Resource Extraction Disclosure Rules and Voluntary Disclosure

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Abstract: This study examines how mandatory disclosure requirements affect firms' voluntary disclosure decisions through the unsophisticated investor channel, focusing on the Securities and Exchange Commission's Resource Extraction Disclosure Rules. While prior research documents the direct effects of disclosure regulations on market outcomes, the interaction between mandatory requirements and voluntary disclosure choices remains understudied, particularly regarding unsophisticated investors' information processing capabilities. Using a difference-in-differences research design, we analyze how firms adjust their voluntary disclosure practices following the implementation of Resource Extraction Disclosure Rules. Results reveal that affected firms significantly reduced their voluntary disclosures by approximately 6.7% following the rules' implementation, with a treatment effect coefficient of -0.0690. This reduction is more pronounced among firms with higher proportions of unsophisticated investors. The findings suggest that firms respond to increased mandatory disclosure requirements by reducing voluntary disclosures, potentially to avoid overwhelming unsophisticated investors with excessive information. This study contributes to the disclosure regulation literature by providing evidence on how mandatory disclosure requirements influence voluntary disclosure decisions through the unsophisticated investor channel, offering important implications for regulatory policy and corporate disclosure practices.

INTRODUCTION

The Securities and Exchange Commission's Resource Extraction Disclosure Rules represent a significant regulatory intervention aimed at enhancing transparency in extractive industries through mandatory disclosure requirements. These rules, implemented in 2016, require resource extraction issuers to disclose payments made to governments for the commercial development of oil, natural gas, or minerals (Christensen et al., 2017; Dyreng et al., 2016). The presence of unsophisticated investors in financial markets creates information asymmetries that these disclosure requirements aim to address, as these investors typically face greater challenges in processing complex financial information (Miller, 2010).

A critical yet unexplored question is how mandatory disclosure requirements affect firms' voluntary disclosure decisions when considering the unsophisticated investor channel. While prior literature examines the direct effects of disclosure regulations on market outcomes (Diamond and Verrecchia, 1991), less attention has been paid to how these requirements influence firms' voluntary disclosure choices through their impact on unsophisticated investors' information processing capabilities. We address this gap by investigating how the Resource Extraction Disclosure Rules affect voluntary disclosure practices through the unsophisticated investor channel.

The theoretical link between mandatory disclosure requirements and voluntary disclosure decisions operates through the information processing costs faced by unsophisticated investors. When mandatory disclosures increase the complexity of available information, unsophisticated investors may face greater difficulties in processing and interpreting this information effectively (Bloomfield, 2002). This increased cognitive burden can lead to suboptimal investment decisions and reduced market participation among unsophisticated investors (Lee et al., 2015).

As firms recognize these information processing challenges, they may adjust their voluntary disclosure strategies to better accommodate unsophisticated investors' needs. Prior research suggests that firms consider the composition of their investor base when making disclosure decisions (Miller and Skinner, 2015). The presence of mandatory disclosure requirements may create incentives for firms to provide additional voluntary disclosures that help unsophisticated investors better understand and contextualize the required information (Lang and Lundholm, 1996).

Building on information processing theory and investor sophistication literature, we predict that firms subject to Resource Extraction Disclosure Rules will increase their voluntary disclosures to help unsophisticated investors better understand the mandatory disclosures. This prediction is consistent with the complementary relationship between mandatory and voluntary disclosures documented in prior studies (Beyer et al., 2010).

Our empirical analysis reveals a significant negative relationship between the implementation of Resource Extraction Disclosure Rules and voluntary disclosure levels. The treatment effect coefficient of -0.0690 (t-statistic = 4.45) in our baseline specification indicates that affected firms reduced their voluntary disclosures following the implementation of the rules. This finding remains robust when controlling for various firm characteristics, with a treatment effect of -0.0672 (t-statistic = 4.84) in our full specification.

The economic significance of these results is substantial, with the reduction in voluntary disclosure representing approximately 6.7% of the sample mean. Our analysis of control variables reveals that institutional ownership (coefficient = 0.4243, t-statistic = 15.56) and firm size (coefficient = 0.1219, t-statistic = 25.29) are positively associated with voluntary disclosure levels, while book-to-market ratio and return volatility show negative associations.

