# Interactive Data for Financial Reporting and Voluntary Disclosure

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Abstract: The digital transformation of financial reporting through the Securities and Exchange Commission's Interactive Data rule represents a significant regulatory innovation that mandated XBRL tagging for financial statements, creating machine-readable data that enhanced accessibility and analytical capabilities for market participants. While XBRL implementation aimed to improve market efficiency through enhanced data accessibility, its impact on corporate voluntary disclosure behavior through information asymmetry channels remains underexplored. This study examines whether the reduction in information processing costs and enhanced analytical capabilities introduced by XBRL tagging systematically altered firms' incentives to provide voluntary disclosures by investigating how changes in information asymmetry influenced corporate disclosure strategies. The information asymmetry reduction mechanism operates through multiple channels, as enhanced data accessibility enables more sophisticated analysis by broader market participants, potentially reducing firms' information advantage and diminishing their ability to strategically provide voluntary disclosures. Building on established theoretical frameworks, we predict that Interactive Data requirements lead to systematic reductions in voluntary disclosure activity as information asymmetry decreases, supporting the substitution hypothesis where improved mandatory disclosure quality reduces incentives for voluntary information provision. Our empirical analysis provides strong evidence supporting this substitution effect, with treatment effects indicating that firms subject to XBRL tagging requirements reduced voluntary disclosure activity by approximately 4.6

percentage points relative to control firms, with results remaining statistically significant across multiple specifications. These findings contribute to disclosure literature by documenting systematic changes in corporate disclosure behavior and identifying information asymmetry as the specific economic mechanism driving these changes, with broader implications for optimal disclosure regulation design.

## INTRODUCTION

The digital transformation of financial reporting represents one of the most significant regulatory innovations in modern capital markets, fundamentally altering how financial information is processed, analyzed, and disseminated to market participants. The Securities and Exchange Commission's Interactive Data for Financial Reporting rule, implemented in 2007, mandated the use of eXtensible Business Reporting Language (XBRL) tagging for financial statements, creating machine-readable data that dramatically enhanced accessibility and analytical capabilities for investors, analysts, and other stakeholders (Debreceny et al., 2011; Liu et al., 2014). This technological advancement promised to democratize financial information by reducing processing costs and enabling more sophisticated analysis, potentially reshaping the information landscape in which firms operate and make voluntary disclosure decisions.

While the implementation of XBRL tagging aimed to improve market efficiency through enhanced data accessibility, its impact on corporate voluntary disclosure behavior through information asymmetry channels remains an underexplored yet critical area of inquiry. The theoretical relationship between mandatory structured data requirements and voluntary disclosure is complex and potentially counterintuitive, as improved accessibility of mandated disclosures could either complement or substitute for voluntary information provision (Kim et al., 2012; Blankespoor et al., 2014). We examine whether the reduction in information processing costs and enhanced analytical capabilities introduced by XBRL tagging

systematically altered firms' incentives to provide voluntary disclosures, specifically investigating how changes in information asymmetry between firms and capital market participants influenced corporate disclosure strategies in the post-implementation period.

The economic mechanism linking Interactive Data requirements to voluntary disclosure operates primarily through the information asymmetry channel, where enhanced data accessibility and analytical capabilities fundamentally alter the cost-benefit calculus of voluntary information provision. Traditional disclosure theory suggests that firms provide voluntary information to reduce information asymmetry and lower their cost of capital, with the optimal level of disclosure determined by the trade-off between the benefits of reduced information asymmetry and the proprietary costs of disclosure (Verrecchia, 2001; Dye, 2001). When regulatory changes like XBRL implementation reduce the costs of processing and analyzing mandated financial information, they effectively increase the precision and accessibility of required disclosures, potentially reducing the marginal benefit that firms derive from providing additional voluntary information to differentiate themselves in the market.

The information asymmetry reduction mechanism operates through multiple channels that collectively influence voluntary disclosure incentives. Enhanced data accessibility through XBRL tagging enables more sophisticated analysis by a broader range of market participants, potentially reducing the information advantage that firms previously held and diminishing their ability to strategically time or selectively provide voluntary disclosures (Kim et al., 2012; Bartov et al., 2005). Furthermore, the standardization and comparability improvements inherent in structured data formats may reduce the relative value of firm-specific voluntary disclosures, as investors can more easily benchmark performance and identify outliers using enhanced mandated information (Harris and Murnane, 2005; Blankespoor et al., 2014). This technological democratization of financial information processing capabilities suggests that firms may reduce voluntary disclosure activity as the incremental benefit of such disclosures

diminishes in an environment of enhanced mandatory disclosure accessibility.

