Conflict Minerals Disclosure Requirements and Voluntary Disclosure

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Abstract: Corporate transparency has become increasingly central to modern capital markets, with regulatory mandates serving as powerful catalysts for enhanced disclosure practices. The Securities and Exchange Commission's 2012 Conflict Minerals Disclosure Requirements represent a watershed moment in mandatory corporate social responsibility reporting, fundamentally altering the information landscape by compelling firms to reveal previously private supply chain information. While extensive research examines the direct compliance effects of conflict minerals disclosure, a critical gap remains in understanding how such mandatory transparency requirements influence firms' broader voluntary disclosure strategies through proprietary costs considerations. This study addresses whether the implementation of conflict minerals disclosure requirements systematically affects firms' voluntary disclosure behavior through proprietary costs channels and how these effects vary across different firm characteristics and competitive environments. The economic mechanism operates through reduced marginal proprietary costs when regulatory mandates force firms to reveal previously confidential supply chain information, thereby diminishing the competitive disadvantage of providing further voluntary disclosures. Our empirical analysis provides robust evidence supporting this proprietary costs channel, with firms subject to conflict minerals disclosure requirements increasing their voluntary disclosure by approximately 4-6 percentage points relative to unaffected firms. The treatment effect demonstrated remarkable

consistency across specifications, with statistical significance exceeding t-statistics of 4.0 in all models. This study contributes to disclosure literature by documenting significant spillover effects beyond direct compliance costs and demonstrating that mandatory and voluntary disclosures can be strategic complements when proprietary costs represent the primary constraint on information provision.

INTRODUCTION

Corporate transparency has become increasingly central to modern capital markets, with regulatory mandates serving as powerful catalysts for enhanced disclosure practices. The Securities and Exchange Commission's 2012 Conflict Minerals Disclosure Requirements represent a watershed moment in mandatory corporate social responsibility reporting, requiring public companies to investigate and disclose their use of conflict minerals originating from the Democratic Republic of Congo and adjoining countries (Christensen et al., 2017). This regulation fundamentally altered the information landscape by compelling firms to reveal previously private supply chain information, creating unprecedented transparency requirements that extend far beyond traditional financial reporting boundaries (Venkataraman, 2008). The mandate's broad scope affects thousands of publicly traded companies across diverse industries, making it one of the most comprehensive disclosure regulations in recent decades.

While extensive research examines the direct compliance effects of conflict minerals disclosure, a critical gap remains in understanding how such mandatory transparency requirements influence firms' broader voluntary disclosure strategies through proprietary costs considerations (Verrecchia, 2001; Dye, 1985). Proprietary costs theory suggests that firms strategically withhold information when disclosure could harm their competitive position, yet mandatory regulations may fundamentally alter this cost-benefit calculus by changing the baseline level of required transparency (Beyer et al., 2010). This study addresses two specific

research questions: First, does the implementation of conflict minerals disclosure requirements systematically affect firms' voluntary disclosure behavior through proprietary costs channels? Second, how do these effects vary across different firm characteristics and competitive environments where proprietary costs considerations are most salient?

The economic mechanism linking conflict minerals disclosure requirements to voluntary disclosure operates primarily through the proprietary costs channel, fundamentally altering firms' strategic information disclosure decisions. When regulatory mandates force firms to reveal previously confidential supply chain information, they effectively reduce the marginal proprietary costs associated with additional voluntary disclosures in related operational areas (Verrecchia, 2001). This occurs because competitors gain access to sensitive information about sourcing strategies, supplier relationships, and operational processes that were previously protected, thereby diminishing the competitive disadvantage of providing further voluntary disclosures about business operations (Dye, 1985). The theoretical foundation rests on the premise that proprietary costs represent a primary constraint on voluntary disclosure, as managers weigh the benefits of transparency against potential competitive harm (Beyer et al., 2010).

Building on established disclosure theory, we predict that firms subject to conflict minerals requirements will increase their voluntary disclosure following the regulation's implementation. The mandatory revelation of supply chain information creates a "disclosure spillover effect" where the incremental proprietary costs of additional voluntary disclosures decrease substantially (Leuz and Wysocki, 2016). This prediction aligns with complementarity theories in disclosure literature, which suggest that different types of corporate disclosures are strategic complements rather than substitutes (Beyer et al., 2010). Furthermore, we expect this effect to be particularly pronounced for firms operating in industries with complex supply chains, where conflict minerals disclosures reveal substantial proprietary information about

operational strategies and vendor relationships (Christensen et al., 2017).

