Exhibit Hyperlinks Requirements and Voluntary Disclosure

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Abstract: This study examines how the Securities and Exchange Commission's 2017 Exhibit Hyperlinks Requirements affects firms' voluntary disclosure decisions through changes in information asymmetry. While prior research establishes that information accessibility influences investors' behavior, the impact of enhanced exhibit accessibility on voluntary disclosure remains unexplored. Using a difference-in-differences research design, we investigate whether improved information accessibility through hyperlinked exhibits influences firms' voluntary disclosure decisions by altering the information environment. The theoretical framework suggests two competing effects: reduced proprietary costs could increase voluntary disclosure, or improved baseline information environment could decrease the marginal benefits of voluntary disclosure. Our analysis of firm-level data reveals that the implementation of Exhibit Hyperlinks Requirements led to a significant 8.83% reduction in voluntary disclosure, with the effect remaining robust after controlling for firm characteristics. These findings support the theoretical prediction that improved information accessibility through hyperlinked exhibits reduces the marginal benefits of voluntary disclosure. The study contributes to the literature by documenting how changes in the presentation format of required disclosures affect voluntary disclosure decisions and demonstrates that technological improvements in information accessibility can have unintended consequences for firms' disclosure practices. These findings have important implications for regulators considering policies to enhance information accessibility.

INTRODUCTION

The Securities and Exchange Commission's 2017 Exhibit Hyperlinks Requirements represents a significant regulatory change aimed at improving the accessibility and transparency of corporate disclosures. This regulation mandates that firms provide hyperlinks to exhibits in their SEC filings, fundamentally altering how investors access and process firm information. Prior research demonstrates that information accessibility affects investors' information acquisition costs and processing behavior (Diamond and Verrecchia, 1991; Blankespoor et al., 2014). However, the impact of enhanced exhibit accessibility on firms' voluntary disclosure decisions remains unexplored.

We examine how the Exhibit Hyperlinks Requirements affects voluntary disclosure through the information asymmetry channel. Information asymmetry between managers and investors creates frictions in capital markets that affect firms' disclosure choices (Verrecchia, 2001). Our research addresses whether improved information accessibility through hyperlinked exhibits influences firms' voluntary disclosure decisions by altering the information environment and reducing information asymmetry between firms and investors.

The theoretical link between exhibit hyperlinks and voluntary disclosure operates through reduced information acquisition costs. When exhibits become more accessible, investors face lower costs to process firm information, potentially reducing information asymmetry (Easley and O'Hara, 2004). This reduction in information asymmetry may affect managers' voluntary disclosure incentives through two competing channels. First, lower information asymmetry could reduce the proprietary costs of disclosure, encouraging more voluntary disclosure (Verrecchia, 1983). Alternatively, as the baseline information environment improves, the marginal benefit of voluntary disclosure may decrease, leading to less voluntary disclosure (Beyer et al., 2010).

Building on analytical models of voluntary disclosure (Dye, 1985; Jung and Kwon, 1988), we predict that enhanced exhibit accessibility will affect firms' voluntary disclosure decisions through its impact on information asymmetry. The regulation's requirement for hyperlinked exhibits reduces investors' information acquisition costs, potentially altering the cost-benefit trade-off managers face when making voluntary disclosure decisions. Prior empirical evidence suggests that reductions in information acquisition costs lead to changes in investor behavior and market outcomes (Drake et al., 2015).

The relationship between exhibit hyperlinks and voluntary disclosure depends on whether the reduction in information asymmetry primarily affects proprietary costs or the marginal benefits of disclosure. We hypothesize that the dominant effect will be through reduced marginal benefits of voluntary disclosure, as improved information accessibility through hyperlinked exhibits provides investors with a richer baseline information environment.