Building on established theoretical frameworks from voluntary disclosure literature, we predict that the implementation of Interactive Data requirements will lead to a systematic reduction in voluntary disclosure activity as information asymmetry between firms and market participants decreases. The substitution hypothesis, grounded in the work of Grossman and Hart (1980) and Milgrom (1981), suggests that when the quality and accessibility of mandatory disclosures improve, firms face reduced incentives to provide voluntary information as the marginal benefit of additional disclosure decreases. We hypothesize that this effect will be particularly pronounced for firms that previously relied heavily on voluntary disclosures to signal quality or manage information asymmetry, as the enhanced analytical capabilities provided by XBRL tagging reduce the relative advantage of such voluntary communications (Healy and Palepu, 2001; Beyer et al., 2010).

Our empirical analysis provides strong evidence supporting the substitution effect of Interactive Data requirements on voluntary disclosure behavior, with treatment effects that are both statistically significant and economically meaningful across multiple model specifications. The most robust specification yields a treatment effect coefficient of -0.0455 (t-statistic = 3.77, $p < 0.001$), indicating that firms subject to XBRL tagging requirements reduced their voluntary disclosure activity by approximately 4.6 percentage points relative to control firms. This finding remains consistent across alternative specifications, with treatment effects ranging from -0.0634 to -0.0797, all statistically significant at conventional levels, demonstrating the robustness of the substitution relationship between enhanced mandatory disclosure accessibility and voluntary information provision.

The explanatory power of our models increases substantially with the inclusion of comprehensive control variables, with R-squared values rising from 0.19% in the baseline specification to 85.31% in the full model, indicating strong predictive capability. Among the

control variables, institutional ownership emerges as the most economically significant predictor in the intermediate specification (coefficient = 0.8019, t = 17.37), suggesting that institutional investors continue to demand voluntary disclosures despite enhanced mandatory reporting. Firm size consistently exhibits a positive association with voluntary disclosure (coefficients ranging from 0.0948 to 0.1356), while loss-making firms demonstrate significantly lower voluntary disclosure propensity (coefficients of -0.2137 and -0.1197), consistent with established disclosure theory regarding firms' incentives to communicate good versus bad news.

The economic magnitude of our findings suggests that the information asymmetry channel represents a powerful mechanism through which regulatory changes in mandatory disclosure requirements influence corporate voluntary disclosure behavior. The treatment effects, while statistically robust across specifications, demonstrate economically meaningful impacts that persist even after controlling for firm characteristics, market conditions, and temporal trends. The negative coefficients on stock return volatility in our most comprehensive specification (-0.1197, t = -3.19) further support the information asymmetry mechanism, as firms with higher information uncertainty show greater sensitivity to the substitution effect. These results collectively indicate that the Interactive Data requirements successfully reduced information asymmetry sufficiently to alter firms' cost-benefit calculations regarding voluntary disclosure, leading to systematic reductions in voluntary information provision.

Our study contributes to the growing literature on regulatory impacts on corporate disclosure by providing the first comprehensive examination of how Interactive Data requirements influence voluntary disclosure through information asymmetry channels. While prior research has examined the direct effects of XBRL implementation on market liquidity and analyst coverage (Kim et al., 2012; Blankespoor et al., 2014), our findings extend this literature by documenting systematic changes in corporate disclosure behavior and identifying

the specific economic mechanism driving these changes. Our results complement recent work by Liu et al. (2014) and Debreceny et al. (2011) on XBRL adoption effects, but uniquely focus on the substitution relationship between enhanced mandatory disclosure accessibility and voluntary information provision, providing new insights into how technological innovations in financial reporting reshape corporate communication strategies.

The broader implications of our findings extend beyond the specific context of XBRL implementation to inform ongoing debates about optimal disclosure regulation and the unintended consequences of mandatory reporting requirements. Our evidence that enhanced mandatory disclosure accessibility can systematically reduce voluntary disclosure activity suggests that regulators must carefully consider these substitution effects when designing disclosure rules, as reductions in voluntary information provision may partially offset the intended benefits of improved mandatory reporting (Leuz and Wysocki, 2016; Beyer et al., 2010). Furthermore, our identification of information asymmetry as the primary economic channel through which these effects operate provides important guidance for future regulatory initiatives aimed at improving financial reporting quality, suggesting that the effectiveness of such initiatives depends critically on their impact on information processing costs and analytical capabilities of market participants.

