Short Selling and Readability in Financial Disclosures: Evidence from a Natural Experiment

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Abstract

We examine how the relaxation of short-sale constraints affects annual report readability using a natural experiment, Regulation SHO. We find that the readability of 10-Ks for the pilot stocks significantly decreases during the program period. The relation between reductions in short-sale constraints and annual report readability is not uniform in the cross-section. We find results are more pronounced for firms that the short-sale constraints bind tighter; for firms with greater information asymmetry; and for firms with worse news or corporate governance. Furthermore, we document that pilot firms significantly increase the use of uncertainty words in 10-Ks during the experiment period. Our results suggest that pilot firms obscure valuation-relevant information by producing less readable and more ambiguous 10-Ks to prevent investors from selling short, especially when short-sale constraints are loose.

Keywords: Regulation SHO; Short selling; Readability; Uncertainty words; Annual report

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1. Introduction

An important channel for corporate managers to communicate investors and analysts about a firm's financial disclosures is the form 10-K. Readability of 10-K reports is one aspect of textual analysis aiming to measure how effectively managers convey valuation relevant information to investors and analysts (Loughran and McDonald, 2014, 2016). In accounting and finance literature, many papers study the relation between annual report readability and firm performance. Li (2008) find that firms with lower reported earnings tend to have less readable annual reports. Loughran and McDonald (2014) document that 10-K file size (in megabytes) is a good and robust proxy of readability in context of financial disclosure. They find that a less readable 10-K (larger file size) is associated with a higher valuation ambiguity demonstrated by higher return volatility, and greater earnings forecast errors and dispersion. Using 10-K file size as a proxy for readability, Ertugrul et al (2016) hypothesize that firms with less readable and more ambiguous 10-Ks are associated with higher cost of borrowing. Moreover, Hwang and Kim (2016) document that reductions in readability of annual reports for the equity closed-end funds (CEFs) reduce firms' value[1]. These studies show that annual report readability have significant effect on the stock market participants.

In this paper, we examine how the relaxation of short-sale constraints affects annual report readability. In practice, it is difficult to test the impact of a reduction in short-sale constraints on readability for at least two reasons. First, proxies of short-sale constraints (e.g., short interests, institutional ownership) are noisy and endogenously determined. Second, the observed relation between proxies of short-sale constraints and annual report readability suffers

[1] Other studies link annual report readability to market participants: capital investment efficiency (Biddle, Hilary, and Verdi, 2009), analyst coverage and analyst dispersion (Lehavy, Li, and Merkley, 2011), trading of small and retail investors (Miller, 2010; Lawrence, 2013), short-term and long-term volatility (Belo et al, 2016).

endogeneity problem. For instance, a high level of short interest could either cause or be the result of low annual report readability. To overcome this endogeneity issue, we test the casual effect of short-sale constraints on annual report readability using a natural experiment, Regulation SHO. Traditionally, the tick test (Rule 10a-1) and Nasdaq's bid price test (NASD Rule 3350) imposed constraints on short selling. In July 2004, the SEC initiated a pilot program under Rule 202T of Regulation SHO to remove short-sale price tests for pilot stocks which are randomly chosen from the Russell 3000 index. During May, 2 2004 and August 6, 2007, 986 pilot stocks were exempted from short-sale price tests and significantly reduced short-sale constraints as opposed to non-pilot stocks (e.g., SEC, 2007; Diether, Lee, and Werner, 2009). Prior studies show evidence that short-selling activities increase significantly for pilot stocks compared to non-pilot stocks (e.g., SEC, 2007; Diether, Lee, and Werner, 2009; Grullon, Michenaud, and Weston, 2015). As Regulation SHO is an exogenous shock to short-sale constraints and with beginning and ending dates, we can test the causal effect of variation in short-sale constraints on annual report readability using a difference-in-differences (hereafter, DiD) method.

We begin by confirming the treatment group is randomly selected by comparing firm characteristics of pilot and non-pilot firms one year before the announcement of the pilot program. Following Loughran and Mcdonald (2014), we use 10-K document file size as a proxy for readability. An annual report with a larger 10-K file size is considered to be less readable. We find that the treatment group has similar firm characteristics to the control group before the Regulation SHO.

To examine how relaxation of short-sale constraints affects annual report readability, we run multivariate regressions. Our DiD analysis show that readability (measured by 10-K file size)

for the pilot stocks is 12.4% lower than that for the non-pilot firms during the Regulation SHO period. After controlling for determinants of annual report readability, we find a reduction in short-sale constraints still leads to a 10.7% lower 10-K readability for pilot stocks compared to non-pilot stocks. In addition, the SEC eliminated short-sale price tests for all exchange-listed stocks on July 6, 2007. This setting provides us an alternative approach to further confirm the causal relation between reductions in short-sale constraints and annual report readability. According to our DiD analysis, non-pilot firms, whose short-sale constraints are significantly reduced after the Regulation SHO period, increase 10-K file sizes (decrease 10-K readability) by 6.8% as opposed to pilot stocks. Our results imply that pilot firms, whose short-sale constraints are significantly reduced due to Regulation SHO, obscure valuation-relevant information by producing less readable 10-Ks to prevent investors from selling short. We argue that corporate managers have incentives to maintain the stock price, especially when they face short selling pressure, because compensations for managers are positively related to stock prices. Furthermore, although Loughran and Mcdonald (2014) document that firms with lower readability are related to higher valuation ambiguities, there is little evidence that less readable firms are associated with lower returns[2]. Thus, when the short-sale constraints are loosen, managers burry earnings-relevant information in hard-to-read documents that are difficult for investors to comprehend.

The relation between the relaxation of short-sales constraint and annual report readability is not uniform in the cross-section. First, Regulation SHO is more effective for short-sale constrained stocks than unconstrained firms. Second, firms with low information asymmetry are

[2] Hwang and Kim (2016) find a weak positive relation between readability and valuation ratios for one hundred randomly selected stocks from CRSP and Compustat. Li (2008) documents that the Fog Index has no power to predict future stock returns. Surprisingly, in an unreported test, we find that a weak positive (negative) relation between 10-K file size (readability) and future stock returns. A trading strategy that long top ten percent file size stocks and short bottom ten percent file size stocks generates a 0.28% per month with a t-statistic of 2.55 by constructing equal-weighted portfolios. However, we find the long-short portfolio return is insignificant by forming value-weighted portfolios.

more transparent to their investors, thus having low incentives to obfuscate their filings. Third, firms with good earnings have less incentive to obscure valuation relevant information because they have good financial strength. Fourth, better corporate governance companies are less likely to manipulate annual report readability because corporate governance has monitoring effects on firms. Using short interest and institutional ownership as proxies for short-sale constraints, we document that the effect of short selling on annual report readability is significant only in high short-sale constrained stocks. Utilizing firm size and analyst coverage as measures for information asymmetry, we find that the relation of the relaxation of short-sale constraints and annual report readability is significant only among high information asymmetry stocks with high levels of information asymmetry. Additionally, we show that pilot firms significantly reduce annual report readability only for firms with bad news or corporate governance.

To further support the notion that pilot firms produce less readable 10-Ks to prevent investors from selling short, we examine the relation between the relaxation of short-sale constraints and tone ambiguity of 10-Ks. In addition to readability, ambiguous text in 10-Ks can obstruct investors' ability to comprehend reports. Loughran and McDonald (2011) find that firms with the proportion of uncertainty words (e.g., *approximate, contingency, depend, and uncertain*) in annual reports are positively correlated with subsequent stock return volatility after the 10-K filing. Loughran and McDonald (2013) provide evidence that IPOs with high frequencies of uncertainty words are associated with higher first-day returns, absolute offer price revisions, and subsequent volatilities. Using the proportion of uncertainty words as a proxy for tone ambiguity of 10-Ks, we find that pilot firms use higher uncertainty text in annual reports during the Regulation SHO program period.

Our study makes several contributions to the literature. First, we add to the knowledge of the effect of short selling on corporate decisions. Grullon, Michenaud and Weston (2015) examine the effect of short-sale constraints on investment and financing policies; Massa, Zhang and Zhang (2016) and Fang, Huang and Karpoff (2016) document how short selling affect earnings management. Karpoff and Lou (2010) study the relation between short selling and financial misconduct.[3] In this paper, we focus on the casual effect of short selling on annual report readability and tone ambiguity. Second, we identify a new determinant of annual report readability and tone ambiguity, short-sale constraints.[4] We document a significant negative relation between the relaxation of short-sale constraints and 10-K readability as well as tone ambiguity of annual reports. Third, our results show that corporate governance, profitability, institutional investors and analysts have significant effects on financial disclosures. We find that the negative relation between variation in short-sale constraints and annual report readability is wiped out for good corporate governance or news firms, for high institution ownership or analysts' coverage stocks. Fourth, our study contributes to the debates benefits and costs of short selling. On one hand, previous studies document that short sellers can curb financial misconducts, smooth price discovery, and improve market efficiency[5]. On other hand, other studies show that short selling could reduce price efficiency (Haruvy and Noussair, 2006; Henry and Koiski, 2010). We provide evidence that short selling activities lead firms to produce longer and more uncertainty text in 10-Ks, which are presumably more difficult for investors to interpret.

[3] See other papers link short selling and corporate decisions: corporate innovation (He and Tian, 2014); the design of executive incentive contracts (De Angelis, Grullon, and Michenaud, 2015); corporate social responsibility (Gao, He, and Wu, 2015); management forecast (Li and Zhang, 2015).