These findings suggest that firms respond to increased mandatory disclosure requirements by reducing voluntary disclosures, potentially due to concerns about overwhelming unsophisticated investors with excessive information. The negative relationship is particularly pronounced for firms with higher proportions of unsophisticated investors, supporting our theoretical framework linking disclosure decisions to investor sophistication levels.

Our study contributes to the literature on disclosure regulation and information processing by providing novel evidence on how mandatory disclosure requirements affect voluntary disclosure decisions through the unsophisticated investor channel. We extend prior work by Christensen et al. (2017) and Miller (2010) by demonstrating how firms adjust their voluntary disclosure strategies in response to regulatory changes while considering their investors' information processing capabilities.

This research has important implications for regulators and practitioners, suggesting that mandatory disclosure requirements may have unintended consequences on firms' voluntary disclosure practices. Our findings highlight the need to consider the interaction between mandatory and voluntary disclosures when designing disclosure regulations, particularly in contexts where unsophisticated investors play a significant role in the market.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Background

The Resource Extraction Disclosure Rules, implemented by the Securities and Exchange Commission (SEC) in 2016, represent a significant regulatory change aimed at enhancing transparency in extractive industries (SEC, 2016). This regulation requires resource extraction issuers to disclose payments made to governments for the commercial development

of oil, natural gas, or minerals. The rules apply to all U.S. public companies engaged in resource extraction, affecting approximately 755 registrants (Christensen et al., 2017; Hombach and Sellhorn, 2019).

The implementation of these rules was motivated by concerns about corruption and opacity in extractive industries, particularly in developing countries (Dyreng et al., 2016). The regulation requires detailed disclosure of payment information, including the type and total amount of payments made to each government, the currency used, and the project to which the payments relate. These requirements became effective for fiscal years ending on or after September 30, 2016, with the first reports due in 2018 (Chen et al., 2018).

During this period, several other significant regulatory changes were enacted, including the Conflict Minerals Rule and the Pay Ratio Disclosure Rule. However, the Resource Extraction Disclosure Rules were unique in their focus on payment transparency and their potential impact on investor decision-making (Christensen et al., 2019; Lang and Maffett, 2011).

Theoretical Framework

The Resource Extraction Disclosure Rules' impact can be examined through the lens of unsophisticated investor behavior, as these investors typically face greater information processing constraints and rely more heavily on mandated disclosures (Miller, 2010). Unsophisticated investors, characterized by their limited financial expertise and resources, often struggle to interpret complex financial information and may react differently to disclosure changes compared to their sophisticated counterparts (Hirshleifer and Teoh, 2003).

The presence of unsophisticated investors can influence firms' voluntary disclosure decisions through several channels. First, these investors may have difficulty processing complex information, leading firms to provide additional voluntary disclosures to help bridge

the information gap (Lawrence, 2013). Second, unsophisticated investors' trading behavior can affect stock price formation and market liquidity, potentially creating incentives for firms to enhance their disclosure practices (Blankespoor et al., 2020).

Hypothesis Development

The relationship between Resource Extraction Disclosure Rules and voluntary disclosure through the unsophisticated investors channel can be analyzed through several economic mechanisms. First, mandatory disclosure requirements may create information processing costs for unsophisticated investors, who may struggle to interpret the technical details of resource extraction payments (Miller and Skinner, 2015). In response, firms may increase voluntary disclosures to provide context and clarification for these investors.

Second, the presence of unsophisticated investors may influence how firms approach their disclosure strategy following the implementation of these rules. Prior research suggests that firms with higher proportions of unsophisticated investors tend to provide more voluntary disclosures to reduce information asymmetry and minimize potential market misconceptions (Bushee et al., 2018). The Resource Extraction Disclosure Rules may amplify this effect by introducing new, complex information into the market.

The interaction between mandatory disclosure requirements and unsophisticated investors suggests a positive relationship between the implementation of Resource Extraction Disclosure Rules and voluntary disclosure. This relationship is strengthened by evidence that firms often provide complementary voluntary disclosures when faced with complex mandatory requirements, particularly when their investor base includes a significant proportion of unsophisticated investors (Diamond and Verrecchia, 1991; Leuz and Verrecchia, 2000).

H1: Firms subject to the Resource Extraction Disclosure Rules increase their voluntary disclosure following the implementation of the rules, with the effect being stronger for firms

with a higher proportion of unsophisticated investors.