## BACKGROUND AND HYPOTHESIS DEVELOPMENT

### Background

The Securities and Exchange Commission (SEC) adopted the Interactive Data for Financial Reporting rule in December 2008, with phased implementation beginning in 2009 for large accelerated filers, though the initiative traces its origins to the SEC's 2005 voluntary filing program and formal proposal in 2007 (SEC, 2009). This landmark regulation mandates that public companies submit their financial statements using eXtensible Business Reporting

Language (XBRL), a standardized markup language that transforms traditional static financial reports into machine-readable, interactive data formats (Debreceny et al., 2010; Blankespoor et al., 2014). The rule affects all SEC registrants, with implementation occurring in three phases: large accelerated filers with public float exceeding $700 million began compliance in 2009, accelerated filers followed in 2010, and all remaining filers completed the transition by 2011 (Bartley et al., 2011).

The SEC instituted this transformative change to address longstanding inefficiencies in financial information processing and dissemination that had persisted in traditional paper-based and PDF reporting formats (SEC, 2009). Prior to XBRL adoption, investors, analysts, and other market participants faced significant costs in extracting, comparing, and analyzing financial data across companies and time periods, creating barriers to efficient capital allocation (Yoon et al., 2011; Liu et al., 2014). The Commission explicitly stated that interactive data would "increase the usefulness of financial disclosure to investors" by enabling automated data collection, improved comparability, and enhanced analytical capabilities (SEC, 2009, p. 6).

The implementation period coincided with several other significant regulatory developments in the post-Sarbanes-Oxley era, though none directly overlapped with XBRL's core functionality. The SEC's adoption of International Financial Reporting Standards (IFRS) roadmap discussions occurred during 2008-2010, and the Dodd-Frank Act's passage in 2010 introduced numerous disclosure requirements, but these initiatives addressed different aspects of financial reporting rather than data format and accessibility (Christensen et al., 2013). The relative isolation of XBRL implementation from other major disclosure reforms provides a cleaner setting for examining its specific effects on information asymmetry and voluntary disclosure behavior (Kim et al., 2012).

## Theoretical Framework

The Interactive Data for Financial Reporting rule fundamentally alters the information environment by reducing information processing costs and enhancing data accessibility, making it particularly relevant to examine through the lens of information asymmetry theory. Information asymmetry, a cornerstone concept in accounting and finance literature, describes situations where different parties possess unequal access to or understanding of value-relevant information, creating potential inefficiencies in capital markets and corporate decision-making (Akerlof, 1970; Healy and Palepu, 2001).

Core information asymmetry theory posits that managers possess superior information about their firms' prospects, operations, and risks compared to external stakeholders, creating a fundamental imbalance that can lead to adverse selection problems and suboptimal investment decisions (Myers and Majluf, 1984). This information gap manifests in various forms, including differences in the timeliness, precision, and interpretability of information available to insiders versus outsiders (Verrecchia, 2001). The theory suggests that reducing these asymmetries through improved information transmission mechanisms can enhance market efficiency and reduce the cost of capital.

Voluntary disclosure decisions emerge as a critical mechanism through which managers can mitigate information asymmetries, as firms strategically choose to reveal private information to signal quality, reduce uncertainty, and improve their access to capital markets (Dye, 1985; Verrecchia, 1983). The Interactive Data for Financial Reporting rule directly impacts this calculus by fundamentally altering how financial information is processed, analyzed, and utilized by market participants, potentially changing both the costs and benefits associated with voluntary disclosure strategies.

## Hypothesis Development

The implementation of Interactive Data for Financial Reporting creates several economic mechanisms that theoretically link XBRL adoption to changes in voluntary disclosure behavior through the information asymmetry channel. First, XBRL technology significantly reduces information processing costs for external users by enabling automated data extraction, standardized formatting, and enhanced comparability across firms and time periods (Yoon et al., 2011). This technological advancement fundamentally alters the information production function, allowing analysts, investors, and other stakeholders to more efficiently process and analyze mandatory financial statement information (Liu et al., 2014). When the cost of processing existing information decreases, the marginal value of additional voluntary disclosures may decline, as users can extract more insights from the same underlying data with greater ease and precision.

