure by Fama-French Industry

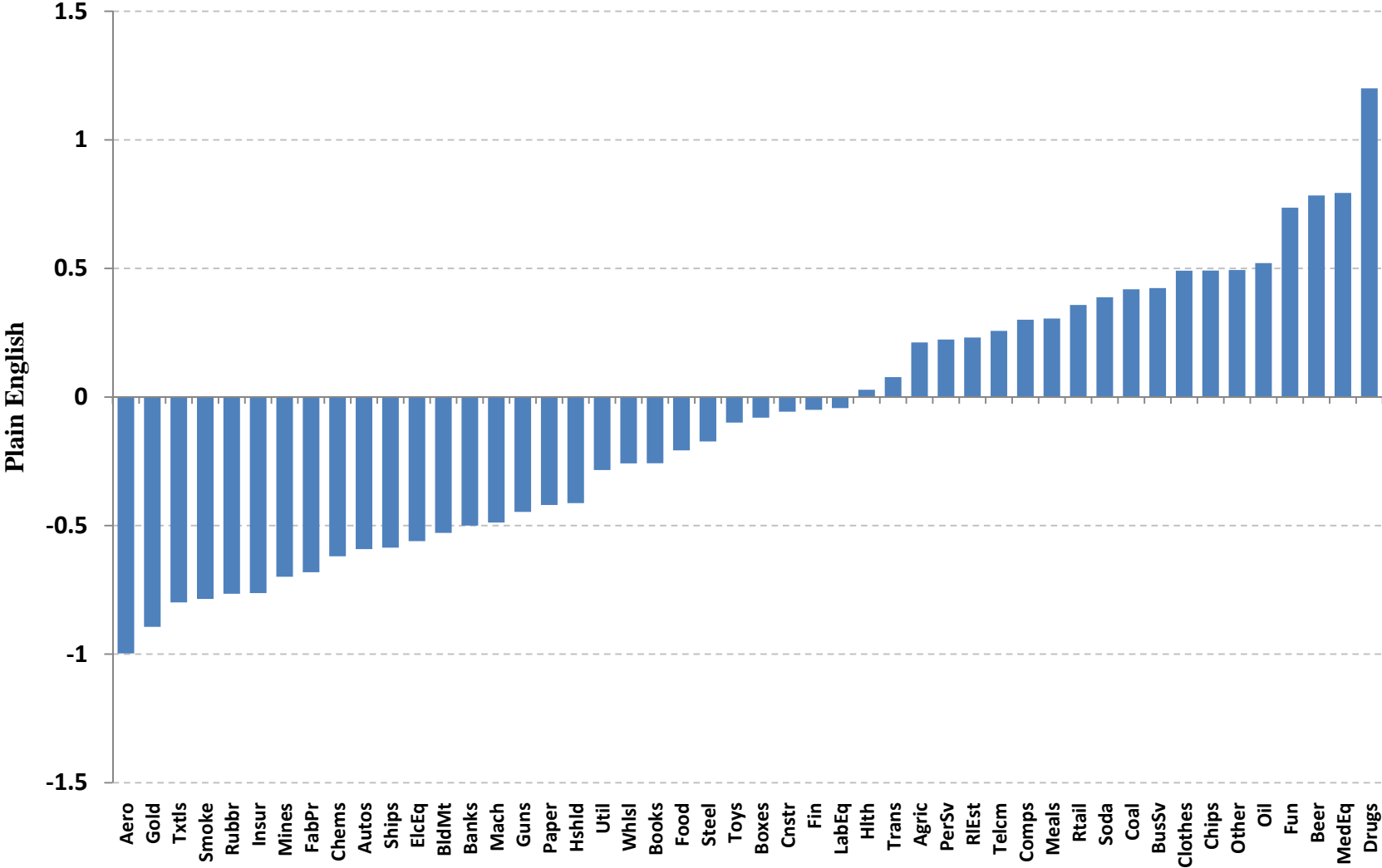


Figure 3

Change in Proportion of 100-Share Trades Relative to Change in Plain English Decile