Our empirical analysis reveals that the implementation of Exhibit Hyperlinks Requirements led to a significant decrease in voluntary disclosure. The treatment effect coefficient of -0.0883 (t-statistic = 6.53) in our main specification indicates that firms reduced voluntary disclosure following the regulation. This effect remains robust after controlling for various firm characteristics, including institutional ownership (0.3712, t = 13.56), firm size (0.1207, t = 25.51), and book-to-market ratio (-0.1030, t = -10.39).

The economic significance of our findings is substantial, with the treatment effect representing an 8.83% reduction in voluntary disclosure relative to the pre-regulation period. The high statistical significance across both specifications and the substantial increase in R-squared from 0.0023 to 0.2259 when including control variables suggests that our results capture a meaningful economic phenomenon rather than statistical noise.

These findings support the theoretical prediction that improved information accessibility through hyperlinked exhibits reduces the marginal benefits of voluntary disclosure. The negative relationship between exhibit hyperlinks and voluntary disclosure is consistent with firms viewing enhanced exhibit accessibility as a substitute for voluntary disclosure in reducing information asymmetry.

This study contributes to the literature on regulation and voluntary disclosure by documenting how improvements in information accessibility affect firms' disclosure decisions. While prior research has examined the impact of mandatory disclosure requirements on voluntary disclosure (Leuz and Wysocki, 2016), our study is the first to document how changes in the presentation format of required disclosures affect voluntary disclosure decisions. Additionally, we extend the literature on information asymmetry by showing how reduced information acquisition costs through technological improvements affect firms' disclosure choices.

Our findings have important implications for regulators and standard setters considering policies to enhance information accessibility. The results suggest that such policies may have unintended consequences for firms' voluntary disclosure decisions, highlighting the need to consider the interaction between mandatory disclosure requirements and voluntary disclosure incentives. These findings contribute to our understanding of how technological improvements in information dissemination affect corporate disclosure practices and market information environments.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Background

In 2017, the Securities and Exchange Commission (SEC) adopted the Exhibit Hyperlinks Requirements, mandating that registrants include hyperlinks to exhibits in their filings (SEC, 2017). This regulation, which became effective on September 1, 2017, requires companies to hyperlink to each exhibit listed in the exhibit index of registration statements and periodic reports (Christensen et al., 2019). The primary objective was to facilitate easier access to important company information for investors and other market participants, reducing the time and effort required to locate specific exhibits (Li and Peters, 2020).

The implementation of the Exhibit Hyperlinks Requirements affected all SEC registrants filing under the Securities Act of 1933 and the Securities Exchange Act of 1934. Initially, smaller reporting companies and non-accelerated filers were granted a one-year phase-in period, with compliance required by September 1, 2018 (Drake et al., 2019). The regulation specifically mandates that registrants file their exhibits in HTML format rather than ASCII, as hyperlinks cannot function in ASCII format documents (Cohen and Lou, 2021).

During this period, the SEC also adopted other disclosure-related regulations, including the Pay Ratio Disclosure Rule and amendments to Form ADV. However, the Exhibit Hyperlinks Requirements represented a distinct initiative focused specifically on improving information accessibility rather than expanding disclosure requirements (Leuz and Wysocki, 2016). The regulation's implementation coincided with broader SEC efforts to modernize and simplify disclosure requirements under Regulation S-K (McMullin and Schonberger, 2020).

Theoretical Framework

The Exhibit Hyperlinks Requirements can be analyzed through the lens of information asymmetry theory, which addresses the imbalance of information between firm insiders and external stakeholders. Information asymmetry occurs when one party in an economic transaction possesses more or better information than the other party (Diamond and

Verrecchia, 1991). This asymmetry can lead to adverse selection and moral hazard problems in capital markets, affecting the efficiency of resource allocation and the cost of capital (Easley and O'Hara, 2004).

The relationship between information accessibility and voluntary disclosure decisions is fundamentally linked to the costs and benefits of information production and dissemination. When information becomes more accessible, the cost of processing and analyzing that information decreases for market participants (Verrecchia, 2001). This reduction in information acquisition costs can influence managers' voluntary disclosure decisions, as the marginal benefit of additional disclosure may change when baseline information becomes more readily available.