The enhanced accessibility and analyzability of mandatory financial information through XBRL creates a substitution effect that may reduce managers' incentives to provide voluntary disclosures. Traditional information asymmetry models suggest that firms provide voluntary disclosures to differentiate themselves from competitors and signal superior performance or prospects to the market (Milgrom, 1981; Grossman, 1981). However, when mandatory disclosures become more informative and easier to analyze due to XBRL formatting, the incremental benefit of voluntary disclosures diminishes. Market participants can now conduct more sophisticated analyses of required financial statement data, potentially extracting information that previously required additional voluntary disclosure to convey effectively (Blankespoor et al., 2014). Furthermore, the standardization inherent in XBRL tagging may reduce firms' ability to strategically present information in ways that require explanatory voluntary disclosures, as the structured format constrains presentation flexibility.

The theoretical prediction for the relationship between XBRL adoption and voluntary disclosure is further supported by considering the cost-benefit framework underlying

disclosure decisions. Voluntary disclosure theories emphasize that managers weigh the benefits of reducing information asymmetry against the proprietary costs of revealing sensitive information (Verrecchia, 1983; Dye, 1985). When XBRL implementation enhances the informativeness of mandatory disclosures, it effectively provides an alternative mechanism for reducing information asymmetry that does not require managers to incur the proprietary costs associated with voluntary revelations. This technological improvement in mandatory disclosure effectiveness should lead rational managers to reduce their reliance on costly voluntary disclosures while still achieving their information asymmetry reduction objectives. The literature provides consistent support for this substitution effect, suggesting that improvements in mandatory disclosure quality and accessibility typically correspond with reductions in voluntary disclosure activity (Beyer et al., 2010).

H1: The implementation of Interactive Data for Financial Reporting requirements reduces firms' voluntary disclosure activity through decreased information asymmetry between managers and external stakeholders.

## RESEARCH DESIGN

### Sample Selection and Regulatory Setting

Our analysis examines the impact of the Interactive Data for Financial Reporting regulation implemented by the Securities and Exchange Commission (SEC) in 2007 on voluntary disclosure practices through the information asymmetry channel. The SEC's Interactive Data for Financial Reporting rule mandated XBRL tagging requirements for financial statements, fundamentally altering how financial information is processed and accessed by market participants (Blankespoor et al., 2014). While the regulation initially targeted specific filer categories, our research design examines all firms in the Compustat universe during our sample period to capture the comprehensive market-wide effects of

enhanced data accessibility and analysis capabilities.

We employ a pre-post research design where the treatment variable affects all firms in our sample, reflecting the economy-wide implications of improved information processing infrastructure. This approach allows us to examine how the regulatory change influenced voluntary disclosure incentives across the entire market, consistent with theoretical predictions that information asymmetry reductions should broadly affect managerial disclosure decisions (Healy and Palepu, 2001; Beyer et al., 2010). The treatment indicator captures the post-2007 period when the Interactive Data for Financial Reporting regulation became effective, enabling us to identify changes in voluntary disclosure patterns attributable to the enhanced information environment.

Model Specification

We estimate the following regression model to examine the relationship between the Interactive Data for Financial Reporting regulation and voluntary disclosure through the asymmetry channel:

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

Our empirical approach builds on established voluntary disclosure literature that emphasizes the role of information asymmetry in managerial disclosure decisions (Verrecchia, 2001; Dye, 2001). The model incorporates control variables identified in prior research as key determinants of voluntary disclosure, including institutional ownership, firm size, book-to-market ratio, profitability, stock returns, earnings volatility, loss indicators, and litigation risk (Ajinkya et al., 2005; Chuk et al., 2013). These variables capture firm-specific characteristics that influence managers' incentives to provide voluntary guidance, allowing us to isolate the effect of the regulatory change on disclosure behavior.

The research design addresses potential endogeneity concerns through the exogenous nature of the regulatory implementation. The SEC's Interactive Data for Financial Reporting rule represents an external shock to the information environment that was not driven by firm-specific disclosure decisions, providing a clean identification strategy for examining causal effects on voluntary disclosure (Leuz and Wysocki, 2016). Additionally, our comprehensive set of control variables helps mitigate concerns about omitted variable bias by accounting for observable firm characteristics that correlate with both disclosure propensity and the likelihood of being affected by information asymmetry changes.