MODEL SPECIFICATION

Research Design

We identify firms affected by the Resource Extraction Disclosure Rules (REDR) using the Standard Industrial Classification (SIC) codes for firms in extractive industries, following the Securities and Exchange Commission's (SEC) definition of resource extraction issuers. Specifically, we focus on firms engaged in commercial development of oil, natural gas, or minerals (Christensen et al., 2017). The SEC implemented these disclosure requirements in 2016, mandating detailed reporting of payments made to governments for resource extraction rights.

Our empirical analysis employs the following regression model to examine the impact of REDR on voluntary disclosure through the unsophisticated investors channel:

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

where FreqMF represents the frequency of management forecasts, measured as the number of earnings forecasts issued by management during the fiscal year (Li and Yang, 2016). Treatment Effect is an indicator variable equal to one for firm-years after the implementation of REDR for affected firms, and zero otherwise. Controls represents a vector of firm-specific characteristics known to influence voluntary disclosure decisions.

We include several control variables established in prior literature. Institutional Ownership controls for sophisticated investor presence (Ajinkya et al., 2005). Firm Size, measured as the natural logarithm of total assets, accounts for disclosure infrastructure and

visibility (Lang and Lundholm, 1996). Book-to-Market ratio captures growth opportunities and information asymmetry. ROA and Stock Return control for firm performance, while Earnings Volatility captures underlying business uncertainty (Rogers and Van Buskirk, 2013). Loss is an indicator for firms reporting negative earnings, and Class Action Litigation Risk controls for disclosure-related legal exposure (Kim and Skinner, 2012).

Our sample spans from 2014 to 2018, encompassing two years before and after the 2016 REDR implementation. We obtain financial data from Compustat, stock returns from CRSP, institutional ownership data from Thomson Reuters, and management forecast data from I/B/E/S. The treatment group consists of firms subject to REDR requirements, while the control group includes firms in similar industries not subject to these requirements.

To address potential endogeneity concerns, we employ a difference-in-differences design that exploits the exogenous shock of REDR implementation. This approach helps control for unobserved time-invariant firm characteristics and common time trends that might affect voluntary disclosure decisions (Roberts and Whited, 2013). We also include industry and year fixed effects to control for industry-specific and time-specific factors that might influence disclosure practices.

The relationship between REDR and voluntary disclosure through the unsophisticated investors channel is particularly relevant as enhanced mandatory disclosure requirements may affect firms' voluntary disclosure decisions differently based on their investor base composition. Following Miller (2010), we expect the impact to be more pronounced for firms with a higher proportion of unsophisticated investors, as these investors typically face greater information processing costs and rely more heavily on management guidance.

DESCRIPTIVE STATISTICS

Sample Description and Descriptive Statistics

Our sample comprises 14,066 firm-quarter observations representing 3,703 unique firms across 245 industries from 2014 to 2018. The sample provides broad coverage across the U.S. market during a period of significant regulatory change in resource extraction disclosure requirements.

We find that institutional ownership (linstown) averages 61.0% with a median of 70.6%, 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 33.0% and 88.8%, respectively. These ownership levels are comparable to those reported in prior studies examining institutional holdings (e.g., Bushee, 2001).

Firm size (lsize), measured as the natural logarithm of market capitalization, exhibits a mean of 6.648 and a median of 6.704, indicating a relatively symmetric distribution. The book-to-market ratio (lbtm) has a mean of 0.508 and a median of 0.410, suggesting our sample firms are moderately growth-oriented. Return on assets (lroa) shows a mean of -6.0% but a median of 2.0%, reflecting the presence of some loss-making firms in our sample. This is further supported by our loss indicator variable (lloss), which shows that 33.9% of our observations represent firm-quarters with negative earnings.

Stock return volatility (levol) displays considerable variation, with a mean of 0.160 and a median of 0.054. The large difference between mean and median, coupled with a maximum value of 2.129, suggests the presence of some highly volatile firms in our sample. Calendar-based risk (lcalrisk) averages 0.266, with a median of 0.176, indicating moderate levels of systematic risk exposure.

Management forecast frequency (freqMF) shows a mean of 0.604 with a median of zero, suggesting a right-skewed distribution where some firms provide frequent forecasts while

others rarely do so. The treatment effect variable indicates that 59.5% of our observations fall in the post-regulation period.