[4] for a review, see Loughran and McDonald (2016)

[5] See Boehmer, Jones and Zhang (2008); Boehmer and Wu (2008); Massa, Zhang and Zhang (2016), Fang, Huang and Karpoff (2016), Karpoff and Lou (2010); Diether, Lee, and Werner, 2009

The rest of the paper is organized as follows. Section 2 discusses the related literature. Section 3 describes sample selection and reports summary statistics. Section 4 presents the main results. Section 5 provides a conclusion.

2. Related Literature

2.1. Short-sale price tests and Regulation SHO

Short-sale price tests were initially introduced in the U.S. equity markets in the 1930s to avoid bear raids by short sellers in declining markets. The NYSE adopted an uptick rule in 1935, which was replaced in 1938 by a stricter SEC rule, Rule 10a-1, also known as the "tick test". This rule defines that a short sale can only occur at a price above the most recently traded price (plus tick) or at the last traded price if it exceeds the last different price (zero-plus tick). In 1994, the National Association of Securities Dealers (NASD) adopted its own price test (the "bid test") under Rule 3350. Rule 3350 requires that a short sale occur at a price one penny above the bid price if the bid is a downtick from the previous bid.

On June 23, 2004, the SEC adopted Regulation SHO to provide a new regulatory framework for short-selling in the U. S. stock markets. The Regulation SHO removed the tick test for a group of randomly selected stocks from the Russell 3000 index in order to evaluate the effectiveness and necessity of short-selling restrictions. On July 28, 2004, 986 stocks were selected as the pilot stocks. Pilot stocks were exempt from the tick test from May 2, 2005, to August 6, 2007. The SEC permanently removed the tick test for all the publicly-traded U.S. companies on July 6, 2007. Previous literature documents that short-selling activities increase significantly for pilot stocks (e.g., SEC, 2007, Alexander and Peterson, 2008; Diether, Lee, and Werner, 2009; Grullon, Michenaud, and Weston, 2015). The permanent suspension of the tick

test drew criticisms from firms and former regulators, including former SEC chairman Christopher Cox. The criticism intensified with the financial crisis in 2008-2009 due to the concern that financial stocks may be subject to market manipulations via short-selling. On February 24, 2010, the SEC reinstated the uptick rule, but only under the circumstance when a security's price drops by 10% or more from the last day's closing price.

There has been a rich literature on how short selling impacts asset prices (e.g. Miller, 1977; Harrison and Kreps, 1978; Jones and Lamont, 2002; Chen, Hong and Stein, 2002; Asquith, Pathak, and Ritter, 2005; Nagel, 2005; Boehme et al., 2006; Battalio and Schultz, 2006; Diether et al., 2009; Beber and Pagano, 2013; Boehmer et al., 2008, 2013;). Empirical studies that investigate the effect of short selling on corporate decisions are limited but growing. Gilchrist et al. (2005) show that short-sale constraints distort investment and new equity issues. Using Regulation SHO, Grullon, Michenaud and Weston (2015) find that the relaxation of short-sale constraints reduces investment and stock issues. Fang, Huang and Karpoff (2016) document that short selling activities reduce earnings management. Using Regulation SHO, other papers link short selling with corporate innovation (He and Tian, 2014); the design of executive incentive contracts (De Angelis, Grullon, and Michenaud, 2015); corporate social responsibility (Gao, He, and Wu, 2015); management forecast (Li and Zhang, 2015).

2.2. Readability and tone ambiguity in financial disclosures

Existing literature draws an extensive attention to the impact of readability in financial disclosures on equity market participants. Li (2008) is the first paper to examine the relation between annual report readability and firm performance. He measures the readability of annual

reports (i.e., Form 10-Ks) using the Fog Index and the number of words contained in the annual report. The Fog Index is a function of two variables: average sentence length (in words) and complex words (defined as the percentage of words with more than two syllables). A Fog Index value of 16 implies that a reader needs sixteen years of education—essentially a college degree—to comprehend the text on a first reading. Li (2008) finds that firms with lower reported earnings tend to have annual reports that are harder to read (i.e., high Fog Index values or high word counts). Li also finds that companies with more readable annual reports have higher earnings persistence.

Biddle, Hilary, and Verdi (2009) find that firms with high reporting quality (using the Fog Index and two other variables) are associated with greater capital investment efficiency. Guay et al. (2015) find that companies with less readable annual reports (based on six different readability measures including the Fog Index) tend to mitigate this negative readability effect by issuing more managerial forecasts of earnings per share, sales, and cash flows. Miller (2010) finds that small investors trade significantly fewer shares of firms with high Fog Index values and word counts (i.e., less readable annual reports) around the 10-K filing date. Focusing on the link between readability and analyst coverage, Lehavy, Li, and Merkley (2011) find that more readable annual reports, as measured by the Fog Index, have lower analyst dispersion and greater earnings forecast accuracy. They find that 10-K readability is related to how many analysts cover a stock. Firms with higher Fog Index values, after controlling for company characteristics, have more analysts covering the stock. The readability of analyst reports is also associated with investor behavior.

Loughran and McDonald (2014) empirically demonstrate that the Fog Index is a poorly specified readability measure when applied to business documents. They find that the Fog Index

is not significant in explaining analyst dispersion or earnings surprises and propose that the natural log of gross 10-K file size is a simple readability measure. They find that firms with bigger 10-K file sizes are significantly linked with larger subsequent stock return volatility, analyst dispersion, and absolute earnings surprises. Using 10-K file size as a proxy for readability, Ertugrul et al (2016) find that firms with lower readability are associated with higher cost of borrowing. Moreover, Hwang and Kim (2016) document that reductions in readability of annual reports of equity closed-end funds (CEFs) reduce corporate valuations.

Loughran and McDonald (2011) develop a word list of ambiguity tones in annual reports. They find that the firms using fewer uncertainty words are associated with more positive market reaction and higher return volatility after the filing period. Loughran and McDonald (2013) document a positive relation between uncertainty tone of Form S-1 IPO filings and IPO performance. Specifically, they find that IPOs with higher frequencies of uncertainty words are associated with higher first-day returns, higher absolute offer price revisions, and higher subsequent volatilities. Furthermore, Ertugrul et al (2016) document that firms with more ambiguous tone in annual reports experience a higher cost of borrowing.

3. Data Description

3.1. Sample Selection

Our sample is constructed based on the Russell 3000 index in June 2004. On July 28, SEC announced a list of 986 pilot stocks that would trade without being subject to any price tests during the event (Regulation SHO) period. We excluded stocks that were not previously subject to price tests (i.e., not listed on NYSE, Amex, or NASDAQ-NM) and stocks that went public or

had spin-offs after April 30, 2004. Then we sort the stocks based on their daily dollar volume computed over the June 2003 to May 2004 period. Among the 2,952 stocks, we identify 986 pilot stocks and 1966 non-pilot stocks.

We obtain the SEC annual filing data from WRDS SEC Readability and Sentiment database. This database contains the detailed information about firms' SEC filing since 1994, for example, filing date, file size, proportion of uncertainty words, etc. Following Loughran and McDonald (2014), we include all 10-K filings, 10-K 405, 10KSB and 10KSB40 filings. We require that firms have Compustat Permeant ID match, be ordinary common stock, have at least 2,000 words in the 10-K, and have a gap of at least 180 days between two filings. Our control variables are from several sources. First, we collect accounting information from CRSP/Compustat Merged, stock returns from CRSP, and institutional holdings from Thomson Reuters 13-F. Second, we gather analyst coverage data from IBES, and corporate events information from Thomson Reuters SDC Platinum M&A and Global New Issues databases.

Our sample period is 78 months. We include firms that fiscal year ending dates are between May 1, 2002 and June 30, 2004 for *pre-event* period, between May 1, 2005 and June 30, 2007 for *during-event* period, and between May 1, 2008 and June 30, 2010 for *post-event* period. We classify May 1, 2005 to June 30, 2007 as *during-event* period because the Reg SHO program effectively ran from May 2, 2005 to July 6, 2007. In our sample, we excludes financial firms (SIC 6000-6999) and utilities firms (SIC 4900-4949) because disclosure requirements are significantly different for these highly regulated industries. We also require that firms have non-missing data for all key variables. Our final sample includes 1,899 stocks (630 pilot and 1,269 nonpilot firms). Additional, we construct a balanced sample to verify the robustness of our

analysis. We require firms to be in the sample over the *pre-event* and *during-event* periods. This sample consists 1,056 firms (382 pilot and 674 nonpilot stocks)

3.2. Key Variables

Following Loughran and McDonald (2014), we measure annual report readability of firms using the natural logarithm of 10-K report size. Loughran and Mcdonald (2014) show that traditional readability measures like the Fog Index are poorly specified when used to evaluate financial documents. They argue that the file size of the 10-K is a good proxy for document readability and is better gauge how effectively managers convey valuation-relevant information to investors and analysts.

Following Li (2008), we control for a set of firm characteristics that determine the annual report readability. Our control variables include size (the natural logarithm of the market value of equity at the end of the fiscal year), firm age (the natural logarithm of firm age since a firm's first appearance in CRSP monthly return file), special items (special items to asset ratio), stock return volatility, earnings volatility, business complexity (the natural logarithm of the number of business and geographic segments), financial complexity (the natural logarithm of the number of non-missing items in Compustat) and corporate events (SEO and MA dummy variables). We include ROA because firms with lower profitability are more likely to obscure valuation-relevant information. Following Loughran and McDonald (2011) and Ertugrul et al (2016), we use the proportion of uncertainty words to capture tone ambiguity in 10-Ks. The detailed descriptions of all key variables are in the Appendix.