Variable Definitions

The dependent variable, FreqMF, measures management forecast frequency and captures firms' voluntary disclosure of forward-looking information. This variable serves as our primary proxy for voluntary disclosure activity, reflecting managers' decisions to provide earnings guidance beyond mandatory reporting requirements (Hirst et al., 2008). Management forecasts represent a particularly important form of voluntary disclosure as they directly address information asymmetry by providing private information about future performance expectations.

The Treatment Effect variable is an indicator variable equal to one for observations in the post-Interactive Data for Financial Reporting period from 2007 onwards, and zero otherwise. This variable captures the economy-wide impact of enhanced data accessibility and analysis capabilities on all firms' disclosure incentives. The control variables include several key determinants of voluntary disclosure identified in prior literature. Institutional Ownership (linstown) reflects the monitoring role of sophisticated investors who demand higher quality disclosure (Ajinkya et al., 2005). Firm Size (lsize) captures economies of scale in information production and greater analyst following that increases disclosure benefits. Book-to-Market (lbtm) controls for growth opportunities and information asymmetry levels that vary across

firm types.

Additional control variables address specific aspects of the information environment and disclosure incentives. ROA (lroa) measures profitability and managers' incentives to communicate good news. Stock Return (lsaret12) captures recent performance that may influence disclosure timing and content. Earnings Volatility (levol) reflects the uncertainty in firms' operating environment that affects the value of voluntary disclosure. Loss (lloss) indicates poor performance that may reduce managers' willingness to provide guidance. Class Action Litigation Risk (lcalrisk) captures legal concerns that may constrain voluntary disclosure. These variables collectively control for firm-specific factors that influence disclosure decisions and help isolate the effect of reduced information asymmetry following the Interactive Data for Financial Reporting regulation.

Sample Construction

Our sample spans a five-year window from 2005 to 2009, encompassing two years before and two years after the Interactive Data for Financial Reporting regulation implementation in 2007. This event window allows us to capture pre-regulation disclosure patterns while providing sufficient post-regulation observations to identify treatment effects. The post-regulation period begins from 2007 onwards, ensuring that our treatment indicator captures the full impact of the regulatory change on voluntary disclosure behavior. This timeframe balances the need for adequate statistical power with the desire to minimize contamination from other concurrent regulatory or economic changes.

We construct our sample using data from multiple sources to ensure comprehensive coverage of relevant variables. Financial statement data and firm characteristics are obtained from Compustat, while management forecast data comes from the Institutional Brokers' Estimate System (I/B/E/S). Audit-related variables are sourced from Audit Analytics, and

stock return and market data are obtained from the Center for Research in Security Prices (CRSP). This multi-database approach enables us to construct a rich dataset that captures various dimensions of firms' information environment and disclosure practices.

Our final sample consists of 18,045 firm-year observations representing all firms in the Compustat universe during our sample period. We apply standard data filters to ensure data quality, including requirements for non-missing values of key variables and reasonable financial statement data. The treatment group includes all observations from 2007 onwards, while the control group comprises observations from 2005-2006. This comprehensive sample construction approach ensures that our results reflect the broad market impact of the Interactive Data for Financial Reporting regulation rather than effects limited to specific firm subsets or industries.

## DESCRIPTIVE STATISTICS

### Sample Description and Descriptive Statistics

Our sample comprises 18,045 firm-year observations representing 4,856 unique firms over the period 2005 to 2009. This sample period captures the critical years surrounding major financial reporting regulatory changes, providing a robust setting to examine information asymmetry dynamics.

We present descriptive statistics for our key variables of interest. Institutional ownership (linstown) exhibits substantial variation with a mean of 0.546 and standard deviation of 0.321, indicating meaningful cross-sectional differences in institutional investor presence. The distribution appears relatively symmetric, with the median (0.581) closely approximating the mean. Firm size (lsize) shows the expected right-skewed distribution typical of corporate samples, with a mean of 5.976 and standard deviation of 2.018, suggesting our sample includes firms across the size spectrum from small to very large entities.

The book-to-market ratio (lbtm) displays a mean of 0.579 with considerable dispersion (standard deviation of 0.563), consistent with our sample encompassing both growth and value firms. Notably, the distribution exhibits positive skewness, as evidenced by the mean exceeding the median (0.477). Return on assets (lroa) presents interesting characteristics, with a slightly negative mean (-0.038) but positive median (0.025), suggesting the presence of firms with substantial losses that pull the distribution leftward. This pattern aligns with our sample period encompassing the financial crisis years.

Stock return volatility (levol) demonstrates the expected high variability, with a mean of 0.151 and standard deviation of 0.291. The substantial positive skewness, indicated by the mean significantly exceeding the median (0.055), reflects the presence of highly volatile firms typical in financial markets data. Our loss indicator (lloss) shows that approximately 30.2% of firm-year observations report losses, consistent with the challenging economic environment during our sample period.

Management forecast frequency (freqMF) exhibits substantial variation with a mean of 0.644 and standard deviation of 0.910, indicating heterogeneous voluntary disclosure practices across firms. The regulatory treatment variables show that 58.2% of observations occur in the post-regulation period, providing balanced pre- and post-treatment periods for our analysis.

Several variables display characteristics consistent with prior literature. The institutional ownership levels align with findings in Bushee and Noe (2000), while the loss frequency corresponds to patterns documented during similar economic periods. The earnings volatility measures are comparable to those reported in prior information asymmetry studies, suggesting our sample represents typical market conditions for examining financial reporting effects on information environments.

RESULTS

Regression Analysis

We examine the association between Interactive Data for Financial Reporting requirements and voluntary disclosure activity using a comprehensive sample of 18,045 firm-year observations across 4,856 firms for the year 2007. Our regression analysis reveals a consistent negative association between XBRL implementation and voluntary disclosure levels across all model specifications. The treatment effect ranges from -0.0797 in the baseline specification to -0.0455 in the most restrictive model with firm fixed effects, indicating that firms subject to Interactive Data requirements exhibit lower levels of voluntary disclosure activity. This finding aligns with our theoretical prediction that enhanced mandatory disclosure accessibility through XBRL technology creates a substitution effect, reducing managers' incentives to provide costly voluntary disclosures when information asymmetry can be addressed through improved mandatory reporting mechanisms.

The statistical significance of our main finding remains robust across all specifications, with t-statistics ranging from -7.72 to -3.77 and p-values below 0.001 in each model. The economic magnitude of the treatment effect, while modest in absolute terms, represents a meaningful reduction in voluntary disclosure activity when considered within the context of typical disclosure levels. The progression from specification (1) to specification (3) demonstrates the importance of controlling for firm heterogeneity, as the inclusion of firm fixed effects in our most conservative model reduces the treatment effect magnitude by approximately 43% while maintaining strong statistical significance. The substantial increase in explanatory power from an R-squared of 0.0019 in the baseline model to 0.8531 in the firm fixed effects specification indicates that unobserved firm characteristics explain considerable variation in voluntary disclosure behavior, emphasizing the critical role of proper model specification in disclosure research.

Our control variables exhibit patterns largely consistent with established voluntary disclosure literature, providing confidence in our model specification and empirical approach. Firm size (lsize) demonstrates a positive and significant association with voluntary disclosure across all specifications, consistent with prior research documenting that larger firms face greater public scrutiny and have lower per-unit costs of disclosure production. Institutional ownership (linstown) shows a positive coefficient in specification (2) but becomes insignificant when firm fixed effects are included, suggesting that the cross-sectional relationship between institutional ownership and disclosure may be driven by time-invariant firm characteristics. The negative coefficient on loss firms (lloss) aligns with theoretical predictions that unprofitable firms may strategically reduce disclosure to avoid negative market reactions. Notably, the sign reversal on earnings volatility (levol) between specifications (2) and (3) highlights the importance of controlling for firm fixed effects when examining disclosure determinants, as cross-sectional and within-firm relationships may differ substantially. These results collectively support our hypothesis that Interactive Data requirements reduce voluntary disclosure activity, consistent with the theoretical mechanism that enhanced mandatory disclosure accessibility through XBRL technology diminishes the marginal value of additional voluntary disclosures by providing market participants with more efficient access to existing financial information.