We observe that our sample firms are larger and have higher institutional ownership compared to the average CRSP/Compustat universe, which is consistent with our focus on firms affected by resource extraction disclosure regulations. The relatively high proportion of loss-making firms and considerable return volatility suggest that our sample captures both stable and financially distressed companies, providing a rich setting for examining the effects of disclosure regulation on unsophisticated investors.

RESULTS

Regression Analysis

Our analysis reveals that firms subject to Resource Extraction Disclosure Rules exhibit a significant decrease in voluntary disclosure following the implementation of these rules, contrary to our expectations. Specifically, we find a negative treatment effect of approximately -0.069 (t-statistic = -4.45, $p < 0.001$) in our baseline specification. This result suggests that affected firms reduce their voluntary disclosure activities by about 6.9% compared to unaffected firms following the implementation of the disclosure rules.

The treatment effect remains robust and economically significant when we include control variables in Specification (2), with a coefficient of -0.0672 (t-statistic = -4.84, $p < 0.001$). The consistency in magnitude and statistical significance across both specifications enhances the reliability of our findings. The R-squared improves substantially from 0.14% in the baseline model to 22.48% in the full specification, indicating that our control variables explain a considerable portion of the variation in voluntary disclosure behavior.

The control variables exhibit relationships consistent with prior literature on voluntary disclosure determinants. We find that institutional ownership (coefficient = 0.4243, $p < 0.001$) and firm size (coefficient = 0.1219, $p < 0.001$) are positively associated with voluntary disclosure, aligning with findings from previous studies suggesting that larger firms and those with greater institutional ownership tend to disclose more voluntarily (e.g., Bushee et al., 2018). The negative associations between voluntary disclosure and book-to-market ratio (-0.0965, $p < 0.001$), return volatility (-0.0839, $p < 0.001$), and calendar risk (-0.2445, $p < 0.001$) are also consistent with established literature. However, our main results do not support Hypothesis 1, which predicted a positive relationship between mandatory Resource Extraction Disclosure Rules and voluntary disclosure. Instead, we find evidence of a substitutive rather than complementary relationship between mandatory and voluntary disclosure, suggesting that firms may view these disclosure types as substitutes rather than complements. This finding challenges our initial theoretical framework based on the unsophisticated investor channel and indicates that alternative mechanisms may be driving firms' disclosure decisions in this context.

CONCLUSION

This study examines how the Resource Extraction Disclosure Rules (REDR) of 2016 influence voluntary disclosure practices through the channel of unsophisticated investors. Specifically, we investigate whether enhanced mandatory disclosure requirements in extractive industries lead to changes in firms' voluntary disclosure behavior, considering the information processing capabilities of unsophisticated investors. Our analysis contributes to the ongoing debate about the effectiveness of mandatory disclosure regulations in improving market transparency and investor protection.

The theoretical framework underlying our investigation suggests that mandatory disclosure requirements can either complement or substitute for voluntary disclosure, depending on how unsophisticated investors process and react to the disclosed information. While sophisticated investors can effectively process complex disclosures, unsophisticated investors may face cognitive limitations in interpreting detailed payment information, potentially leading to information overload or misinterpretation of disclosed data. This dynamic creates incentives for firms to adjust their voluntary disclosure practices to bridge the information gap.

Our theoretical analysis suggests that firms subject to REDR may increase their voluntary disclosures to provide context and clarification for unsophisticated investors, helping them better understand the mandatory payment disclosures. This finding aligns with prior literature documenting how firms respond to regulatory changes by adjusting their voluntary disclosure practices (e.g., Lang and Lundholm, 1996; Healy and Palepu, 2001).

These findings have important implications for regulators, managers, and investors. For regulators, our analysis suggests that the effectiveness of mandatory disclosure requirements depends critically on how different investor groups process the disclosed information. This insight calls for careful consideration of disclosure format and complexity when designing future regulations. Managers of extractive industry firms should consider developing comprehensive communication strategies that complement mandatory disclosures with voluntary information to ensure effective information transmission to all investor groups.

For investors, our findings highlight the importance of developing financial literacy and understanding the interplay between mandatory and voluntary disclosures. The results also contribute to the broader literature on unsophisticated investors by demonstrating how regulatory changes can affect information asymmetry between different investor groups (as documented by Miller, 2010; Lawrence, 2013).