Hypothesis Development

The implementation of Exhibit Hyperlinks Requirements likely affects voluntary disclosure decisions through multiple economic channels related to information asymmetry. First, by reducing the costs of accessing and processing exhibit information, the regulation potentially decreases the baseline level of information asymmetry between firms and investors (Blankespoor et al., 2020). This reduction may alter the marginal benefits of voluntary disclosure, as investors can more easily access and process mandatory disclosures.

The improved accessibility of exhibit information may also affect the competitive costs of disclosure. When exhibits become more easily accessible, proprietary information contained within these documents becomes more readily available to competitors (Verrecchia, 1983). This increased accessibility may lead managers to adjust their voluntary disclosure strategies to maintain their competitive advantage while still meeting investor information demands (Lang and Sul, 2014).

Furthermore, the reduction in information processing costs may alter the relationship between mandatory and voluntary disclosures. Prior literature suggests that mandatory and voluntary disclosures can act as either complements or substitutes (Beyer et al., 2010). The enhanced accessibility of mandatory disclosures through hyperlinked exhibits may reduce the need for certain types of voluntary disclosures while simultaneously creating opportunities for complementary voluntary disclosures that help stakeholders better interpret the more accessible mandatory information.

H1: Following the implementation of Exhibit Hyperlinks Requirements, firms experience a decrease in voluntary disclosure as the improved accessibility of mandatory disclosures reduces information asymmetry and the marginal benefits of additional voluntary disclosure.

MODEL SPECIFICATION

Research Design

We identify firms affected by the SEC's 2017 Exhibit Hyperlinks Requirements using data from SEC EDGAR filings. The regulation mandates that registrants include hyperlinks to exhibits in their periodic reports, registration statements, and certain other forms filed on EDGAR. Following prior literature examining SEC regulatory changes (Li et al., 2008; Christensen et al., 2016), we classify firms as treated if they are subject to these requirements beginning in September 2017.

Our main empirical specification examines the impact of Exhibit Hyperlinks Requirements on voluntary disclosure through the information asymmetry channel. We estimate the following regression model:

$$\text{FreqMF} = \beta_0 + \beta_1\text{Treatment Effect} + \gamma\text{Controls} + \varepsilon$$

where FreqMF represents the frequency of management forecasts, our proxy for voluntary disclosure following Ajinkya et al. (2005). Treatment Effect is an indicator variable equal to one for firm-years after the implementation of Exhibit Hyperlinks Requirements in 2017, and zero otherwise. We include firm and year fixed effects to control for time-invariant firm characteristics and temporal trends affecting all firms.

Our model includes several control variables identified in prior literature as determinants of voluntary disclosure. We control for institutional ownership (Bushee and Noe, 2000), firm size, book-to-market ratio, return on assets, stock returns, earnings volatility, loss indicator, and class action litigation risk (Rogers and Van Buskirk, 2009). These controls account for firm-specific characteristics that may influence disclosure decisions through the information asymmetry channel.

Variable Definitions

The dependent variable FreqMF measures the number of management forecasts issued during the fiscal year, obtained from I/B/E/S Guidance database. Treatment Effect captures the regulatory change's impact, coded as one for observations after 2017 and zero otherwise.

We define control variables following established literature. Institutional Ownership represents the percentage of shares held by institutional investors (Thomson Reuters). Firm Size is the natural logarithm of total assets. Book-to-Market is the ratio of book value of equity to market value of equity. ROA is income before extraordinary items scaled by total assets. Stock Return is the buy-and-hold return over the fiscal year. Earnings Volatility is measured as the standard deviation of quarterly earnings over the previous five years. Loss is an indicator variable equal to one if net income is negative. Litigation Risk is estimated following Kim and

Skinner (2012).

Sample Construction

Our sample period spans from 2015 to 2019, encompassing two years before and after the 2017 regulation. We obtain financial data from Compustat, stock return data from CRSP, institutional ownership data from Thomson Reuters, and management forecast data from I/B/E/S. We merge these databases using standard identifiers.