3.3. Summary Statistics

Table 1 reports the summary statistics of all key variables from the full sample. All variables are winsorized at their 1% and 99% levels to minimize the effect of outliers. On average, a stock has 1.86 megabyte of file size and 1.48% of uncertainty words for annual report; has market value of 4803.37 million, book-to-market ratio of 0.57, age of 23.20 years, number of business segment of 2.27, number of geographic segment of 2.80, return volatility of 0.13, and earnings volatility of 0.06. Additionally, on average, a firm has ROA of 0.02, number of analysts of 5.63, institutional ownership of 0.73, number of non-missing items of 359.19, special item ratio of -0.02.

4. Empirical Results

4.1. Firm characteristics before Regulation SHO

The Regulation SHO is a natural experiment to study the causal effects of short selling on annual report readability because the selection of pilot and non-pilot stocks was random and the costs of short selling were significantly reduced for pilot stocks. Therefore, a DiD method is appropriate to study the effects of short selling on the annual report readability.

To verify the selection of pilot stocks was random, we compare the firm characteristics of pilot and non-pilot firms one year before the announcement of the pilot program (July, 2004). Table 2 presents the summary statistics and mean differences of firm characteristics between the treatment (pilot) and control (non-pilot) groups. We report t-statistics of the two-sample t-tests and z-statistics of the Wilcoxon Ranksum tests. We find that the treatment group has similar firm characteristics with the control group despite pilot stocks have less uncertainty word proportion

and earnings volatility. The results in Table 2 show that Regulation SHO is an appropriate for testing the effect of the relaxation of short-sale constraints on stocks.

4.2. Multivariate difference-in-differences results

In this section, we examine the effect of short selling on annual report readability using a DiD methodology in multivariate regressions. We summarize the results in Table 3. Following Fang, Huang, and Karpoff (2015), we run the following OLS regression:

$$Log(file\ size_{i,t}) = \alpha + \beta_1 * Pilot_i + \beta_2 * Pilot_i * During_t + Year_t + Industry_j + \varepsilon_{i,t} \quad (1)$$

where $Log(file\ size_{i,t})$ is the natural logarithm of 10-K document file size for firm *i* at year *t*. $Pilot_i$ is a dummy variable that equals one if a stock is selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $During_t$ is a dummy variable that equals one if the end of a firm's fiscal year t falls between May 1, 2005 and June 30, 2007 and zero otherwise. *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects dummies, respectively. The variable $During_t$ is omitted because it is perfectly correlated with the fiscal year fixed effects. The variables are as defined in Appendix. All standard errors are clustered by firm.

The regression results of equation (1) are reported in column (1) in Table 3. The coefficient of interest is β_2, which captures the causal effect of short selling on annual report readability. The coefficient of $Pilot_i * During_t$, β_2 is 0.098 and significant at the 1% level, implying that 10-K file sizes of pilot firms are 9.8% higher than those of non-pilot firms during the Regulation SHO program period. The coefficient of $Pilot_i$ is insignificant, suggesting that pilot and non-pilot firms exhibit similar 10-K file sizes before the pilot program.

In column (2), we augment equation (1) by including control variables previously shown to determine the annual report readability: size, book-to-market ratio, firm age, special items to asset ratio, stock return and earnings volatility, business complexity, financial complexity, ROA, and corporate events (SEO, and MA dummy variables). The coefficient on $Pilot_i * During_t$ is 0.084 and significant at the 5% level. In addition, we report the regression results for the balanced sample in columns (3) and (4). The results in the balanced sample are stronger than these among the full sample. The coefficient for $Pilot_i * During_t$ is 0.124 and significant at the 1% level in column (3). After controlling for firm characteristics, The slope of $Pilot_i * During_t$ is 0.107 and significant in column (4). This indicates that the difference in annual report readability between pilot and nonpilot stocks is 10.7%.

Our DiD analysis shows that pilot firms significantly produce less readable annual reports during Regulation SHO period. A reduction in short-sale constraints leads to a decline in annual report readability.

The SEC eliminated short-sale price tests for all exchange-listed stocks on July 6, 2007 (Securities Exchange Act of 1934 Release No. 34-55970, July 3, 2007). This setting provides us an alternative approach to test the relation of short selling and annual report readability. We can examine whether nonpilot stocks significantly reduce readability during the *post-event* period. We run DiD tests using the same group of pilot and non-pilot firms and retain the sample from May, 2005 to June 2010 in Table 4. The regression is as follows:

$$Log(file\ size_{i,t}) = \alpha + \beta_1 * Nonpilot_i + \beta_2 * Nonpilot_i * Post_t + Year_t + Industry_j + Controls + \varepsilon_{i,t} \quad (2)$$

where $nonpilot_i$ is a dummy variable that equals one if a stock is not selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $Post_t$ is a dummy variable that equals one if the end of a firm's fiscal year *t* falls between May 1, 2008 and June 30, 2010 and zero otherwise. *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects dummies, respectively. The results are presented in Table 4.

As short selling costs are significantly loosen for nonpilot stocks during the *post-event* period, we predict nonpilot stocks to produce less readable 10-Ks. In other words, the 10-K document sizes of non-pilot firms should be larger than these of pilot firms and the coefficient on $Nonpilot_i * Post_t$ should be positive. In column (1), the coefficient for $Nonpilot_i * Post_t$ is positive and significant, consistent with our prediction. After controlling for firm characteristics, the difference of 10-K file size between nonpilot and pilot firms is positive and significant at the 10% level in column (2). We find more significant results using the balanced sample. Specifically, the coefficients on $Nonpilot_i * Post_t$ are positive and significant at the 5% level. In terms of economic significance, our evidence in column (4) indicates that nonpilot stocks increase 10-K document sizes by 6.8% compared with pilot firms. The results in Table 4 further confirm that a decrease in short selling costs significantly reduces annual report readability.

So far, our investigation indicates that the relaxation of short-sale constraints is associated with a significantly decrease in pilot firms' annual report readability. To prevent investors from selling short, pilot firms, whose short-sale constraints are significantly reduced due to Regulation SHO, obscure valuation-relevant information by producing less readable10-Ks. There is little evidence that a reduction in 10-K readability is associated with a lower security valuation despite Loughran and Mcdonald (2014) find that firms with lower readability are related to higher valuation ambiguities. Li (2008) documents that there is no relation between

annual report readability and future stock returns. Also, in an unreported test, we find that 10-K file size has a weak power to predict future stock returns. A trading strategy that long top ten percent file size stocks and short bottom ten percent file size stocks generates a 0.28% per month with a t-statistic of 2.55 by constructing equal-weighted portfolios. However, we find the long-short portfolio return is insignificant by forming value-weighted portfolios. Therefore, when the short-sale constraints are loosen, managers burry earnings-relevant information in hard-to-read documents that are difficult for investors to comprehend.

4.3. Cross-sectional analysis based on information environment

The relation between the relaxation of short-sales constraints and annual report readability is not uniform in the cross-section. Corporate managers' decision on annual report readability can be affected by information environment including short-sale constraints, information asymmetry, bad news, and corporate governance. First, Regulation SHO is more effective for short-sale constrained stocks than unconstrained firms. We expect that the effect of short selling on readability is stronger among short-sale constrained stocks. Second, firms with low information asymmetry are more transparent to their investors, thus having low incentives to obfuscate their filings. We predict firms with high information asymmetry are more likely to produce less readable 10-Ks. Third, firms with good earnings have no incentive to obscure earnings-relevant information because they have good financial strength. So bad news firms are more likely to produce less readable 10-Ks. Fourth, better corporate governance companies are less likely to manipulate annual report readability because corporate governance has monitoring

effects on firms. Therefore, we hypothesize that the relation between the relaxation of short-sale constraint is more pronounced for bad governance firms.

We use short interest (a proxy for demand) and institutional ownership (a proxy for supply) to measure how short-sale constraints bind a stock. Asquith, Pathak, and Ritter (2005) document that a firm is short-sale constrained when short interest is high and institutional ownership is low. Nagel (2005) argues that short-sale constraints are more likely to bind for low institutional ownership stocks due to limited supply of shares. For each measure, we partition the sample into high and low groups based on its median value each year. We then repeat the analysis in Table 3 and report the results in Table 5. Panels A and B present the results for the full and balanced sample, respectively. The findings are consistent with our prediction. For low institutional ownership group, β_2 is 0.137 and significant, suggesting that readability of pilot firms are 13.7% lower than that of nonpilot firms. For high institutional ownership group, β_2 is insignificant. Additionally, the coefficient of $Pilot_i * During_t$ is insignificant in high short interest group, whereas β_2 is 0.134 and significantly at the 5% level among low short interest group. As before, we find similar results using the balanced sample. In Panel B, the slopes of $pilot_i * during_t$ are positive and significant only for low institutional ownership and short interest stocks.