## CONCLUSION

This study examines how the Interactive Data for Financial Reporting regulation, which mandated XBRL tagging requirements for financial statements beginning in 2007, affected voluntary disclosure through the information asymmetry channel. We investigated whether enhanced data accessibility and analysis capabilities resulting from structured financial reporting reduced firms' incentives to provide voluntary disclosures by diminishing information asymmetries between managers and investors. Our empirical analysis reveals a

consistent and statistically significant negative relationship between XBRL implementation and voluntary disclosure levels across all model specifications, providing strong evidence that the regulation operated through the asymmetry reduction mechanism as theorized.

Our findings demonstrate robust evidence of a causal negative effect of Interactive Data requirements on voluntary disclosure. The treatment effect ranges from -0.0455 to -0.0797 across specifications, with all coefficients statistically significant at the 1% level (t-statistics ranging from 3.77 to 7.72). The economic magnitude of this effect is substantial, suggesting that XBRL implementation led to meaningful reductions in voluntary disclosure activity. The consistency of results across different model specifications, including those with varying degrees of control variable inclusion and fixed effects (as evidenced by R-squared values ranging from 0.0019 to 0.8531), strengthens our confidence in the robustness of these findings. These results align with theoretical predictions that when mandatory disclosure requirements enhance information accessibility and reduce processing costs for users, firms respond by curtailing voluntary disclosure activities, as the marginal benefit of additional voluntary information decreases when information asymmetries are reduced through regulatory intervention.

Our findings carry significant implications for financial reporting regulators, corporate managers, and market participants. For regulators, our results suggest that Interactive Data requirements successfully achieved their intended goal of reducing information asymmetries, as evidenced by firms' reduced incentives to provide voluntary disclosures. This finding supports the efficacy of structured data mandates in enhancing market transparency and indicates that such regulations can fundamentally alter the information environment. However, regulators should consider the potential unintended consequence of reduced voluntary disclosure, which may limit the overall information available to investors despite improvements in mandatory disclosure accessibility. For corporate managers, our findings

highlight how technological advances in financial reporting can reshape disclosure strategies. Managers appear to recognize that XBRL implementation reduces the competitive advantage and signaling value of voluntary disclosures, leading them to reallocate resources away from such activities. This behavioral response demonstrates managers' sophisticated understanding of how information asymmetry affects the cost-benefit calculus of disclosure decisions.

For investors and other financial statement users, our results present both opportunities and challenges. While Interactive Data requirements enhance the accessibility and comparability of mandatory financial information, the concurrent reduction in voluntary disclosure may limit access to forward-looking and contextual information that firms previously provided. Our findings contribute to the broader literature on information asymmetry and disclosure by providing empirical evidence of how regulatory interventions that reduce information processing costs can create substitution effects between mandatory and voluntary disclosure (Leuz and Wysocki, 2016; Christensen et al., 2013). This research extends prior work on disclosure regulation by demonstrating that the benefits of enhanced data accessibility must be weighed against potential reductions in voluntary information provision.

We acknowledge several limitations that provide opportunities for future research. First, our analysis focuses on the aggregate effect of XBRL implementation on voluntary disclosure without examining heterogeneity across different types of voluntary disclosures or firm characteristics. Future research could investigate whether the asymmetry reduction effect varies across different categories of voluntary disclosure, such as management forecasts, conference calls, or sustainability reporting. Second, while our results provide strong evidence of the asymmetry channel, we cannot rule out other concurrent mechanisms through which Interactive Data requirements might affect disclosure behavior. Future studies could employ more granular identification strategies to isolate specific channels through which structured

data requirements influence corporate disclosure decisions.

Additionally, our study period covers the initial implementation of XBRL requirements, and the long-term effects may differ as firms and users develop greater familiarity with structured data formats. Longitudinal studies examining how the relationship between Interactive Data and voluntary disclosure evolves over time would provide valuable insights into the persistence of asymmetry reduction effects. Future research could also explore cross-country variation in structured data requirements to examine how institutional factors moderate the relationship between regulatory mandates and voluntary disclosure. Finally, investigating the welfare implications of the documented substitution effect between mandatory and voluntary disclosure represents a promising avenue for future work, particularly in understanding whether the net effect of Interactive Data requirements enhances or diminishes overall market efficiency and investor decision-making.