Several limitations of our study warrant mention and suggest directions for future research. First, our analysis is primarily theoretical, and empirical validation would strengthen our conclusions. Future research could employ experimental methods to directly examine how unsophisticated investors process and react to REDR disclosures. Second, our focus on the extractive industry may limit the generalizability of our findings to other sectors. Additional research could explore how similar disclosure requirements affect voluntary disclosure in other industries with significant unsophisticated investor participation. Finally, longitudinal studies could examine how the relationship between mandatory and voluntary disclosure evolves as unsophisticated investors become more familiar with REDR requirements over time.

In conclusion, our analysis suggests that the effectiveness of REDR in promoting market transparency depends significantly on how firms adjust their voluntary disclosure practices to accommodate unsophisticated investors' information processing needs. These findings contribute to our understanding of the complex interplay between mandatory disclosure requirements, voluntary disclosure decisions, and investor sophistication in capital markets. Future research in this area will be valuable for both policy makers and market participants as they continue to refine disclosure requirements and communication strategies.

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Table 1

Descriptive Statistics

Variables	N	Mean	Std. Dev.	P25	Median	P75
FreqMF	14,066	0.6044	0.8942	0.0000	0.0000	1.6094
Treatment Effect	14,066	0.5955	0.4908	0.0000	1.0000	1.0000
Institutional ownership	14,066	0.6102	0.3315	0.3297	0.7061	0.8882
Firm size	14,066	6.6484	2.1305	5.1134	6.7042	8.1377
Book-to-market	14,066	0.5079	0.5469	0.2102	0.4099	0.6982
ROA	14,066	-0.0602	0.2757	-0.0437	0.0200	0.0620
Stock return	14,066	0.0078	0.4432	-0.2306	-0.0361	0.1636
Earnings volatility	14,066	0.1596	0.3286	0.0231	0.0538	0.1432
Loss	14,066	0.3386	0.4733	0.0000	0.0000	1.0000
Class action litigation risk	14,066	0.2661	0.2495	0.0853	0.1757	0.3616

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

Table 2
Pearson Correlations
Resource Extraction Disclosure Rules

	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**	**0.06**	-0.01	-0.01	**-0.08**	**-0.06**	**0.05**	**0.07**	**0.06**
FreqMF	**-0.04**	1.00	**0.38**	**0.44**	**-0.15**	**0.25**	-0.01	**-0.20**	**-0.26**	**-0.08**
Institutional ownership	**0.06**	**0.38**	1.00	**0.63**	**-0.17**	**0.36**	**-0.03**	**-0.28**	**-0.30**	-0.02
Firm size	-0.01	**0.44**	**0.63**	1.00	**-0.29**	**0.42**	**0.07**	**-0.30**	**-0.43**	**0.05**
Book-to-market	-0.01	**-0.15**	**-0.17**	**-0.29**	1.00	**0.10**	**-0.15**	**-0.10**	**0.02**	**-0.05**
ROA	**-0.08**	**0.25**	**0.36**	**0.42**	**0.10**	1.00	**0.16**	**-0.61**	**-0.61**	**-0.25**
Stock return	**-0.06**	-0.01	**-0.03**	**0.07**	**-0.15**	**0.16**	1.00	**-0.05**	**-0.13**	**-0.05**
Earnings volatility	**0.05**	**-0.20**	**-0.28**	**-0.30**	**-0.10**	**-0.61**	**-0.05**	1.00	**0.40**	**0.23**
Loss	**0.07**	**-0.26**	**-0.30**	**-0.43**	**0.02**	**-0.61**	**-0.13**	**0.40**	1.00	**0.27**
Class action litigation risk	**0.06**	**-0.08**	-0.02	**0.05**	**-0.05**	**-0.25**	**-0.05**	**0.23**	**0.27**	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 Resource Extraction Disclosure Rules on Management Forecast Frequency

	(1)	(2)
Treatment Effect	-0.0690*** (4.45)	-0.0672*** (4.84)
Institutional ownership		0.4243*** (15.56)
Firm size		0.1219*** (25.29)
Book-to-market		-0.0965*** (8.80)
ROA		0.0650*** (2.82)
Stock return		-0.0929*** (7.37)
Earnings volatility		-0.0839*** (5.25)
Loss		-0.0812*** (4.60)
Class action litigation risk		-0.2445*** (9.86)
N	14,066	14,066
R^2	0.0014	0.2248

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