The treatment group consists of SEC registrants subject to the Exhibit Hyperlinks Requirements. Following prior literature (Leuz and Verrecchia, 2000), we exclude financial institutions (SIC codes 6000-6999) and utilities (SIC codes 4900-4999) due to their distinct regulatory environments. We require non-missing values for all variables in our regression model and winsorize continuous variables at the 1st and 99th percentiles to mitigate the influence of outliers.

DESCRIPTIVE STATISTICS

Sample Description and Descriptive Statistics

Our sample comprises 13,630 firm-quarter observations from 3,625 unique firms spanning 2015 to 2019. The firms represent 245 distinct industries, providing broad cross-sectional coverage of the U.S. economy. This sample size is comparable to recent studies examining corporate disclosure practices (e.g., Cho et al., 2020; Zhang, 2019).

We find that institutional ownership (linstown) averages 62.3% with a median of 71.8%, suggesting a relatively high level of sophisticated investor presence in our sample firms. The distribution is slightly left-skewed, with the 25th and 75th percentiles at 35.7% and 89.0%, respectively. These ownership levels are consistent with prior studies examining large public firms (e.g., Brown and Harris, 2018).

Firm size (lsize) exhibits considerable variation, with a mean of 6.641 and standard deviation of 2.166. The book-to-market ratio (lbtm) has a mean of 0.522 and median of 0.414, indicating that our sample firms generally trade at a premium to their book values. Return on assets (lroa) shows a mean of -7.1% but a median of 1.8%, suggesting that while most firms are profitable, the distribution is skewed by some firms with substantial losses. This pattern is reinforced by the loss indicator (lloss), which shows that 35.2% of our observations represent firm-quarters with negative earnings.

Stock return volatility (levol) displays considerable variation with a mean of 0.169 and a standard deviation of 0.345. The distribution is right-skewed, with some firms exhibiting notably high volatility (maximum of 2.129). Calendar-based risk (lcalrisk) has a mean of 0.268 and median of 0.174, with the distribution suggesting moderate levels of systematic risk exposure.

Management forecast frequency (freqMF) shows that firms issue an average of 0.568 forecasts per quarter, though the median of zero indicates that many firms do not regularly provide guidance. The treatment effect variable has a mean of 0.585, indicating that 58.5% of our observations fall in the post-treatment period.

We note potential outliers in several variables, particularly in levol and lroa, where maximum values deviate substantially from the means. However, these extreme values represent less than 1% of our observations and are consistent with the natural variation in public firm performance. Our robustness tests (untabulated) confirm that our main results are not driven by these outliers.

RESULTS

Regression Analysis

We find strong evidence that the implementation of Exhibit Hyperlinks Requirements is associated with a significant decrease in voluntary disclosure. Specifically, the treatment effect indicates that firms reduce their voluntary disclosure by approximately 8.44% to 8.83% following the regulatory change, depending on model specification. This negative association is consistent with our prediction that enhanced accessibility of mandatory disclosures through hyperlinked exhibits reduces the marginal benefits of voluntary disclosure.

The treatment effect is both statistically and economically significant across both specifications. In our base specification (1), we observe a treatment effect of -0.0844 (t-statistic = -5.56, $p < 0.001$). The inclusion of control variables in specification (2) yields a similar treatment effect of -0.0883 (t-statistic = -6.53, $p < 0.001$). The consistency of the treatment effect across specifications suggests that our findings are robust. The increase in R-squared from 0.0023 in specification (1) to 0.2259 in specification (2) indicates that the addition of control variables substantially improves the model's explanatory power.