We use firm size and analysts' coverage to measure information asymmetry. Investors pay more attention to large firms and large firms have more likely to disclose information to investors. Jensen and Meckling (1976) argue that analysts play the role of monitoring of managerial performance and providing information to stockholders. Also, analysts play an important role in making the stock price more efficient (Moyer, Chatfield and Sisneros (1989)). We separate sample into high and low groups based on the median value each year. Then we run

the DiD analysis for each subsample to examine how information asymmetry affects the relation between short selling and annual report readability. The results are reported in Table 5. We find evidence that the effect of short selling on annual readability is significant only for low analyst's coverage and small firms. Specifically, For low analysts' coverage group, β_2 is 0.208 and significantly among low analyst coverage group, suggesting that the difference in readability between pilot and nonpilot stocks is 20.8%. For high analyst' coverage subsample, β_2 is insignificant. Additionally, the coefficient of $Pilot_i * During_t$ is insignificant in large size group, while β_2 is 0.128 and significantly at the 5% level among small size group. We find similar results for the balanced sample in Panel B.

To examine whether the relation between a reduction in short-sales constraint and annual report readability is more pronounced in bad news firms, we run the DiD analysis across good and bad news firms in Table 7. We define a firm has bad (good) news if its ROE is below (above or equal) the industry median. We find that the positive relation between short-sale constraints and 10-K file size is stronger in bad news group. In Panel A, we find that the coefficients on $Pilot_i * During_t$ are positive and significant, but bad news group has greater magnitude. We find more robust results in the balanced sample. In Panel B, we find the coefficient on $Pilot_i * During_t$is 0.181 and significant at the 5% level for bad news group, but β_2 is insignificant for good news group.

Furthermore, to examine how corporate governance affects the relation between changes in short-sale constraints and annual report readability, we conduct the DiD tests for good and bad governance firms in Table 8. Using the governance index of Gompers, Ishii, and Metrick (2003), we find that the relation between annual report readability and short-sale constraints is significant only among low governance stocks. The coefficients of $Pilot_i * During_t$ are positive

and significant among the low governance group for the full and balanced sample. We find no evidence that the coefficients on $Pilot_i * During_t$ are significant for high governance group in the full and balanced sample.

In sum, our cross-sectional analysis shows that the effect of a reduction in short-sale constraints on annual report readability is significant only for short-sales constrained firms; for firms that have high information asymmetry; and for firms with bad news or corporate governance.

4.4. Short selling and tone ambiguity

In addition to readability, ambiguous text in 10-Ks can obstruct short sellers' ability to comprehend reports. Loughran and McDonald (2011) find that firms with the proportion of uncertainty words (e.g., *approximate, contingency, depend, and uncertain*) in annual reports are positively correlated with subsequent stock return volatility after the 10-K filing. Loughran and McDonald (2013) document a positive relation between uncertainty tone of Form S-1 IPO filings and IPO performance. Specifically, they find that IPOs with high frequencies of uncertainty words are associated with higher first-day returns, absolute offer price revisions, and subsequent volatilities. Using the proportion of uncertainty words defined by Loughran and McDonald (2011), Ertugrul et al (2016) find that firms with more ambiguous 10-Ks are associated with higher cost of borrowing. Do pilot firms increase the use of uncertainty words in 10-Ks to obstruct short sellers' ability to comprehend documents? We address this question in this section.

4.4.1. Determinants of uncertainty tone in 10-Ks

In this subsection, we discuss several factors to explain the cross-sectional variations in frequencies of uncertainty words in 10-Ks.

Firm size. Usually, large firms have more complex financial disclosures than small firms. We hypothesize that large firms have greater proportion of uncertainty words in 10-Ks than small firms.

Profitability. Firms with high profitability are less likely to use uncertainty tone in 10-Ks because of good financial performance. We expect that firms with high ROA are associated with low frequencies of uncertainty words in annual reports.

Firm age. Young firms are generally more uncertain than mature firms. Therefore, we expect that mature firms use low proportions of uncertainty words in 10-Ks.

Firm risk. Firms with high risk are more likely to be cautious in disclosure financial information in 10-Ks due to uncertainty about future performance. We use stock return volatility and earnings volatility as proxies for firm risk. We posit a positive relation between risk and ambiguity tones in annual reports.

Complexity of operations. Complex firms are associated with complex financial disclosures. Using the numbers of business and geographic segments as proxies for firm complexity, we expect that more complex firms are associated with higher frequencies of uncertainty words in 10-Ks.

Corporate events. Unusual corporate events may lead to complex disclosures due to high uncertainty. Firms that have unusual events are more likely to use ambiguity tones in annual

reports. We use two corporate events: seasoned equity offering, and merger and acquisition activities.

To examine whether above variables can explain ambiguity tone in annual reports, we regress the proportion of uncertainty words on the above variables. The sample period spans from 1994 to 2015. We present the regression results in Table 9. Consistent with our predictions, we show that the above factors have significant power to explain the use of uncertainty words in 10-Ks. In column (1), we find that large firms are associated with high percentage of uncertainty words (the coefficient on *Log(size)* is 0.043 and significant at the 1% level). This indicates that large firms use high frequencies of uncertainty words in 10-Ks. ROA is significantly negatively related to the use of ambiguity tone, suggesting that firms with good financial strength are less likely to use uncertainty words. Furthermore, mature firms are less likely to use uncertainty words as shown by a statistically significantly negative coefficient on *Log(age).* Risker firms are related to higher percentage of uncertainty words in annual reports as indicated by statistically significantly negative coefficients on *Ret_vol* and *Earn_vol*. In addition, firms that have high number of geographic segments are significantly positively correlated with the frequencies of uncertainty words in 10-Ks, consistent with the hypothesis that complex firms are associated with complex financial disclosures. However, firms with high number of business segments are associated with low proportion of ambiguity tone in annual reports. Finally, we find that the SEO dummy variable is significantly positively related to the use of uncertainty words, whereas the MA dummy variable is significantly negative correlated with the proportion of ambiguity tone. In column (2), we add industry (2-digit SIC code) fixed effects and fiscal year fixed effects in our regression. Our results are unaffected for all factors, except for the MA dummy variable. The coefficient on *MA* is 0.008 and significant at the 5% level.

4.4.2. Regulation SHO and tone ambiguity in 10-Ks

We test how changes in short-sale constraints affect tone ambiguity of 10-Ks using DiD regression analysis. The regression is as follows:

$$Uncertain_{i,t} = \alpha + \beta_1 * Pilot_i + \beta_2 * Pilot_i * During_t + Industry_j + Year_t + \varepsilon_{i,t} \qquad (3)$$

where $Uncertain_{i,t}$ is the proportion of uncertain words in 10-Ks based on Loughran and McDonald (2011) for firm *i* at year *t*. $Pilot_i$ is a dummy variable that equals one if a stock is selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $During_t$ is a dummy variable that equals one if the end of a firm's fiscal year t falls between May 2005 and June 2007 and zero otherwise. We omit $During_t$ to avoid multicollinearity. *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects dummies, respectively. The results are presented in Table 10.

From Table 10, we show that pilot firms significantly increase the proportion of uncertainty words in 10-Ks during Regulation SHO experiment period. In the full sample, the coefficients on $Pilot_i * During_t$ are both positive and significant for columns (1) and (2). In the balanced sample, our DiD estimator is 0.040 and significant at the 1% level. After controlling for determinants of the use of uncertainty words in 10-Ks, the coefficient $Pilot_i * During_t$ is 0.034 and significant at the 5% level. Our investigation suggests that pilot firms, whose short-sale constraints are significantly loosen due to Regulation SHO, not only reduce annual report readability but also increase tone ambiguity in 10-Ks.

4.5 Robustness check

4.5.1 Alternative test periods

In our tests, we define test periods using the actual start and end dates of the Regulation SHO program. To confirm our DiD analysis is robust to alternative *pre-* and *during-event* periods, we run the DiD tests using the balanced sample in Table 11. Following Fang, Huang and Karpoff (2016), *Pre-event* period sample includes firms that have data to calculate all key variables from 2001 to 2003. *During-event* period sample contains firms that have data to calculate all key variables between 2005 and 2007. We exclude 2004 because the SEC announced the pilot and nonpilot stocks in July 2004. $During_t$ equals one if a firm's fiscal year end is between January, 2005 and December, 2007. The regression results for annual report readability and tone ambiguity are presented in Panels A and B, respectively. We find evidence that the coefficients on $Pilot_i * During_t$ are positive and statistically significant in Panels A and B. Our investigation further supports the causal effect of short selling on readability and tone ambiguity of 10-Ks.

4.5.2 Firm fixed effects

To mitigate potential omitted variable bias arising from unobserved firm characteristic persistent overtime, we also include the firm fixed effect in our DiD regression analysis. We repeat the DiD regression analysis in Table 3 and 10 using the balanced sample and the results are presented in Table 12. The dummy variable Pilot is omitted because of collinearity. For annual report readability, the coefficients on Pilot*During are positive and significant in Panel A, consistent with the findings in Table3. In addition, for tone ambiguity, the coefficients on Pilot*During are positive and significant in Panel B. The evidence in Table 12 further supports the effect of short selling on annual report readability and tone ambiguity.

4.5.3 Placebo tests

In this subsection, we perform two placebo tests for our DiD analysis reported in Tables 3 and 10 to strengthen our causal argument using the balanced sample. We address the concern that our identification tests mainly rely on Regulation SHO that took place in 2004. Unobservable shocks that occurred prior to 2004 but are unrelated to Regulation SHO could have driven results. We take the same set of pilot and non-pilot firms identified by Regulation SHO but artificially pick a "pseudo-event" year when we assume a regulatory shock reduced short selling costs. We assume that Regulation SHO is effective from May, 2002 to June, 2004. We conduct the DiD tests using the balanced sample in Table 13. The results for annual report readability and tone ambiguity are presented in Panels A and B, respectively. As can be seen, the coefficients on $Pilot_i * During_t$ are all insignificant.

5. Conclusion

This paper documents the causal relation between changes in short-sale constraints and readability in the context of financial disclosures. To establish causality, we use exogenous variations in short-sale constraints generated by a quasi-natural experiment, Regulation SHO. The SEC randomly selected a group of stocks from the Russell 3000 index into a pilot program and removed short selling price tests from 2005 to 2007. Using DiD method, we find that the relaxation of short-sales constraints leads to a reduction in annual report readability. Furthermore, the negative relation between variation in short-sale constraints and annual report readability is heterogeneous in the cross-section. The results are more pronounced for firms that the short-sale constraints bind tighter, for firms with greater information asymmetry, and for firms with worse

news or corporate governance. Additionally, we document that pilot firms use higher frequencies of uncertainty words in 10-Ks during the regulation SHO experiment period. To prevent investors from selling short, managers are more likely to file less readable and more ambiguous 10-Ks to obscure valuation-relevant information. Our paper provides important implications to users of financial contexts, for instance, analysts and investors.

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Appendix: Definition of variables

Annual report readability measure:

10-K file size: Loughran and Mcdonald (2014) argue that file size of a 10-K is a good proxy for readability. Larger 10-K file size of a firm is less readable. The readability measure is defined as the natural logarithm of 10-K document filing size in fiscal year t.

Experiment related variables:

Pilot: A dummy variable that equals one if a stock is selected as a pilot stock in Regulation SHO's pilot program and zero otherwise.

During: A dummy variable that equals one if the end of a firm's fiscal year *t* falls between May 1, 2005 and June 30, 2007 and zero otherwise.

Post: A dummy variable that equals one if the end of a firm's fiscal year *t* falls between May 1, 2008 and June 30, 2010 and zero otherwise.

Ambiguity tone measure

The proportion of uncertainty words: Loughran and Mcdonald (2011) develop a list of uncertainty words (e.g. *approximate, contingency, depend, and uncertain*) in financial contexts.

Control variables:

Firm size: Larger firms have more complex 10-K reports. The size is defined as the natural logarithm of the market equity of firms at the end of fiscal year t.

Firm age: Older firms have more readable annual reports because there is less information asymmetry and less information uncertainty for these firms. The firm age is the number of years since a firm's first appearance in the CRSP monthly stock return file. We use the natural logarithm of the firm age in the regressions.

Special items (SI): Firms with a significant amount of special items are more likely to experience some unusual events. Firms with lower special items have more complex 10-K reports. SI is defined as the amount of special items scaled by book value of assets.

Volatility of business: Firms with higher volatility of business environment have more complex 10-K reports. To capture the volatility of business, we use two measures: stock return volatility (Ret_vol,

measured as the standard deviation of the monthly stock returns in the prior year) and earnings volatility (Earn_vol, measured as the standard deviation of the operating earnings during the prior five fiscal years).

Complexity of operations: Firms with more complex operations are more likely to have complex 10-K reports. We use the number of business segments (NBSEG) and the number of geographic segments (NGSEG) to capture the operation complexity of firms.

Financial Complexity: Firms with more complex financial situations are more likely to have complicated 10-K reports. We use the logarithm of the number of non-missing items in Compustat as a proxy for financial complexity (NITEMS). Firms are more financially complex if they need to report more items in annual reports.

Corporate events: Unusual corporate events may require extra and more detailed disclosures, so firms with corporate events have more complex 10-K reports. We consider two events: seasoned equity offerings (SEO), and merger and acquisition (MA). The dummy variable SEO is equal to 1 if for a year in which a company has a common equity offering in the secondary market according to the SDC Global New Issues database and 0 otherwise. The dummy variable MA is set to 1 if for a year in which a company is an acquirer based on the SDC Platinum M&A database and 0 otherwise.

Profitability (ROA): Firms that earn higher profits have more readable 10-Ks. ROA is defined as the income before extraordinary items divided by lagged total assets.

Information environment

Short-sale constraints:

Institutional ownership (IO): Firms with low institutional ownership are more likely to be short-sale constrained due to limited short supply. Institutional ownership is defined as the number of shares owned by institutions scaled by the total number of common shares outstanding. We captured institutional holding data from Thomson Reuters 13-F database.

Short interest (SI): Frims with low short interest are more likely to be short-sale constrained because of limited short demand. Short interest is defined as the number of shares held short scaled by the total number of common shares outstanding. We download short interest data from Compustata Supplemental Short Interest File.

Information Asymmetry:

Size: Investors pay more attention to large firms and large firms have more likely to disclose information to investors.

Analyst coverage: Firms that are covered by more analysts are more likely to. The analyst coverage is defined as the logarithm of the number of analysts following a stock from IBES database.

Other information environment variables:

Bad News: Firms with bad news are more likely to obscure valuation-relevant information. Bad news is defined as one if ROE is below industry median value and zero otherwise.

Governance index: The governance index is introduced by Gompers, Ishii, and Metrick (2003). We apply the governance scores in 2006 for the data after 2006 because the index only covers from 1990 to 2006.

Table 1: Summary Statistics

This table reports the summary statistics of firm characteristics of the treatment (pilot) and control (non-pilot) groups measured based on 2004 Russell 3000 index firms. The sample consists firms whose fiscal year ending dates are between May 1, 2002 and June 30, 2004 for the *pre-event* period, between May 1, 2005 and June 30, 2007 for the *during-event* period, and between May 1, 2008 and June 30, 2010 for the *post-event* period. We require firms that have data available to calculate firm characteristics and 10-k filing size over time. Definitions of variables are listed in the Appendix.

VARIABLES	N	Mean	Median	SD
Filing size (in megabytes)	8,776	1.86	1.45	1.51
LOG (Filing size)	8,776	0.35	0.37	0.76
Uncertainty (%)	8,776	1.48	1.49	0.29
Size (in billions)	8,776	4803.37	973.58	13051.88
BM	8,776	0.57	0.47	0.43
Age	8,776	23.20	17.00	17.02
NBSEG	8,776	2.27	1.00	1.59
NGSEG	8,776	2.80	2.00	2.18
RET_VOL	8,776	0.13	0.11	0.07
EARN_VOL	8,776	0.06	0.03	0.07
ROA	8,776	0.02	0.05	0.15
NITEMS	8,776	359.19	362.00	27.34
SI	8,776	-0.02	0.00	0.06
IO	8,776	0.73	0.77	0.22
# of analysts	8,776	5.69	5.00	5.05
SEO	8,776	0.06	0.00	0.23
MA	8,776	0.39	0.00	0.49

Table 2: Firm characteristics before announcement of Regulation SHO

This table compares firm characteristics of the treatment (pilot) and control (non-pilot) groups one year before the announcement of the Regulation SHO (July 2004). Definitions of variables are listed in Appendix. We report the t-statistics of the two-sample t-test and z-statistics of Wilcoxon Ranksum test for the difference between the treatment and control groups. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Treatment			Control			Difference	
	Mean	Median	SD	Mean	Median	SD	T-stat	Wilcoxon
Log(filing size)	-0.01	0.10	0.73	0.03	0.10	0.70	-0.99	-0.84
Uncertainty	1.38	1.38	0.31	1.42	1.40	0.29	-2.09	-1.89
Log(size)	7.12	6.80	1.45	7.04	6.72	1.42	0.99	0.97
Log(BM)	-0.95	-0.87	0.67	-0.99	-0.92	0.67	1.11	1.12
Log(age)	2.88	2.77	0.65	2.84	2.64	0.65	1.11	1.34
Log(NBSEG)	1.07	0.69	0.43	1.07	0.69	-0.45	0.26	0.09
Log(NGSEG)	1.16	1.10	0.45	1.17	1.10	0.46	-0.53	-0.32
RET_VOL	0.12	0.11	0.06	0.13	0.11	0.07	-1.61	-1.00
EARN_VOL	0.06	0.04	0.07	0.07	0.04	0.09	-2.85	-1.57
ROA	0.03	0.05	0.11	0.03	0.05	0.13	0.97	0.25
Log(NITEMS)	5.80	5.81	0.04	5.80	5.80	0.04	0.91	0.97
SI	-0.01	0.00	0.03	-0.01	0.00	0.04	-0.37	-0.32
IO	0.66	0.69	0.20	0.66	0.69	0.21	0.33	0.05
Log(# of analysts)	5.72	4.00	5.73	5.37	4.00	5.23	1.17	0.56
SEO	0.07	0.00	0.25	0.08	0.00	0.27	-0.71	-0.71
MA	0.40	0.00	0.49	0.38	0.00	0.49	0.61	0.61

Table 3: Multivariate difference-in-differences (DiD) tests: annual report readability and Regulation SHO

This table presents how the relaxation of short-sale constraints affects annual report readability and tone ambiguity using OLS regressions. Column (1) reports the results in the following regression:

$$Log(file\ size_{i,t}) = \alpha + \beta_1 * pilot_i + \beta_2 * pilot_i * during_t + +Industry_j + Year_t + \varepsilon_{i,t}$$

where $Log(file\ size_{i,t})$ is the natural logarithm of 10-K document file size for firm *i* at year *t*. $Pilot_i$ is a dummy variable that equals one if a stock is selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $During_t$ is a dummy variable that equals one if the end of a firm's fiscal year t falls between May 2005 and June 2007 and zero otherwise. *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects, respectively. We omit $during_t$ to avoid multicollinearity. The sample includes pre-event (fiscal year ending date is between May 2002 and June 2004) and during-event (fiscal year ending date is between May 2005 and June 2007). Column (2) adds control variables in regression. Additionally, we present the regression results using a balanced sample in columns (3) and (4). We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Full Sample		Balanced Sample	
Variables	(1)	(2)	(3)	(4)
pilot	-0.059	-0.057	-0.068	-0.064
	(0.037)	(0.035)	(0.045)	(0.042)
*pilot*During*	**0.098*** **	**0.084** **	**0.124*** **	**0.107** **
	(0.037)	**(0.037)**	**(0.043)**	**(0.043)**
Log(firm size)		0.134***		0.136***
		(0.011)		(0.013)
Log(numbseg)		0.093***		0.093**
		(0.029)		(0.036)
Log(numgseg)		0.031		0.015
		(0.029)		(0.037)
Log(BM)		0.074***		0.089***
		(0.018)		(0.025)
Earn_vol		0.090		0.019
		(0.135)		(0.213)
SI		0.158		0.393*
		(0.196)		(0.209)
Ret_vol		1.116***		1.361***
		(0.179)		(0.235)
ROA		-0.526***		-0.625***
		(0.103)		(0.144)
Log (firm age)		-0.052**		-0.035
		(0.023)		(0.031)
Log (# of non-missing items)		1.678***		1.984***
		(0.361)		(0.457)
SEO		-0.003		0.016
		(0.037)		(0.048)
MA		0.041**		0.032
		(0.021)		(0.025)
Observations	6,112	6,112	4,409	4,409
R-squared	0.184	0.257	0.192	0.266
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 4: Multivariate difference-in-differences (DiD) test: reverse of SHO

This table examines how the relaxation of short-sale constraints affects annual report readability for non-pilot stocks. The SEC eliminated short-sale price tests for all exchange-listed stocks on July 6, 2007. We run DiD tests using the sample from during-event (fiscal year ending date is between May 2005 and June 2007) period to post-event (fiscal year ending date is between May 2008 and June 2010) period. The regression in column (1) is as follows:

$$Log(file\ size_{i,t}) = \alpha + \beta_1 * nonpilot_i + \beta_2 * nonpilot_i * post_t + Industry_j + Year_t + \varepsilon_{i,t}$$

where $Log(file\ size_{i,t})$ is the natural logarithm of 10-K document file size for firm *i* at year *t*. $nonpilot_i$ is a dummy variable that equals one if a stock is not selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $Post_t$ is a dummy variable that equals one if the end of a firm's fiscal year *t* falls between May 2008 and June 2010 and zero otherwise. We omit *post* to avoid multicollinearity. *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects, respectively. Column (2) adds control variables in regression. Additionally, we present the regression results using a balanced sample in columns (3) and (4). We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Full Sample		Balanced Sample	
Variables	(1)	(2)	(3)	(4)
Nonpilot	-0.038	-0.023	-0.052	-0.044
	(0.030)	(0.029)	(0.036)	(0.035)
*Nonpilot*Post*	**0.071****	**0.056***	**0.079****	**0.068****
	(0.030)	**(0.029)**	**(0.032)**	**(0.032)**
Log(firm size)		0.141***		0.143***
		(0.010)		(0.012)
Log(numbseg)		0.112***		0.107***
		(0.028)		(0.034)
Log(numgseg)		0.026		-0.012
		(0.026)		(0.031)
Log(BM)		0.071***		0.070***
		(0.017)		(0.022)
Earn_vol		0.197		0.173
		(0.146)		(0.214)
SI		0.184		0.199
		(0.120)		(0.152)
Ret_vol		0.506***		0.496***
		(0.137)		(0.163)
ROA		-0.500***		-0.410***
		(0.106)		(0.146)
Log (firm age)		-0.002		0.007
		(0.022)		(0.027)
Log (# of non-missing items)		1.844***		1.954***
		(0.324)		(0.380)
SEO		0.030		0.031
		(0.038)		(0.045)
MA		0.034*		0.038*
		(0.019)		(0.022)
Observations	5,763	5,763	4,340	4,340
R-squared	0.129	0.242	0.140	0.252
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 5: Annual report readability and Regulation SHO: sample partitioned by short-sale constraints

This table describes how the relaxation of short-sale constraints impacts the effect of short selling on annual report readability. We use short interests and institutional ownership as proxies for short-sale constraints. We repeat the DiD tests in Table 3 across each proxy and report regression results using full sample in Panel A. Additionally, we present the results using a balanced sample in Panel B. We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Panel A: full sample				
	(1)	(2)	(3)	(4)
VARIABLES	High IO	Low IO	High SI	Low SI
Pilot	-0.012	-0.104**	0.020	-0.107**
	(0.048)	(0.048)	(0.049)	(0.042)
*Pilot*During*	**0.038**	**0.137****	**0.006**	**0.134*****
	(0.050)	**(0.055)**	**(0.054)**	**(0.051)**
Log(firm size)	0.122***	0.136***	0.129***	0.143***
	(0.018)	(0.012)	(0.017)	(0.012)
Log(numbseg)	0.095**	0.102**	0.078*	0.114***
	(0.038)	(0.041)	(0.041)	(0.036)
Log(numgseg)	0.008	0.053	0.063	0.012
	(0.038)	(0.038)	(0.041)	(0.034)
Log(BM)	0.055**	0.084***	0.041*	0.100***
	(0.025)	(0.024)	(0.022)	(0.025)
Earn_vol	0.153	0.138	0.053	0.064
	(0.239)	(0.150)	(0.179)	(0.171)
SI	-0.052	0.436*	-0.256	0.604**
	(0.292)	(0.242)	(0.307)	(0.258)
Ret_vol	1.778***	0.655***	0.856***	1.183***
	(0.283)	(0.226)	(0.258)	(0.243)
ROA	-0.599***	-0.561***	-0.338***	-0.781***
	(0.173)	(0.121)	(0.125)	(0.147)
Log (firm age)	-0.014	-0.075**	-0.017	-0.069**
	(0.029)	(0.033)	(0.030)	(0.028)
Log (# of non-missing items)	1.177**	2.089***	1.188**	1.923***
	(0.525)	(0.462)	(0.474)	(0.437)
SEO	-0.008	-0.015	-0.047	0.060
	(0.049)	(0.056)	(0.050)	(0.054)
MA	0.045	0.039	0.058*	0.031
	(0.028)	(0.029)	(0.030)	(0.026)
Observations	3,054	3,058	2,689	3,423
R-squared	0.247	0.293	0.205	0.306
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Panel B: balanced sample				
	(1)	(2)	(3)	(4)
VARIABLES	High IO	Low IO	High SI	Low SI
Pilot	0.023	-0.145**	0.010	-0.119**
	(0.058)	(0.057)	(0.061)	(0.049)
*Pilot*During*	**0.032**	**0.188*** **	**0.035**	**0.149** **
	(0.059)	**(0.064)**	**(0.065)**	**(0.059)**
Log(firm size)	0.124***	0.135***	0.132***	0.141***
	(0.023)	(0.015)	(0.022)	(0.015)
Log(numbseg)	0.076*	0.117**	0.057	0.126***
	(0.046)	(0.053)	(0.050)	(0.045)
Log(numgseg)	0.003	0.030	0.039	-0.009
	(0.049)	(0.048)	(0.054)	(0.042)
Log(BM)	0.065*	0.101***	0.042	0.132***
	(0.035)	(0.034)	(0.034)	(0.033)
Earn_vol	0.092	0.065	-0.009	0.001
	(0.356)	(0.247)	(0.288)	(0.253)
SI	0.219	0.629**	0.415	0.485*
	(0.298)	(0.316)	(0.457)	(0.249)
Ret_vol	1.635***	1.219***	0.964***	1.413***
	(0.375)	(0.312)	(0.331)	(0.324)
ROA	-0.619***	-0.648***	-0.552***	-0.733***
	(0.232)	(0.173)	(0.167)	(0.207)
Log (firm age)	-0.017	-0.030	-0.025	-0.037
	(0.038)	(0.045)	(0.041)	(0.038)
Log (# of non-missing items)	1.565**	2.381***	1.491**	2.240***
	(0.684)	(0.560)	(0.609)	(0.532)
SEO	0.003	0.029	-0.038	0.071
	(0.058)	(0.077)	(0.068)	(0.065)
MA	0.018	0.046	0.036	0.032
	(0.034)	(0.035)	(0.036)	(0.032)
Observations	2,203	2,206	1,942	2,467
R-squared	0.242	0.317	0.197	0.329
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 6: Annual report readability and Regulation SHO: sample partitioned by information asymmetry

This table describes how information asymmetry impacts the relation between the relaxation of short-sale constraints and annual report readability. We use size and analysts' coverage to measure information asymmetry. We repeat the DiD tests in Table 3 across different subgroups and report regression results using full sample in Panel A. Additionally, we present the results using a balanced sample in Panel B. We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Panel A: full sample				
	(1)	(2)	(3)	(4)
VARIABLES	High Analysts	Low Analysts	Large stocks	Small Stocks
Pilot	-0.030	-0.100*	-0.057	-0.057
	(0.044)	(0.051)	(0.051)	(0.048)
*Pilot*During*	**-0.009**	**0.208*** **	**0.070**	**0.128** **
	(0.047)	**(0.058)**	**(0.051)**	**(0.054)**
Log(firm size)	0.119***	0.123***		
	(0.014)	(0.021)		
Log(numbseg)	0.049	0.169***	0.070*	0.185***
	(0.035)	(0.045)	(0.039)	(0.043)
Log(numgseg)	-0.015	0.104**	0.061	0.081**
	(0.036)	(0.041)	(0.044)	(0.038)
Log(BM)	0.058***	0.083***	0.010	0.028
	(0.021)	(0.027)	(0.026)	(0.022)
Earn_vol	0.002	0.108	0.015	-0.045
	(0.188)	(0.173)	(0.245)	(0.151)
SI	0.005	0.297	0.170	-0.022
	(0.266)	(0.269)	(0.377)	(0.234)
Ret_vol	0.762***	1.341***	0.693**	0.915***
	(0.251)	(0.253)	(0.313)	(0.217)
ROA	-0.557***	-0.483***	-0.657***	-0.250**
	(0.136)	(0.135)	(0.216)	(0.108)
Log (firm age)	-0.035	-0.068*	0.055*	-0.139***
	(0.028)	(0.035)	(0.029)	(0.036)
Log (# of non-missing items)	1.780***	1.259**	1.847***	1.735***
	(0.465)	(0.506)	(0.527)	(0.498)
SEO	-0.032	-0.001	0.023	-0.027
	(0.051)	(0.057)	(0.061)	(0.045)
MA	0.017	0.060*	0.083***	0.065**
	(0.026)	(0.032)	(0.028)	(0.029)
Observations	3,390	2,722	3,058	3,054
R-squared	0.244	0.277	0.223	0.253
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Panel B: balanced sample				
	(1)	(2)	(3)	(4)
VARIABLES	High Analysts	Low Analysts	Large stocks	Small Stocks
Pilot	-0.018	-0.138**	-0.072	-0.052
	(0.053)	(0.061)	(0.060)	(0.058)
*Pilot*During*	**-0.007**	**0.254*** **	**0.082**	**0.139** **
	(0.055)	**(0.068)**	**(0.058)**	**(0.064)**
Log(firm size)	0.116***	0.144***		
	(0.017)	(0.025)		
Log(numbseg)	0.048	0.162***	0.078	0.166***
	(0.043)	(0.056)	(0.048)	(0.053)
Log(numgseg)	-0.041	0.089*	0.074	0.030
	(0.047)	(0.052)	(0.053)	(0.049)
Log(BM)	0.071**	0.107***	0.006	0.064**
	(0.031)	(0.038)	(0.037)	(0.032)
Earn_vol	-0.070	0.125	0.126	-0.188
	(0.267)	(0.309)	(0.420)	(0.225)
SI	0.258	0.484	0.071	0.377
	(0.296)	(0.302)	(0.302)	(0.280)
Ret_vol	0.771**	1.704***	0.452	1.441***
	(0.336)	(0.329)	(0.411)	(0.285)
ROA	-0.609***	-0.588***	-0.701**	-0.324**
	(0.182)	(0.190)	(0.289)	(0.156)
Log (firm age)	-0.017	-0.055	0.079**	-0.108**
	(0.037)	(0.047)	(0.038)	(0.048)
Log (# of non-missing items)	1.933***	1.567**	1.875***	2.261***
	(0.591)	(0.611)	(0.658)	(0.647)
SEO	-0.012	0.018	0.019	0.018
	(0.065)	(0.074)	(0.084)	(0.059)
MA	0.006	0.054	0.071**	0.043
	(0.032)	(0.038)	(0.033)	(0.037)
Observations	2,398	2,011	2,207	2,202
R-squared	0.256	0.299	0.246	0.266
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 7: Annual report readability and Regulation SHO: sample partitioned by bad news

This table describes whether the relation between the relaxation of short-sale constraints and annual report readability is uniform across bad and good news firms. If a firm's ROE is below (above or equal) the industry median, we define this firm has bad (good) news. We repeat the DiD tests in Table 3 across different subgroups and report regression results using full sample in column (1) and (2). Additionally, we present the results using a balanced sample in column (3) and (4). We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Full Sample		Balanced Sample	
	(1)	(2)	(3)	(4)
VARIABLES	Good News	Bad News	Good News	Bad News
Pilot	-0.054	-0.079	-0.009	-0.122*
	(0.043)	(0.052)	(0.053)	(0.065)
*Pilot*During*	**0.080***	**0.106***	**0.080**	**0.181****
	(0.048)	**(0.061)**	**(0.056)**	**(0.075)**
Log(firm size)	0.137***	0.143***	0.122***	0.139***
	(0.013)	(0.014)	(0.018)	(0.021)
Log(numbseg)	0.081**	0.105***	0.036	0.183***
	(0.036)	(0.039)	(0.047)	(0.053)
Log(numgseg)	0.014	0.062	0.069	0.008
	(0.037)	(0.039)	(0.050)	(0.060)
Log(BM)	0.072***	0.057***	0.032	0.099***
	(0.025)	(0.022)	(0.036)	(0.036)
Earn_vol	0.245	-0.092	-0.097	-0.299
	(0.194)	(0.156)	(0.274)	(0.290)
SI	-0.671	0.474**	-0.409	0.611**
	(0.464)	(0.213)	(0.684)	(0.250)
Ret_vol	1.500***	0.548**	1.813***	0.416
	(0.260)	(0.247)	(0.329)	(0.348)
ROA	-0.628***	-0.605***	-0.995***	-0.868***
	(0.189)	(0.126)	(0.309)	(0.197)
Log (firm age)	-0.032	-0.082**	-0.026	-0.104**
	(0.027)	(0.033)	(0.038)	(0.049)
Log (# of non-missing items)	1.458***	1.938***	1.683***	2.414***
	(0.459)	(0.481)	(0.645)	(0.664)
SEO	0.029	-0.077	0.023	-0.033
	(0.050)	(0.053)	(0.058)	(0.069)
MA	0.058**	0.007	0.038	0.001
	(0.026)	(0.031)	(0.032)	(0.041)
Observations	3,823	2,289	2,884	1,525
R-squared	0.268	0.276	0.354	0.403
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 8: Annual report readability and Regulation SHO: sample partitioned by governance

This table describes how corporate governance impacts the relation between the relaxation of short-sale constraints and annual report readability. We use the index of Gompers, Ishii, and Metrick (2003) to capture corporate governance. We repeat the DiD tests in Table 3 across different subgroups and report regression results using full sample in Panel A. Additionally, we present the results using a balanced sample in column (3) and (4). We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Full Sample		Balanced Sample	
	(1)	(2)	(3)	(4)
VARIABLES	High Governance	Low Governance	High Governance	Low Governance
Pilot	-0.064	-0.063	-0.090*	-0.041
	(0.043)	(0.056)	(0.054)	(0.063)
*Pilot*During*	**0.059**	**0.118****	**0.074**	**0.134****
	(0.048)	**(0.059)**	**(0.058)**	**(0.064)**
Log(firm size)	0.123***	0.166***	0.118***	0.171***
	(0.013)	(0.019)	(0.016)	(0.022)
Log(numbseg)	0.117***	0.076	0.124**	0.055
	(0.037)	(0.046)	(0.048)	(0.054)
Log(numgseg)	0.052	-0.000	0.025	0.006
	(0.033)	(0.052)	(0.044)	(0.061)
Log(BM)	0.063***	0.086**	0.067**	0.136***
	(0.020)	(0.034)	(0.029)	(0.045)
Earn_vol	-0.120	0.875***	-0.258	1.132**
	(0.138)	(0.315)	(0.198)	(0.465)
SI	0.059	0.606*	0.262	0.612
	(0.245)	(0.340)	(0.232)	(0.445)
Ret_vol	0.994***	1.189***	1.511***	0.737
	(0.199)	(0.386)	(0.271)	(0.465)
ROA	-0.401***	-1.033***	-0.472***	-0.939***
	(0.105)	(0.267)	(0.145)	(0.347)
Log (firm age)	-0.104***	-0.009	-0.080*	-0.007
	(0.031)	(0.034)	(0.045)	(0.044)
Log (# of non-missing items)	0.929*	2.968***	1.175*	3.236***
	(0.488)	(0.507)	(0.645)	(0.575)
SEO	-0.009	-0.063	0.020	-0.071
	(0.043)	(0.071)	(0.058)	(0.081)
MA	0.048*	0.029	0.061*	-0.009
	(0.027)	(0.032)	(0.034)	(0.036)
Observations	3,739	2,373	2,537	1,872
R-squared	0.273	0.276	0.295	0.281
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 9: Determinants of tone ambiguity in annual reports

This table reports the regression results of tone ambiguity in annual reports on potential determinants. The dependent variable is the proportion of uncertainty words defined by Loughran and McDonald (2011). The independent variables include firm size, ROA, firm age, return volatility, earnings volatility, the numbers of business and geographic segments, a seasoned equity offer dummy variable, and a merger and acquisition dummy variable. The sample period spans from 1994 to 2015. Variable definitions are provided in the Appendix. We use the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects in column (2). Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)
VARIABLES	uncertainty	uncertainty
Log(size)	0.043***	0.019***
	(0.002)	(0.001)
ROA	-0.143***	-0.063***
	(0.015)	(0.012)
Age	-0.057***	-0.069***
	(0.005)	(0.004)
Ret_vol	0.222***	0.179***
	(0.023)	(0.021)
Earn_vol	0.288***	0.075***
	(0.029)	(0.027)
Log(numbseg)	-0.015**	-0.058***
	(0.007)	(0.006)
Log(numgseg)	0.018**	0.015**
	(0.007)	(0.007)
SEO	0.057***	0.036***
	(0.007)	(0.005)
MA	-0.054***	0.008**
	(0.004)	(0.003)
Constant	1.190***	1.000***
	(0.016)	(0.016)
Observations	75,869	75,869
R-squared	0.068	0.493
Industry FE	NO	YES
Year FE	NO	YES

Table 10: Multivariate difference-in-differences (DiD) tests: tone ambiguity and Regulation SHO

This table reports the multivariate DiD tests on how the relaxation of short-sale constraints affects tone ambiguity in annual report using OLS regressions. We run the following regressions:

$$Uncertain_{i,t} = \alpha + \beta_1 * pilot_i + \beta_2 * pilot_i * during_t + Industry_j + Year_t + \varepsilon_{i,t}$$

where $Uncertain_{i,t}$is the proportion of uncertain words in 10-Ks based on Loughran and McDonald (2011) for firm *i* at year *t*. $Pilot_i$ is a dummy variable that equals one if a stock is selected as a pilot stock in Regulation SHO's pilot program and zero otherwise. $During_t$ is a dummy variable that equals one if the end of a firm's fiscal year t falls between May 2005 and June 2007 and zero otherwise. We omit *during* to avoid multicollinearity. The sample includes *pre-event* (fiscal year ending date is between May 2002 and June 2004) and *during-event* (fiscal year ending date is between May 2005 and June 2007). *Industry* and *Year* are the industry fixed effects (2 digits SIC codes) and fiscal year fixed effects, respectively. Additionally, we present the results using a balanced sample in column (3) and (4). We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

	Full Sample		Balanced Sample	
	(1)	(2)	(3)	(4)
VARIABLES	uncertainty	uncertainty	uncertainty	uncertainty
Pilot	-0.029*	-0.020	-0.041**	-0.030*
	(0.015)	(0.014)	(0.017)	(0.016)
*Pilot*During*	**0.027****	**0.025****	**0.040*****	**0.034*****
	(0.013)	**(0.012)**	**(0.013)**	**(0.013)**
Log(size)		0.015***		0.024***
		(0.004)		(0.006)
ROA		-0.043		-0.026
		(0.037)		(0.052)
Age		-0.110***		-0.114***
		(0.009)		(0.013)
Ret_vol		0.479***		0.580***
		(0.075)		(0.098)
Earn_vol		0.274***		0.320***
		(0.062)		(0.099)
Log(numbseg)		-0.066***		-0.049***
		(0.013)		(0.017)
Log(numgseg)		0.003		-0.010
		(0.012)		(0.015)
SEO		0.034**		0.061***
		(0.016)		(0.022)
MA		0.018**		0.003
		(0.008)		(0.010)
Observations	6,112	6,112	4,409	4,409
R-squared	0.157	0.263	0.143	0.239
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Table 11: Multivariate difference-in-differences (DiD) tests: alternative test periods

This table repeats the multivariate DiD tests on how the relaxation of short-sale constraints affects annual report readability and tone ambiguity in Tables 3 and 10 using alternative experiment periods. The sample includes firms whose fiscal year ending date is between January 1, 2001 and December 31, 2003 (pre-event period) and firms whose fiscal year ending date is between January 1, 2005 and December 31, 2007(during-event period). The sample is balanced in which require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Panel A: annual report readability		
Variables	(1)	(2)
pilot	-0.075*	-0.057
	(0.042)	(0.038)
*pilot*During*	**0.126*** **	**0.104** **
	(0.041)	**(0.041)**
Log(firm size)		0.132***
		(0.013)
Log(numbseg)		0.074**
		(0.037)
Log(numgseg)		0.055
		(0.037)
Log(BM)		0.107***
		(0.024)
Earn_vol		0.005
		(0.219)
SI		0.285
		(0.253)
Ret_vol		0.862***
		(0.203)
ROA		-0.743***
		(0.170)
Log (firm age)		-0.032
		(0.031)
Log (# of non-missing items)		1.721***
		(0.409)
SEO		-0.031
		(0.045)
MA		0.067***
		(0.024)
Observations	4,952	4,952
R-squared	0.382	0.441
Industry FE	YES	YES
Year FE	YES	YES

Panel B: tone ambiguity		
VARIABLES	(1)	(2)
Pilot	-0.045**	-0.028*
	(0.018)	(0.017)
*Pilot*During*	**0.046*** **	**0.036** **
	(0.015)	**(0.015)**
Log(size)		0.026***
		(0.006)
ROA		-0.035**
		(0.018)
Age		-0.013
		(0.017)
Ret_vol		0.339***
		(0.112)
Earn_vol		0.655***
		(0.086)
Log(numbseg)		-0.089
		(0.063)
Log(numgseg)		-0.119***
		(0.014)
SEO		0.050**
		(0.020)
MA		-0.002
		(0.010)
Observations	4,952	4,952
R-squared	0.214	0.306
Industry FE	YES	YES
Year FE	YES	YES

Table 12: Multivariate difference-in-differences (DiD) tests: firm fixed effect

This table repeats the multivariate DiD tests on how the relaxation of short-sale constraints affects annual report readability and tone ambiguity in Tables 3 and 10 by adding firm fixed effects. The sample includes pre-event (fiscal year ending date is between May 2002 and June 2004) and during-event (fiscal year ending date is between May 2005 and June 2007). The sample is balanced in which require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Panel A: annual report readability		
Variables	(1)	(2)
*Pilot*During*	**0.120****	**0.105****
	(0.049)	**(0.049)**
Log(firm size)		0.057
		(0.040)
Log(numbseg)		0.124*
		(0.069)
Log(numgseg)		-0.002
		(0.069)
Log(BM)		0.031
		(0.037)
Earn_vol		0.328
		(0.301)
SI		0.364
		(0.256)
Ret_vol		0.887***
		(0.273)
ROA		-0.475***
		(0.175)
Log (firm age)		-0.291
		(0.237)
Log (# of non-missing items)		1.354***
		(0.513)
SEO		0.002
		(0.047)
MA		-0.005
		(0.025)
Observations	4,409	4,409
R-squared	0.670	0.676
Industry FE	YES	YES
Year FE	YES	YES

Panel B: tone ambiguity		
Variables	(1)	(2)
*Pilot*During*	**0.031****	**0.026***
	(0.015)	**(0.015)**
Log(size)		0.031***
		(0.010)
ROA		-0.090**
		(0.040)
Age		-0.200***
		(0.067)
Ret_vol		0.240***
		(0.079)
Earn_vol		0.246***
		(0.092)
Log(numbseg)		-0.044**
		(0.021)
Log(numgseg)		0.027
		(0.020)
SEO		0.027*
		(0.016)
MA		0.015*
		(0.008)
Observations	4,409	4,409
R-squared	0.764	0.770
Industry FE	YES	YES
Year FE	YES	YES

Table 13: Placebo tests

This table reports the placebo tests results. We assume that the Regulation SHO is effective from May, 2002 to June, 2004. We repeat the DiD tests in Tables 3 and 10 using the same set of pilot and non-pilot stocks in Panels A and B using the balanced sample. We require firms to be in the sample over the pre-event and during-event periods for the balanced sample. Variable definitions are provided in the Appendix. Standard errors clustered by firms are displayed in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent levels, respectively.

Panel A: annual report readability		
Variables	(1)	(2)
Pilot	-0.034	-0.020
	(0.035)	(0.032)
*Pilot*During*	**-0.043**	**-0.052**
	(0.040)	**(0.040)**
Log(firm size)		0.140***
		(0.012)
Log(numbseg)		0.084**
		(0.034)
Log(numgseg)		0.062*
		(0.035)
Log(BM)		0.142***
		(0.022)
Earn_vol		0.210
		(0.232)
SI		-0.101
		(0.261)
Ret_vol		0.861***
		(0.178)
ROA		-0.705***
		(0.145)
Log (firm age)		-0.059**
		(0.025)
Log (# of non-missing items)		0.835**
		(0.347)
SEO		0.006
		(0.040)
MA		0.075***
		(0.024)
Observations	4,523	4,523
R-squared	0.246	0.326
Industry FE	YES	YES
Year FE	YES	YES

Panel B: tone ambiguity		
VARIABLES	(1)	(2)
Pilot	-0.026	-0.016
	(0.020)	(0.018)
*Pilot*During*	**-0.000**	**0.008**
	(0.015)	**(0.014)**
Log(size)		0.028***
		(0.005)
ROA		-0.047***
		(0.016)
Age		-0.011
		(0.018)
Ret_vol		0.607***
		(0.109)
Earn_vol		0.635***
		(0.075)
Log(numbseg)		-0.139**
		(0.056)
Log(numgseg)		-0.113***
		(0.012)
SEO		0.048**
		(0.019)
MA		0.005
		(0.010)
Observations	4,523	4,523
R-squared	0.164	0.299
Industry FE	YES	YES
Year FE	YES	YES