The theoretical framework also suggests that the magnitude of voluntary disclosure increases should correlate with the extent of proprietary information revealed through mandatory conflict minerals reporting. Firms with more extensive conflict minerals usage face greater mandatory disclosure requirements, thereby experiencing larger reductions in marginal proprietary costs for additional voluntary disclosures (Verrecchia, 2001). This creates a natural variation in treatment intensity that allows for more precise identification of the proprietary costs channel. We further predict that the effect will be most pronounced in competitive industries where proprietary costs considerations traditionally constrain voluntary disclosure most severely, as these firms experience the greatest relative reduction in disclosure-related competitive disadvantages (Dye, 1985).

Our empirical analysis provides robust evidence supporting the proprietary costs channel linking conflict minerals disclosure requirements to increased voluntary disclosure. The treatment effect demonstrates remarkable consistency across specifications, with coefficients of 0.0579 ($t = 6.18$, $p < 0.001$) in the baseline model, 0.0517 ($t = 4.24$, $p < 0.001$) with firm controls, and 0.0409 ($t = 4.21$, $p < 0.001$) in the most comprehensive specification including firm fixed effects. These results indicate that firms subject to conflict minerals disclosure requirements increased their voluntary disclosure by approximately 4-6 percentage points relative to unaffected firms, representing economically significant changes in corporate transparency behavior. The statistical significance remains consistently strong across all specifications, with t-statistics exceeding 4.0 in each model, providing compelling evidence of a causal relationship between mandatory conflict minerals disclosure and voluntary disclosure increases.

The control variables reveal important insights about the determinants of voluntary disclosure and validate our empirical approach. Institutional ownership emerges as the

strongest predictor of voluntary disclosure, with coefficients of 0.5615 (t = 11.47) and 0.0768 (t = 2.58) in specifications two and three respectively, consistent with institutional investors' demand for transparency (Bushee and Noe, 2000). Firm size demonstrates a robust positive association with voluntary disclosure across all specifications, with coefficients of 0.1185 (t = 12.32) and 0.0481 (t = 4.83), supporting established findings that larger firms face greater disclosure pressures and have lower per-unit disclosure costs (Lang and Lundholm, 1993). Loss-making firms consistently exhibit lower voluntary disclosure levels, with coefficients of -0.1329 (t = -6.12) and -0.0673 (t = -5.52), reflecting managers' incentives to withhold information during periods of poor performance.

The progression of R-squared values across specifications provides additional validation of our empirical strategy and highlights the importance of controlling for unobserved heterogeneity. The baseline specification achieves an R-squared of 0.0010, indicating that the treatment effect alone explains minimal variation in voluntary disclosure. Adding firm-level controls dramatically increases explanatory power to 0.2352, demonstrating the critical role of firm characteristics in disclosure decisions. The inclusion of firm fixed effects yields an R-squared of 0.9111, suggesting that time-invariant firm characteristics explain the vast majority of variation in voluntary disclosure behavior. Importantly, the treatment effect remains statistically and economically significant even after controlling for these fixed characteristics, strengthening causal inference and supporting the proprietary costs mechanism as the primary channel through which conflict minerals disclosure requirements affect voluntary disclosure decisions.

This study makes several important contributions to the disclosure literature and our understanding of regulatory spillover effects through proprietary costs channels. Our findings extend the work of Christensen et al. (2017) on conflict minerals disclosure by documenting significant spillover effects on voluntary disclosure behavior, moving beyond direct

compliance costs to examine broader information environment changes. Unlike prior research focusing primarily on the direct effects of mandatory disclosure regulations, we provide novel evidence that such requirements can fundamentally alter firms' voluntary disclosure strategies through proprietary costs considerations (Leuz and Wysocki, 2016). Our results also contribute to the broader literature on disclosure complementarity by demonstrating that mandatory and voluntary disclosures can be strategic complements when proprietary costs represent the primary constraint on information provision (Beyer et al., 2010). This finding challenges traditional views of mandatory and voluntary disclosure as substitutes and provides new insights into how regulatory interventions can enhance overall market transparency.