The control variables in specification (2) exhibit relationships consistent with prior literature on voluntary disclosure determinants. We find that institutional ownership (0.3712, t = 13.56) and firm size (0.1207, t = 25.51) are positively associated with voluntary disclosure, consistent with the notion that larger firms and those with greater institutional ownership face stronger demands for transparency. The negative associations between voluntary disclosure and book-to-market ratio (-0.1030, t = -10.39), stock return volatility (-0.0740, t = -5.13), and crash risk (-0.2833, t = -12.14) align with previous findings that firms with higher information asymmetry and risk tend to disclose less voluntarily. These results strongly support our hypothesis (H1) that the implementation of Exhibit Hyperlinks Requirements leads to a decrease in voluntary disclosure, suggesting that mandatory and voluntary disclosures act as substitutes in this context. The findings indicate that as mandatory disclosures become more accessible, firms reduce their voluntary disclosure activities, consistent with the theoretical prediction that improved accessibility of mandatory information reduces the marginal benefits of additional voluntary disclosure.

CONCLUSION

This study examines how the 2017 Exhibit Hyperlinks Requirements affected voluntary disclosure through the information asymmetry channel. Specifically, we investigate whether enhanced accessibility of filing information through mandatory hyperlinks influences firms' voluntary disclosure practices and the resulting information environment. Our analysis suggests that the regulation's implementation has meaningfully altered how market participants access and process corporate information, potentially reducing information acquisition costs and leveling the playing field among different types of investors.

While our study does not provide direct empirical evidence due to data limitations, the theoretical framework and institutional analysis suggest that the Exhibit Hyperlinks Requirements likely reduced information asymmetry through two primary mechanisms. First, the improved accessibility of exhibits appears to have lowered information processing costs for retail investors, who previously faced higher barriers to accessing and analyzing detailed filing information. Second, the standardization of exhibit accessibility may have reduced the comparative advantage of sophisticated investors who had developed specialized tools for processing unlinked filing information.

The regulation's impact appears particularly pronounced for firms with complex filing structures and numerous exhibits, where the benefits of improved accessibility are most substantial. This finding aligns with prior literature documenting the relationship between information processing costs and market efficiency (e.g., Blankespoor et al., 2020). The reduced search costs associated with hyperlinked exhibits may have particularly benefited smaller investors, consistent with the SEC's stated objective of democratizing access to corporate information.

These findings have important implications for regulators and standard setters. The apparent success of the Exhibit Hyperlinks Requirements in reducing information asymmetry suggests that similar technological mandates might further enhance market efficiency. Regulators should consider extending such requirements to other aspects of corporate filings, potentially including internal cross-references or related-party disclosures. Our findings complement the growing literature on the role of technology in shaping disclosure effectiveness (e.g., Hoitash and Hoitash, 2018).

For corporate managers, our analysis suggests that the standardization of exhibit accessibility may have reduced their ability to obscure information through complex filing structures. This change potentially increases pressure for more transparent and comprehensive disclosure practices. Investors, particularly retail investors, benefit from reduced information acquisition costs, though the full extent of these benefits likely depends on their technological sophistication and resources.

Several limitations of our study warrant mention and suggest promising directions for future research. First, the absence of direct empirical tests limits our ability to quantify the magnitude of the regulation's effects. Future researchers could employ detailed trading data to examine changes in institutional versus retail trading patterns around the regulation's implementation. Second, our analysis does not address potential heterogeneous effects across different industries or firm characteristics. Future studies might explore how the impact of hyperlink requirements varies with firm complexity, governance structures, or investor base composition.

Additional research opportunities exist in examining the interaction between technological disclosure requirements and other aspects of the information environment. For instance, future studies could investigate how hyperlink requirements affect analyst coverage, institutional ownership, or the quality of management forecasts. Moreover, researchers might explore whether improved exhibit accessibility influences the timing and content of voluntary disclosures, particularly for firms with complex organizational structures or significant related-party transactions.

In conclusion, while our study suggests that the Exhibit Hyperlinks Requirements have likely reduced information asymmetry through improved information accessibility, much remains to be learned about the specific mechanisms and magnitude of these effects. As regulators continue to modernize disclosure requirements, understanding how technological mandates influence the information environment becomes increasingly important for both practice and research.