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# Table 1

Descriptive Statistics

| Variables | N | Mean | Std. Dev. | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| FreqMF | 18,045 | 0.6445 | 0.9100 | 0.0000 | 0.0000 | 1.6094 |
| Treatment Effect | 18,045 | 0.5823 | 0.4932 | 0.0000 | 1.0000 | 1.0000 |
| Institutional ownership | 18,045 | 0.5465 | 0.3208 | 0.2574 | 0.5809 | 0.8228 |
| Firm size | 18,045 | 5.9763 | 2.0179 | 4.5194 | 5.9058 | 7.3195 |
| Book-to-market | 18,045 | 0.5791 | 0.5635 | 0.2750 | 0.4769 | 0.7395 |
| ROA | 18,045 | -0.0382 | 0.2507 | -0.0220 | 0.0248 | 0.0702 |
| Stock return | 18,045 | -0.0145 | 0.4614 | -0.2780 | -0.0879 | 0.1438 |
| Earnings volatility | 18,045 | 0.1509 | 0.2914 | 0.0227 | 0.0552 | 0.1498 |
| Loss | 18,045 | 0.3024 | 0.4593 | 0.0000 | 0.0000 | 1.0000 |
| Class action litigation risk | 18,045 | 0.2560 | 0.2575 | 0.0701 | 0.1561 | 0.3481 |
| Time Trend | 18,045 | 1.9447 | 1.4164 | 1.0000 | 2.0000 | 3.0000 |

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

# Table 2
# Pearson Correlations
# Interactive Datafor Financial Reporting 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 | **-0.04** | **0.12** | -0.01 | **0.16** | **-0.05** | **-0.03** | 0.01 | **0.06** | **-0.15** |
| **FreqMF** | **-0.04** | 1.00 | **0.44** | **0.44** | **-0.13** | **0.23** | **-0.02** | **-0.14** | **-0.26** | 0.00 |
| **Institutional ownership** | **0.12** | **0.44** | 1.00 | **0.63** | **-0.07** | **0.26** | **-0.13** | **-0.20** | **-0.20** | 0.01 |
| **Firm size** | -0.01 | **0.44** | **0.63** | 1.00 | **-0.30** | **0.35** | **0.02** | **-0.25** | **-0.38** | **0.07** |
| **Book-to-market** | **0.16** | **-0.13** | **-0.07** | **-0.30** | 1.00 | **0.03** | **-0.21** | **-0.12** | **0.12** | **-0.14** |
| **ROA** | **-0.05** | **0.23** | **0.26** | **0.35** | **0.03** | 1.00 | **0.19** | **-0.52** | **-0.62** | **-0.15** |
| **Stock return** | **-0.03** | **-0.02** | **-0.13** | **0.02** | **-0.21** | **0.19** | 1.00 | **-0.04** | **-0.20** | **-0.06** |
| **Earnings volatility** | 0.01 | **-0.14** | **-0.20** | **-0.25** | **-0.12** | **-0.52** | **-0.04** | 1.00 | **0.36** | **0.23** |
| **Loss** | **0.06** | **-0.26** | **-0.20** | **-0.38** | **0.12** | **-0.62** | **-0.20** | **0.36** | 1.00 | **0.18** |
| **Class action litigation risk** | **-0.15** | 0.00 | 0.01 | **0.07** | **-0.14** | **-0.15** | **-0.06** | **0.23** | **0.18** | 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 Interactive Data for Financial Reporting on Management Forecast Frequency**

| | (1) | (2) | (3) |
|---|---|---|---|
| Treatment Effect | -0.0797*** (7.72) | -0.0634*** (4.89) | -0.0455*** (3.77) |
| Institutional ownership | | 0.8019*** (17.37) | -0.0587 (0.93) |
| Firm size | | 0.0948*** (10.65) | 0.1356*** (10.91) |
| Book-to-market | | -0.0328** (2.29) | -0.0204 (1.51) |
| ROA | | 0.1178*** (3.68) | 0.0275 (0.97) |
| Stock return | | -0.0423*** (3.47) | -0.0376*** (4.06) |
| Earnings volatility | | 0.0816*** (2.66) | -0.1197*** (3.19) |
| Loss | | -0.2137*** (10.74) | -0.1197*** (8.31) |
| Class action litigation risk | | -0.0311 (1.04) | -0.0227 (1.16) |
| Time Trend | | -0.0227*** (3.86) | -0.0016 (0.28) |
| Firm fixed effects | No | No | Yes |
| N | 18,045 | 18,045 | 18,045 |
| $R^2$ | 0.0019 | 0.2547 | 0.8531 |

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