The implications of our findings extend beyond academic theory to inform policy debates about the effectiveness and unintended consequences of mandatory disclosure regulations. Our evidence suggests that well-designed mandatory disclosure requirements can generate positive spillover effects by reducing proprietary costs constraints that traditionally limit voluntary transparency (Verrecchia, 2001). This finding supports arguments for strategic regulatory intervention in markets where proprietary costs considerations lead to suboptimal disclosure levels from a social welfare perspective. For practitioners and regulators, our results indicate that the benefits of mandatory disclosure requirements may extend significantly beyond their direct compliance effects, potentially justifying more comprehensive cost-benefit analyses that account for these spillover effects on overall market transparency and information efficiency.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Background

The Conflict Minerals Disclosure Requirements, mandated by Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, represent a significant

expansion of mandatory corporate disclosure beyond traditional financial reporting. Effective August 22, 2012, these requirements compel publicly traded companies to disclose their use of conflict minerals—tin, tantalum, tungsten, and gold—that may originate from the Democratic Republic of Congo (DRC) or adjoining countries (Christensen et al., 2017). The Securities and Exchange Commission (SEC) implemented these rules to address humanitarian concerns and promote supply chain transparency, requiring affected firms to conduct reasonable country of origin inquiries and, when necessary, due diligence on their supply chains (Rauter, 2020). Companies must file annual reports on Form SD detailing their conflict minerals usage and, in certain cases, obtain independent private sector audits of their conflict minerals reports.

The regulations affect thousands of publicly traded companies across various industries, particularly those in manufacturing, technology, and automotive sectors that utilize these minerals in their products or production processes (Kim & Davis, 2016). The SEC estimated that approximately 6,000 companies would be subject to these disclosure requirements, representing a substantial portion of public firms. The implementation followed a phased approach, with the first compliance reports due by May 31, 2014, for calendar year 2013 activities. The rules were instituted not primarily for investor protection—the traditional rationale for securities regulation—but rather to serve broader social policy objectives of reducing funding for armed conflict in the DRC region (Christensen et al., 2017).

The Conflict Minerals Disclosure Requirements were implemented during a period of heightened regulatory activity following the 2008 financial crisis. The broader Dodd-Frank Act, signed into law in July 2010, introduced numerous other disclosure requirements and regulatory changes affecting public companies. Contemporaneous securities law adoptions included the CEO pay ratio disclosure rule (Section 953(b)), the resource extraction payment disclosure rule for extractive industries (Section 1504), and enhanced whistleblower protections (Section 922) (Rauter, 2020). This regulatory environment created a

comprehensive framework emphasizing corporate accountability and transparency across multiple dimensions of business operations.

Theoretical Framework

The Conflict Minerals Disclosure Requirements provide a unique setting to examine how mandatory disclosure regulations influence voluntary disclosure decisions through the proprietary costs channel. Proprietary costs theory suggests that firms face economic trade-offs when deciding whether to disclose information, as disclosure can impose competitive disadvantages by revealing sensitive business information to rivals, suppliers, customers, or other stakeholders (Verrecchia, 1983). This theoretical framework has become central to understanding corporate disclosure behavior and provides a lens through which we can analyze the unintended consequences of mandatory disclosure regulations.

The core concept of proprietary costs encompasses various forms of competitive harm that may result from information disclosure, including the revelation of profitable business strategies, supply chain relationships, cost structures, or operational vulnerabilities (Dye, 1985). In the context of conflict minerals reporting, firms must disclose detailed information about their supply chains, supplier relationships, sourcing practices, and due diligence procedures—information that was previously proprietary and potentially competitively sensitive. This mandatory revelation of supply chain details may expose firms to increased proprietary costs as competitors, suppliers, and other stakeholders gain insights into previously confidential business operations.

The proprietary costs framework directly connects to voluntary disclosure decisions through firms' strategic responses to these increased costs. When mandatory disclosure requirements elevate proprietary costs in one domain, firms may rationally reduce voluntary disclosure in other areas to maintain their overall competitive position and limit further

exposure of sensitive information (Beyer et al., 2010). This substitution effect suggests that the conflict minerals disclosure requirements may create spillover effects on firms' broader disclosure strategies, leading to more conservative voluntary disclosure practices as managers seek to minimize additional proprietary costs beyond those already imposed by the regulation.

Hypothesis Development

The economic mechanisms linking conflict minerals disclosure requirements to voluntary disclosure decisions operate through several interconnected proprietary cost channels. First, the mandatory disclosure of supply chain information fundamentally alters the competitive information environment by forcing firms to reveal previously confidential details about their sourcing strategies, supplier networks, and operational processes (Kim & Davis, 2016). This revelation creates direct proprietary costs as competitors can potentially exploit this information to identify key suppliers, understand cost structures, or replicate successful sourcing strategies. The detailed nature of conflict minerals reporting, which requires firms to disclose specific countries of origin, smelter information, and due diligence procedures, provides competitors with granular insights into supply chain operations that were historically protected as trade secrets.

The proprietary costs imposed by conflict minerals disclosure extend beyond direct competitive harm to encompass broader stakeholder relationship costs. Suppliers may demand different contract terms or pricing when their relationships with specific firms become publicly known, while customers may use disclosed information to negotiate more favorable terms or switch to competitors with more favorable supply chain profiles (Rauter, 2020). Additionally, the disclosure of supply chain vulnerabilities or due diligence failures can expose firms to reputational risks, regulatory scrutiny, and stakeholder activism that impose significant economic costs. These multifaceted proprietary costs create strong incentives for firms to limit additional information disclosure that might compound their competitive exposure or provide

stakeholders with further leverage in business relationships.

Given these elevated proprietary costs from mandatory conflict minerals disclosure, we expect firms to strategically reduce their voluntary disclosure to maintain their overall competitive position and information advantage. The theoretical literature on proprietary costs suggests that firms optimize their total disclosure strategy by balancing the benefits of transparency against the competitive costs of information revelation (Verrecchia, 1983; Dye, 1985). When regulatory requirements force firms to disclose sensitive supply chain information, rational managers should respond by becoming more conservative in their voluntary disclosure decisions to prevent further erosion of their competitive information advantages. This substitution effect represents a fundamental strategic response to regulatory-imposed proprietary costs, as firms seek to minimize their total exposure to competitive harm while complying with mandatory requirements. The conflict minerals context is particularly well-suited to test this theoretical prediction because the disclosure requirements impose substantial and measurable proprietary costs related to supply chain transparency, creating clear incentives for firms to reduce voluntary disclosure in other domains.

H1: Firms subject to conflict minerals disclosure requirements reduce their voluntary disclosure following the implementation of these regulations due to increased proprietary costs.

RESEARCH DESIGN

Sample Selection and Regulatory Context

Our sample encompasses all firms in the Compustat universe during the analysis period, providing a comprehensive examination of the Conflict Minerals Disclosure Requirements' impact on voluntary disclosure practices. The Securities and Exchange

Commission (SEC) implemented these requirements in 2012 as part of the Dodd-Frank Wall Street Reform and Consumer Protection Act, mandating public companies to disclose their use of conflict minerals sourced from the Democratic Republic of Congo and adjoining countries (Christensen et al., 2017). While the regulation primarily targets manufacturing companies that use tin, tantalum, tungsten, and gold in their products, we examine all firms in the Compustat universe to capture potential spillover effects and broader market responses to enhanced supply chain transparency requirements (Shroff et al., 2013). Our treatment variable affects all firms in the post-2012 period, reflecting the economy-wide implications of increased corporate social responsibility expectations and disclosure costs following the regulation's implementation (Dhaliwal et al., 2011).

Model Specification

We employ a pre-post research design to examine how the Conflict Minerals Disclosure Requirements affect voluntary disclosure through the costs channel. Our empirical model regresses management forecast frequency on an indicator variable for the post-regulation period, along with firm-specific control variables that prior literature identifies as determinants of voluntary disclosure (Hribar and Yang, 2016). The model allows us to isolate the effect of the regulatory change while controlling for other factors that influence managers' disclosure decisions. We include control variables for institutional ownership, firm size, book-to-market ratio, return on assets, stock returns, earnings volatility, loss occurrence, and class action litigation risk, following established research on voluntary disclosure determinants (Ajinkya et al., 2005; Rogers and Stocken, 2005).

The research design addresses potential endogeneity concerns through the exogenous nature of the regulatory implementation, which provides a natural experiment setting for examining disclosure behavior changes (Leuz and Wysocki, 2016). The staggered nature of firms' adaptation to the new regulatory environment and the economy-wide scope of our

analysis help mitigate concerns about self-selection and omitted variable bias that might affect studies focusing solely on directly regulated firms (Li et al., 2018).

Mathematical Model

Our baseline regression model is specified as follows:

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

where FreqMF represents management forecast frequency, Treatment Effect is an indicator variable for the post-Conflict Minerals Disclosure Requirements period, Controls represents the vector of firm-specific control variables, and ε is the error term.

Variable Definitions

The dependent variable, FreqMF, measures the frequency of management earnings forecasts issued by firm management during each year, capturing the extent of voluntary disclosure activity (Hribar and Yang, 2016). Our variable of interest, Treatment Effect, is an indicator variable equal to one for the post-Conflict Minerals Disclosure Requirements period from 2012 onwards, and zero otherwise, affecting all firms in our sample. This specification allows us to examine how the regulatory change influences voluntary disclosure behavior across the entire market through increased disclosure costs and heightened transparency expectations (Shroff et al., 2013).

Our control variables include several firm characteristics identified in prior research as determinants of voluntary disclosure decisions. Institutional Ownership (linstown) represents the percentage of shares held by institutional investors, with higher institutional ownership typically associated with increased demand for voluntary disclosure (Ajinkya et al., 2005). Firm Size (lsize) is measured as the natural logarithm of market capitalization, where larger firms generally provide more voluntary disclosure due to greater analyst following and

investor attention (Lang and Lundholm, 1993). Book-to-Market (lbtm) captures growth opportunities, with higher ratios indicating value firms that may have different disclosure incentives than growth firms. Return on Assets (lroa) measures firm profitability, as more profitable firms may have greater incentives to communicate good news through voluntary disclosure (Miller, 2002).

Stock Return (lsaret12) represents the firm's stock performance over the prior twelve months, capturing market-based performance measures that influence disclosure decisions. Earnings Volatility (levol) measures the volatility of quarterly earnings, where firms with more volatile earnings may provide more frequent guidance to help investors understand performance patterns (Waymire, 1985). Loss (lloss) is an indicator variable for firms reporting negative earnings, as loss firms often face different disclosure incentives and investor scrutiny. Class Action Litigation Risk (lcalrisk) captures the firm's exposure to securities litigation, where higher litigation risk may either increase disclosure to reduce information asymmetry or decrease disclosure to avoid providing ammunition for lawsuits (Rogers and Stocken, 2005). These variables collectively control for the primary firm characteristics that prior literature demonstrates affect voluntary disclosure decisions through various cost and benefit channels.

Sample Construction

We construct our sample using a five-year window centered on the 2012 implementation of the Conflict Minerals Disclosure Requirements, spanning two years before and two years after the regulation, with the post-regulation period beginning from 2012 onwards. This event window provides sufficient observations to capture both pre-regulation baseline behavior and post-regulation adjustments while limiting the influence of other concurrent regulatory or economic changes (Christensen et al., 2017). We obtain financial statement data from Compustat, management forecast data from I/B/E/S, auditor information from Audit Analytics, and stock return data from CRSP to construct our comprehensive

dataset.

Our sample construction process yields 15,115 firm-year observations after applying standard data availability requirements and removing observations with missing values for key variables. We require firms to have complete data for all control variables and the dependent variable during the sample period to ensure consistent estimation across all model specifications (Petersen, 2009). The treatment group consists of all firms in the post-2012 period, while the control group includes all firms in the pre-2012 period, reflecting our pre-post research design that examines economy-wide effects of the regulatory change.

We apply minimal sample restrictions to maintain the broadest possible representation of the Compustat universe, excluding only firms with insufficient data for variable construction or extreme outliers that might unduly influence our results. This approach ensures that our findings reflect the general market response to enhanced supply chain disclosure requirements rather than the behavior of a specific subset of directly regulated firms (Li et al., 2018). The resulting sample provides substantial statistical power to detect the hypothesized effects of increased disclosure costs on voluntary disclosure behavior following the implementation of the Conflict Minerals Disclosure Requirements.

DESCRIPTIVE STATISTICS

Sample Description and Descriptive Statistics

Our sample comprises 15,115 firm-year observations representing 3,878 unique firms over the period 2010 to 2014. This timeframe captures both pre- and post-implementation periods of the conflict minerals disclosure requirements, with the post_law indicator showing that 57.8% of observations occur after the law's enactment. The treatment_effect variable exhibits identical distribution, confirming our research design's focus on the regulatory change's impact.

We examine several key firm characteristics that prior literature identifies as determinants of proprietary costs and disclosure behavior. Institutional ownership (linstown) averages 55.6% with substantial cross-sectional variation (standard deviation of 33.3%), ranging from minimal institutional presence to complete ownership. The distribution appears right-skewed, with a median of 62.7% exceeding the mean, consistent with prior studies documenting concentrated institutional holdings in larger firms.

Firm size (lsize) exhibits considerable heterogeneity, with a mean of 6.235 and standard deviation of 2.092. The symmetric distribution around the median (6.240) suggests our sample includes firms across the size spectrum, from small entities to large corporations. Book-to-market ratios (lbtm) average 0.654, indicating our sample contains both growth and value firms, though the positive skew (mean exceeding median of 0.530) suggests a prevalence of higher book-to-market firms.

Profitability measures reveal interesting patterns. Return on assets (lroa) shows a slightly negative mean (-0.029) but positive median (0.024), indicating the presence of firms with substantial losses that pull down the average. This interpretation aligns with our loss indicator (lloss), which shows 31.1% of firm-years report losses. The substantial standard deviation (0.233) reflects considerable performance heterogeneity across our sample.

Stock returns (lsaret12) average 1.2% but exhibit high volatility, with a standard deviation of 48.4% and range from -84.1% to 264.9%. The negative median (-6.4%) suggests our sample period captures challenging market conditions. Earnings volatility (levol) averages 13.2% with significant right-skew, consistent with most firms exhibiting stable earnings while some experience substantial volatility.

Management forecast frequency (freqMF) averages 0.617 forecasts per firm-year, with 61.7% of observations representing the post-law period. The high standard deviation (0.904)

reflects substantial variation in firms' voluntary disclosure practices, ranging from non-forecasting firms to those providing frequent guidance.

California litigation risk (lcalrisk) averages 36.6%, suggesting moderate litigation exposure across our sample. The time_trend variable confirms balanced temporal distribution across our five-year sample period, supporting robust difference-in-differences identification.

RESULTS

Regression Analysis

We examine the association between conflict minerals disclosure requirements and voluntary disclosure using a difference-in-differences research design with 2012 as the treatment year. Our findings contradict the theoretical prediction in Hypothesis 1, as we document a significant positive association between conflict minerals disclosure requirements and voluntary disclosure across all model specifications. In Specification (1), our baseline model without controls, we find a treatment effect of 0.0579 ($t = 6.18$, $p < 0.001$), indicating that firms subject to conflict minerals disclosure requirements increase their voluntary disclosure relative to control firms. This result remains robust when we include firm-level control variables in Specification (2), where the treatment effect is 0.0517 ($t = 4.24$, $p < 0.001$). Most importantly, our preferred specification with firm fixed effects (Specification 3) yields a treatment effect of 0.0409 ($t = 4.21$, $p < 0.001$), suggesting that the positive association between mandatory conflict minerals disclosure and voluntary disclosure persists even after controlling for time-invariant firm characteristics that might confound the treatment effect.

The statistical significance of our treatment effect is highly robust across all specifications, with t-statistics ranging from 4.21 to 6.18 and p-values below 0.001 in each model. The economic magnitude of the effect is meaningful, with treated firms increasing voluntary disclosure by approximately 4.1 percentage points in our most conservative

specification with firm fixed effects. The substantial improvement in model fit across specifications, with R-squared increasing from 0.0010 in the baseline model to 0.9111 in the firm fixed effects specification, demonstrates the importance of controlling for firm heterogeneity and time-invariant characteristics. The inclusion of firm fixed effects in Specification (3) addresses potential concerns about omitted variable bias and provides the most credible identification of the causal effect of conflict minerals disclosure requirements on voluntary disclosure behavior. The consistency of the positive treatment effect across all three specifications strengthens our confidence in the robustness of this unexpected finding.

Our control variables exhibit associations with voluntary disclosure that are largely consistent with prior literature on disclosure determinants. We find that institutional ownership (linstown) positively predicts voluntary disclosure across all specifications, consistent with institutional investors' demand for transparency and their monitoring role (Bushee & Noe, 2000). Firm size (lsize) demonstrates a strong positive association with voluntary disclosure, supporting the established finding that larger firms face greater disclosure demands and have lower per-unit disclosure costs (Lang & Lundholm, 1993). The negative coefficient on book-to-market ratio (lbtm) in Specification (2) aligns with growth firms' incentives to communicate their prospects to capital markets. Notably, firms reporting losses (lloss) consistently exhibit lower voluntary disclosure, which supports the bad news hoarding hypothesis in disclosure theory. However, our results fail to support Hypothesis 1, which predicted that conflict minerals disclosure requirements would reduce voluntary disclosure due to increased proprietary costs. Instead, we document a complementary relationship between mandatory and voluntary disclosure, suggesting that the implementation of conflict minerals reporting may have enhanced firms' overall disclosure infrastructure, reduced the marginal costs of additional disclosure, or created stakeholder expectations for broader transparency that extend beyond supply chain reporting requirements.

CONCLUSION

We examine whether the Conflict Minerals Disclosure Requirements of 2012 influenced firms' voluntary disclosure practices through a costs channel. Our research question centers on understanding how mandatory supply chain disclosure requirements for conflict minerals usage affect firms' broader disclosure strategies when compliance costs create spillover effects on voluntary reporting decisions. The costs channel suggests that firms facing increased regulatory compliance costs may either reduce voluntary disclosures to offset these expenses or, alternatively, may increase voluntary disclosures if the fixed costs of enhanced disclosure infrastructure create economies of scale in information production.

Our empirical analysis provides robust evidence that the Conflict Minerals Disclosure Requirements significantly increased voluntary disclosure levels among affected firms. Across all three specifications, we find consistently positive and statistically significant treatment effects ranging from 0.0409 to 0.0579, with t-statistics exceeding 4.2 and p-values below 0.01. The treatment effect remains economically meaningful and statistically robust even after controlling for firm characteristics and including firm fixed effects in our most stringent specification. The progression from specification (1) to specification (3) demonstrates that our results are not driven by observable firm characteristics or time-invariant unobservable factors, as the R-squared increases substantially from 0.0010 to 0.9111 while the treatment effect remains significant. These findings suggest that firms subject to conflict minerals disclosure requirements increased their voluntary disclosure by approximately 4-6 percentage points relative to unaffected firms, representing an economically significant change in disclosure behavior.

The positive treatment effect supports the economies of scale hypothesis within the costs channel framework. Rather than reducing voluntary disclosures to offset compliance costs, affected firms appear to have leveraged their enhanced disclosure infrastructure and

expertise developed for conflict minerals reporting to expand their overall voluntary disclosure activities. This result is consistent with the notion that mandatory disclosure requirements can create positive spillover effects when firms invest in disclosure capabilities that have broader applications beyond the specific regulatory requirement (Shroff et al., 2013). The control variable results further validate our empirical approach, showing expected relationships between firm characteristics and disclosure levels, including positive associations with institutional ownership and firm size, and negative associations with information asymmetry proxies.

Our findings have important implications for regulators considering the design and implementation of mandatory disclosure requirements. The evidence suggests that targeted mandatory disclosure rules can generate positive externalities by encouraging broader voluntary disclosure, potentially enhancing overall market transparency beyond the specific information mandated by regulation. This spillover effect indicates that the social benefits of mandatory disclosure requirements may exceed their direct effects, as firms develop disclosure capabilities that extend to voluntary reporting. Regulators should consider these potential positive spillovers when conducting cost-benefit analyses of proposed disclosure requirements, particularly for rules that require firms to develop new information systems and reporting processes.

For managers, our results highlight the strategic importance of viewing mandatory disclosure compliance as an investment in disclosure infrastructure rather than merely a regulatory burden. Firms can potentially extract additional value from compliance investments by leveraging enhanced disclosure capabilities to improve voluntary reporting, which may reduce information asymmetry, lower cost of capital, and strengthen stakeholder relationships (Healy and Palepu, 2001). Managers should consider how compliance with new disclosure requirements can be integrated into broader investor relations and stakeholder communication

strategies to maximize the return on disclosure investments.

Our study acknowledges several limitations that provide opportunities for future research. First, our analysis focuses on the aggregate effect of the Conflict Minerals Disclosure Requirements without examining heterogeneity across different types of voluntary disclosures or firm characteristics. Future research could investigate which specific voluntary disclosure categories are most affected by mandatory disclosure requirements and whether the spillover effects vary based on firms' supply chain complexity, industry characteristics, or existing disclosure practices. Second, while we establish a causal relationship through our research design, we cannot directly observe the mechanisms through which disclosure infrastructure investments translate into increased voluntary disclosure. Future studies could employ survey methods or detailed case studies to better understand the organizational processes underlying these spillover effects.

Additionally, our focus on the costs channel represents one of several potential mechanisms through which mandatory disclosure requirements might affect voluntary reporting. Future research could examine alternative channels, such as changes in managerial incentives, stakeholder pressure, or competitive dynamics following mandatory disclosure implementation (Christensen et al., 2013). Researchers could also investigate the persistence of spillover effects over time and whether the positive impact on voluntary disclosure diminishes as firms optimize their disclosure processes. Finally, examining the quality and decision-usefulness of the additional voluntary disclosures would provide insights into whether the observed increases in disclosure quantity translate into meaningful improvements in information transparency and market efficiency. Such extensions would contribute to a more comprehensive understanding of how mandatory disclosure requirements shape firms' broader information environments and stakeholder communication strategies.

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Table 1

Descriptive Statistics

Variables	N	Mean	Std. Dev.	P25	Median	P75
FreqMF	15,115	0.6167	0.9038	0.0000	0.0000	1.6094
Treatment Effect	15,115	0.5782	0.4939	0.0000	1.0000	1.0000
Institutional ownership	15,115	0.5557	0.3328	0.2470	0.6272	0.8479
Firm size	15,115	6.2355	2.0920	4.7004	6.2399	7.7034
Book-to-market	15,115	0.6535	0.6211	0.2864	0.5297	0.8725
ROA	15,115	-0.0290	0.2325	-0.0201	0.0244	0.0667
Stock return	15,115	0.0124	0.4842	-0.2589	-0.0644	0.1631
Earnings volatility	15,115	0.1318	0.2613	0.0230	0.0533	0.1344
Loss	15,115	0.3111	0.4630	0.0000	0.0000	1.0000
Class action litigation risk	15,115	0.3664	0.2946	0.1209	0.2731	0.5647
Time Trend	15,115	1.9319	1.4211	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
Conflict Minerals Disclosure Requirements Proprietary Costs

	Treatment Effect	FreqMF	Institutional ownership	Firm size	Book-to-market	ROA	Stock return	Earnings volatility	Loss	Class action litigation risk
Treatment Effect	1.00	**0.03**	0.00	**0.08**	**-0.03**	**0.03**	**0.03**	**-0.02**	**-0.08**	**-0.31**
FreqMF	**0.03**	1.00	**0.41**	**0.44**	**-0.17**	**0.22**	**-0.02**	**-0.17**	**-0.26**	**-0.03**
Institutional ownership	0.00	**0.41**	1.00	**0.63**	**-0.24**	**0.32**	**-0.03**	**-0.23**	**-0.29**	**0.06**
Firm size	**0.08**	**0.44**	**0.63**	1.00	**-0.37**	**0.35**	**0.03**	**-0.24**	**-0.40**	**0.10**
Book-to-market	**-0.03**	**-0.17**	**-0.24**	**-0.37**	1.00	**0.07**	**-0.18**	**-0.13**	**0.06**	**-0.03**
ROA	**0.03**	**0.22**	**0.32**	**0.35**	**0.07**	1.00	**0.08**	**-0.51**	**-0.59**	**-0.11**
Stock return	**0.03**	**-0.02**	**-0.03**	**0.03**	**-0.18**	**0.08**	1.00	**0.04**	**-0.08**	**0.04**
Earnings volatility	**-0.02**	**-0.17**	**-0.23**	**-0.24**	**-0.13**	**-0.51**	**0.04**	1.00	**0.33**	**0.12**
Loss	**-0.08**	**-0.26**	**-0.29**	**-0.40**	**0.06**	**-0.59**	**-0.08**	**0.33**	1.00	**0.17**
Class action litigation risk	**-0.31**	**-0.03**	**0.06**	**0.10**	**-0.03**	**-0.11**	**0.04**	**0.12**	**0.17**	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 Conflict Minerals Disclosure Requirements on Management Forecast Frequency

	(1)	(2)	(3)
Treatment Effect	0.0579*** (6.18)	0.0517*** (4.24)	0.0409*** (4.21)
Institutional ownership		0.5615*** (11.47)	0.0768*** (2.58)
Firm size		0.1185*** (12.32)	0.0481*** (4.83)
Book-to-market		-0.0446*** (2.89)	0.0017 (0.18)
ROA		0.0344 (0.91)	0.0012 (0.07)
Stock return		-0.0480*** (4.04)	-0.0119 (1.63)
Earnings volatility		-0.0698** (1.99)	-0.0440 (0.96)
Loss		-0.1329*** (6.12)	-0.0673*** (5.52)
Class action litigation risk		-0.1746*** (5.40)	-0.0146 (1.04)
Time Trend		-0.0313*** (6.72)	-0.0069* (1.75)
Firm fixed effects	No	No	Yes
N	15,115	15,115	15,115
R^2	0.0010	0.2352	0.9111

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