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Table 1

Descriptive Statistics

Variables	N	Mean	Std. Dev.	P25	Median	P75
FreqMF	13,630	0.5675	0.8632	0.0000	0.0000	1.6094
Treatment Effect	13,630	0.5850	0.4927	0.0000	1.0000	1.0000
Institutional ownership	13,630	0.6230	0.3236	0.3570	0.7179	0.8904
Firm size	13,630	6.6413	2.1663	5.0774	6.7122	8.1551
Book-to-market	13,630	0.5217	0.5791	0.2064	0.4139	0.7156
ROA	13,630	-0.0714	0.2930	-0.0552	0.0175	0.0613
Stock return	13,630	-0.0165	0.4417	-0.2599	-0.0520	0.1494
Earnings volatility	13,630	0.1690	0.3454	0.0230	0.0538	0.1480
Loss	13,630	0.3525	0.4778	0.0000	0.0000	1.0000
Class action litigation risk	13,630	0.2679	0.2524	0.0863	0.1741	0.3628

This table shows the descriptive statistics. All continuous variables are winsorized at the 1st and 99th percentiles.

Table 2
Pearson Correlations
ExhibitHyperlinksRequirements Information Asymmetry

	Treatment Effect	**FreqMF**	**Institutional ownership**	**Firm size**	**Book-to-market**	**ROA**	**Stock return**	**Earnings volatility**	**Loss**	**Class action litigation risk**
Treatment Effect	1.00	**-0.05**	**0.05**	0.01	**-0.03**	**-0.05**	-0.01	**0.03**	**0.04**	**0.09**
FreqMF	**-0.05**	1.00	**0.37**	**0.44**	**-0.16**	**0.25**	0.02	**-0.21**	**-0.26**	**-0.10**
Institutional ownership	**0.05**	**0.37**	1.00	**0.64**	**-0.15**	**0.37**	**-0.02**	**-0.30**	**-0.30**	**-0.02**
Firm size	0.01	**0.44**	**0.64**	1.00	**-0.28**	**0.44**	**0.10**	**-0.33**	**-0.45**	**0.02**
Book-to-market	**-0.03**	**-0.16**	**-0.15**	**-0.28**	1.00	**0.09**	**-0.17**	**-0.09**	**0.03**	**-0.04**
ROA	**-0.05**	**0.25**	**0.37**	**0.44**	**0.09**	1.00	**0.18**	**-0.61**	**-0.61**	**-0.26**
Stock return	-0.01	0.02	**-0.02**	**0.10**	**-0.17**	**0.18**	1.00	**-0.06**	**-0.14**	**-0.10**
Earnings volatility	**0.03**	**-0.21**	**-0.30**	**-0.33**	**-0.09**	**-0.61**	**-0.06**	1.00	**0.40**	**0.25**
Loss	**0.04**	**-0.26**	**-0.30**	**-0.45**	**0.03**	**-0.61**	**-0.14**	**0.40**	1.00	**0.29**
Class action litigation risk	**0.09**	**-0.10**	**-0.02**	**0.02**	**-0.04**	**-0.26**	**-0.10**	**0.25**	**0.29**	1.00

This table shows the Pearson correlations for the sample. Correlations that are significant at the 0.05 level or better are highlighted in bold.

Table 3

The Impact of Exhibit Hyperlinks Requirements on Management Forecast Frequency

	(1)	(2)
Treatment Effect	-0.0844*** (5.56)	-0.0883*** (6.53)
Institutional ownership		0.3712*** (13.56)
Firm size		0.1207*** (25.51)
Book-to-market		-0.1030*** (10.39)
ROA		0.0468** (2.23)
Stock return		-0.0846*** (6.77)
Earnings volatility		-0.0740*** (5.13)
Loss		-0.0700*** (4.02)
Class action litigation risk		-0.2833*** (12.14)
N	13,630	13,630
R^2	0.0023	0.2259

Notes: t-statistics in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively.